Date: 16 August 1999
To: Bechtel Hanford, Inc. (technical representative)
From: TechLaw, Inc.
Project: 100-BC Areas - Full Protocol - Waste Site Group 3 Overburden
Subject: Radiochemistry - Data Package No. H0409-TNU (SDG No. H0409)

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INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. H0409-TNU which was prepared by Thermo NUtech (TNU). A list of samples validated along with the analyses reported and the requested analytes is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analysis
B0VFL1	05/18/99	Soil	C	See note 1
B0VFL2	05/18/99	Soil	C	See note 1
B0VFL3	05/18/99	Soil	C	See note 1
B0VFL4	05/18/99	Soil	C	See note 1
B0VFL5	05/18/99	Soil	C	See note 1
B0VFL6	05/18/99	Soil	C	See note 1
B0VFM3	05/18/99	Soil	C	See note 1
B0VFM4	05/18/99	Soil	C	See note 1
B0VFM5	05/18/99	Soil	C	See note 1
B0VFM6	05/18/99	Soil	C	See note 1

1 - Gamma spectroscopy; alpha spectroscopy (isotopic uranium, isotopic plutonium and americium-241); total strontium; nickel-63.

Data validation was conducted in accordance with the BHI validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL May 1998). Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- **Holding Times**

  Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for radiochemical analysis is 6 months with liquid scintillation requiring analysis within 7 days of distillation.

  Due to the isotopic plutonium analysis being conducted 5 days after the other samples in the SDG, all isotopic plutonium results in sample BOVFL4 were qualified as estimates and flagged "J".

  All holding times were acceptable.

- **Blanks**

  Laboratory Blanks

  Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination. If blank analysis results indicate the presence of an analyte above the MDA, the following qualifiers are applied: All positive sample results less than five times the highest blank concentration are qualified as estimates and flagged "J"; sample results below the MDA are qualified as undetected and flagged "U"; sample results above the MDA and greater than five times the highest blank concentration are not qualified.

  Due to the blank analysis being conducted 3 days later than the SDG, all isotopic uranium results were qualified as estimates and flagged "J".

  Due to blank analysis MDAs up to 10,000 times the TDL, all gamma spectroscopy results in sample BOVFL1 were qualified as estimates and flagged "J".

  All other blank results were acceptable although the MDA exceeded the TDL for U-238 (GEA).

Equipment Blanks

One equipment blank (B0VFM6) was submitted for analysis. Uranium-233/234, uranium-238 (alpha spec), potassium-40, radium-226, radium-228, thorium-228 and thorium-232 were detected in the equipment blank. Under the BHI statement of work, no qualification is required.

- **Accuracy**

Accuracy is evaluated by analyzing distilled water or field samples spiked with known amounts of radionuclides. The sample activity as determined by analysis is compared to the known activity to assess accuracy. The acceptable laboratory control sample and matrix spike recovery range is either 70-130% or ±3 sigma. In addition, samples may be spiked with a radiochemical tracer to assist in isolating the radioisotope of interest with the yield of the tracer being used in calculating sample activity. The acceptable range for tracer recovery is 20% to 105%. Spike sample results outside the above ranges result in associated sample results being qualified as estimates, rejected, or not qualified, depending on the activity of the individual sample.

All accuracy results were acceptable.

- **Precision**

Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. Precision may also be assessed using unspiked duplicate sample analyses. If both sample and replicate activities are greater than five times the CRDL and the RPD is less than 30 percent, the results are acceptable. If either activities are less then five times the CRDL, a control limit of less than or equal to two times the CRDL is used for soil samples and less than or equal to the CRDL for water samples. If either the original or replicate value is below the CRDL, the applicable control limits are less than or equal to the CRDL for water samples and less than or equal to two times the CRDL for soil samples. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

The isotopic uranium duplicate analysis was conducted 3 days later than the SDG, however, no qualification is required under the BHI statement of work.

Due to the lack of an associated duplicate analysis, all gamma spectroscopy results in sample B0VFL1 were qualified as estimates and flagged "J".

All duplicate results were acceptable.

Field Duplicate Samples

One pair of field duplicate samples (samples B0VFM4/B0VFM5) were submitted to TNU for analysis. The duplicate sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. All field duplicate results were acceptable.

- **Detection Levels**

Reported analytical detection levels are compared against the 100 Area Remedial Action Sampling and Analysis Plan target detection limits (TDLs) or the contract specified MDA if no TDL was specified, to ensure that laboratory detection levels meet the required criteria. The reported detection limit exceeded the TDL for uranium-238 (GEA) in all samples; europium-155 in samples B0VFL1, B0VFL2, B0VFL3, B0VFL4, B0VFL6, B0VFM3 and B0VFM6; europium-152, uranium-235 (aspec) and uranium-235 (GEA) in sample BOVFL1; uranium-235 (GEA) in sample BOVFL2; and uranium-235 (aspec) in B0VFL3. Under the BHI statement of work, no qualification is required. All other reported laboratory MDAs were at or below the analyte-specific TDL or contract specified MDA.

- **Completeness**

Data Package No. H0409 (SDG No. H0409) was submitted for validation and verified for completeness. The completion rate was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Due to blank analysis MDAs up to 10,000 times the TDL, all gamma spectroscopy results in sample B0VFL1 were qualified as estimates and flagged "J". Due to the lack of an associated duplicate analysis, all gamma spectroscopy results in sample B0VFL1 were qualified as estimates and flagged "J". Due to the isotopic plutonium analysis being conducted 5 days after the other samples in the SDG, all isotopic plutonium results in sample BOVFL4 were qualified as estimates and flagged "J". Due to the blank analysis being conducted 3 days later than the SDG, all isotopic uranium results were qualified as estimates and flagged "J". Data flagged "J" is an estimate, but under the BHI validation SOW, the data may

be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

The reported detection limit exceeded the TDL for uranium-238 (GEA) in all samples; europium-155 in samples B0VFL1, B0VFL2, B0VFL3, B0VFL4, B0VFL6, B0VFM3 and B0VFM6; europium-152, uranium-235 (aspec) and uranium-235 (GEA) in sample BOVFL1; uranium-235 (GEA) in sample BOVFL2; and uranium-235 (aspec) in B0VFL3. Under the BHI statement of work, no qualification is required.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-96-22, Rev. 1, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, May 1998.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the BHI statement of work are as follows:

U - Indicates the compound or analyte was analyzed for and not detected above the minimum detectable activity (MDA) in the sample. The value reported is the sample result corrected for sample dilution and moisture content by the laboratory. The data is usable for decision making purposes.

UJ - Indicates the compound or analyte was analyzed for and not detected at concentrations above the minimum detectable activity (MDA) in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate, but is usable for decision making purposes.

J - Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: H0409	REVIEWER: TLI	DATE: 8/16/99	PAGE_1_OF_1_
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Gamma Spectroscopy	J	B0VFL1	Blank analysis MDAs greatly exceeded TDLs
Isotopic Plutonium	J	B0VFL4	Sample not run with SDG
Isotopic Uranium	J	All	Blank analysis not conducted with SDG
Gamma Spectroscopy	J	B0VFL1	No duplicate analysis

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

RADIOCHEMISTRY ANALYSIS, SOIL MATRIX, (PCi/G)

Project: BECHTEL-HANFORD																							
Laboratory: TNU																							
Case	SDG: H0409																						
Sample Number		B0VFL1		B0VFL2		B0VFL3		B0VFL4		B0VFL5		B0VFL6		B0VFM3		B0VFM4		B0VFM5		B0VFM6			
Location		Overburden		Overburden		Overburden		Overburden		Overburden		Overburden		Overburden		Overburden		Overburden		Overburden			
Remarks		A1		A2		A3		A4		B5		B6		B7		B8		Duplicate		Equip. Blank			
Sample Date		05/18/99		05/18/99		05/18/99		05/18/99		05/18/99		05/18/99		05/18/99		05/18/99		05/18/99		05/18/99			
Radiochemistry	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q		
Uranium-234	0.1	0.652	J	0.529	J	0.446	J	0.531	J	0.549	J	0.504	J	0.519	J	0.430	J	0.432	J	0.237	J		
Uranium-235	0.1	0.093	UJ	0.041	UJ	0.016	UJ	0.034	UJ	0.020	UJ	0.020	UJ	0.086	UJ	0.073	UJ	0.040	UJ	0.021	UJ		
Uranium-238	0.1	0.371	J	0.504	J	0.563	J	0.522	J	0.682	J	0.588	J	0.550	J	0.490	J	0.515	J	0.229	J		
Plutonium-238	0.1	-0.014	U	0.008	U	0.006	U	0.018	UJ	0.008	U	0.008	U	0	U	-0.007	U	0.013	U	0	U		
Plutonium-239/40	0.1	0.035	U	0.016	U	0.006	U	0.028	UJ	0.039	U	0.008	U	-0.007	U	-0.007	U	0	U	-0.014	U		
Nickel-63	30	-0.027	U	0.772	U	0.418	U	-0.259	U	1.42	U	0.680	U	-1.06	U	0.987	U	-1.14	U	-0.379	U		
Americium-241	0.1	-0.004	U	-0.018	U	0	U	0	U	0	U	0.003	U	0.008	U	0	U	0.003	U	-0.003	U		
Strontium (total)	1	0.146	U	0.125	U	-0.217	U	0.131	U	0.166		0.023	U	-0.033	U	0.001	U	0.028	U	-0.007	U		
Potassium-40		12.1	J	25.6		11.4		11.6		11.4		11.6		12.2		11.8		11.3		16.8			
Cobalt 60	0.05	U	UJ	U	U	U	U	U	U	U	U	U	U	0.051		U	U	U	U	U	U		
Cesium 137	0.05	17.2	J	6.17		1.14		2.36		1.14		0.394		1.63		0.029		0.023		U	U		
Europium 152	0.1	U	UJ	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U		
Europium 154	0.1	U	UJ	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U		
Europium 155	0.05	U	UJ	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U		
Radium-226		0.420	J	0.976		0.440		0.437		0.424		0.487		0.463		0.452		0.476		0.198			
Radium-228		0.764	J	1.37		0.631		0.700		0.589		0.607		0.740		0.674		0.653		0.232			
Thorium-228		0.671	J	1.33		0.576		0.576		0.599		0.590		0.654		0.609		0.643		0.224			
Thorium-232		0.764	J	1.37		0.631		0.700		0.589		0.607		0.740		0.674		0.653		0.232			
Americium-241 (GEA)	0.1	U	UJ	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U		
Uranium-238 (GEA)	0.1	U	UJ	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U		
Uranium-235 (GEA)	0.1	U	UJ	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U		

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SAMPLE DELIVERY GROUP H0409

N905124-01 B0VFL1

DATA SHEET

SDG	7128	Client/Case no	Hanford SDG-H0409
Contact	L.A. Johnson	Case no	TRB-SBB-207925
Lab sample id	N905124-01	Client sample id	B0VFL1
Dept sample id	7128-001	Location/Matrix	100 B/C Overburden "A" SOLID
Received	05/21/99	Collected	05/18/99 08:50
% solids	96.0	Custody/SAF No	B99-002-105 B99-002

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Uranium 233/234	U-233/234	0.652	0.19	0.12	1.0	~~U~~ J	U
Uranium 235	15117-96-1	0.093	0.063	0.12	1.0	U J	U
Uranium 238	U-238	0.371	0.16	0.098	1.0	~~U~~ J	U
Plutonium 238	13981-16-3	-0.014	0.014	0.068	1.0	U	PU
Plutonium 239/240	PU-239/240	0.035	0.043	0.054	1.0	U	PU
Nickel 63	13981-37-8	-0.027	1.8	3.1	30	U	NI_L
Americium 241	14596-10-2	-0.004	0.017	0.040	1.0	U	AM
Total Strontium	SR-RAD	0.146	0.14	0.18	1.0	U	SR
Potassium 40	13966-00-2	12.1	0.52	0.26		J	GAM
Cobalt 60	10198-40-0	U		0.024	0.050	U	GAM
Cesium 137	10045-97-3	17.2	0.14	0.055	0.10		GAM
Europium 152	14683-23-9	U		0.16	0.10	U	GAM
Europium 154	15585-10-1	U		0.083	0.10	U	GAM
Europium 155	14391-16-3	U		0.13	0.10	U	GAM
Radium 226	13982-63-3	0.420	0.078	0.096	0.10		GAM
Radium 228	15262-20-1	0.764	0.11	0.11	0.20		GAM
Thorium 228	14274-82-9	0.671	0.049	0.067			GAM
Thorium 232	TH-232	0.764	0.11	0.11			GAM
Americium 241	14596-10-2	U		0.19		U	GAM
Uranium 238	U-238	U		3.1		U	GAM
Uranium 235	15117-96-1	U		0.19		U	GAM

100 B/C Areas-Full Protocol

PV 8/16/99

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	07/22/99

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SAMPLE DELIVERY GROUP H0409

N905124-02 B0VFL2

DATA SHEET

SDG	7128	Client/Case no	Hanford SDG-H0409
Contact	L.A. Johnson	Case no	TRB-SBB-207925
Lab sample id	N905124-02	Client sample id	B0VFL2
Dept sample id	7128-002	Location/Matrix	100 B/C Overburden "A" SOLID
Received	05/21/99	Collected	05/18/99 09:15
% solids	96.2	Custody/SAF No	B99-002-105 B99-002

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Uranium 233/234	U-233/234	0.529	0.14	0.065	1.0	~~U~~ J	U
Uranium 235	15117-96-1	0.041	0.041	0.079	1.0	U J	U
Uranium 238	U-238	0.504	0.14	0.065	1.0	~~U~~ J	U
Plutonium 238	13981-16-3	0.008	0.031	0.074	1.0	U	PU
Plutonium 239/240	PU-239/240	0.016	0.031	0.074	1.0	U	PU
Nickel 63	13981-37-8	0.772	1.6	2.7	30	U	NI_L
Americium 241	14596-10-2	-0.018	0.018	0.055	1.0	U	AM
Total Strontium	SR-RAD	0.125	0.095	0.15	1.0	U	SR
Potassium 40	13966-00-2	25.6	0.64	0.26			GAM
Cobalt 60	10198-40-0	U		0.026	0.050	U	GAM
Cesium 137	10045-97-3	6.17	0.074	0.027	0.10		GAM
Europium 152	14683-23-9	U		0.094	0.10	U	GAM
Europium 154	15585-10-1	U		0.090	0.10	U	GAM
Europium 155	14391-16-3	U		0.12	0.10	U	GAM
Radium 226	13982-63-3	0.976	0.061	0.059	0.10		GAM
Radium 228	15262-20-1	1.37	0.13	0.13	0.20		GAM
Thorium 228	14274-82-9	1.33	0.042	0.044			GAM
Thorium 232	TH-232	1.37	0.13	0.13			GAM
Americium 241	14596-10-2	U		0.099		U	GAM
Uranium 238	U-238	U		3.4		U	GAM
Uranium 235	15117-96-1	U		0.14		U	GAM

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8/16/99

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
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Version	3.06
Report date	07/22/99

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SAMPLE DELIVERY GROUP H0409

N905124-03 B0VFL3

DATA SHEET

SDG	7128	Client/Case no	Hanford SDG-H0409
Contact	L.A. Johnson	Case no	TRB-SBB-207925
Lab sample id	N905124-03	Client sample id	B0VFL3
Dept sample id	7128-003	Location/Matrix	100-B/C Overburden "A" SOLID
Received	05/21/99	Collected	05/18/99 09:40
% solids	95.9	Custody/SAF No	B99-002-105 B99-002

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Uranium 233/234	U-233/234	0.446	0.16	0.10	1.0	~~U~~ J	U
Uranium 235	15117-96-1	0.016	0.032	0.12	1.0	U J	U
Uranium 238	U-238	0.563	0.19	0.10	1.0	~~U~~ J	U
Plutonium 238	13981-16-3	0.006	0.024	0.057	1.0	U	PU
Plutonium 239/240	PU-239/240	0.006	0.036	0.066	1.0	U	PU
Nickel 63	13981-37-8	0.418	1.6	2.6	30	U	NI_L
Americium 241	14596-10-2	0	0.017	0.041	1.0	U	AM
Total Strontium	SR-RAD	-0.217	0.30	0.43	1.0	U	SR
Potassium 40	13966-00-2	11.4	0.31	0.12			GAM
Cobalt 60	10198-40-0	U		0.012	0.050	U	GAM
Cesium 137	10045-97-3	1.14	0.026	0.016	0.10		GAM
Europium 152	14683-23-9	U		0.038	0.10	U	GAM
Europium 154	15585-10-1	U		0.044	0.10	U	GAM
Europium 155	14391-16-3	U		0.060	0.10	U	GAM
Radium 226	13982-63-3	0.440	0.027	0.025	0.10		GAM
Radium 228	15262-20-1	0.631	0.068	0.065	0.20		GAM
Thorium 228	14274-82-9	0.576	0.019	0.019			GAM
Thorium 232	TH-232	0.631	0.068	0.065			GAM
Americium 241	14596-10-2	U		0.045		U	GAM
Uranium 238	U-238	U		1.7		U	GAM
Uranium 235	15117-96-1	U		0.072		U	GAM

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Protocol	Hanford
Version	Ver 1.0
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Version	3.06
Report date	07/22/99

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SAMPLE DELIVERY GROUP H0409

N905124-04 B0VFL4

DATA SHEET

SDG	7128	Client/Case no	Hanford SDG-H0409
Contact	L.A. Johnson	Case no	TRB-SBB-207925
Lab sample id	N905124-04	Client sample id	B0VFL4
Dept sample id	7128-004	Location/Matrix	100 B/C Overburden "A" SOLID
Received	05/21/99	Collected	05/18/99 10:00
% solids	96.3	Custody/SAF No	B99-002-105 B99-002

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Uranium 233/234	U-233/234	0.531	0.16	0.071	1.0	~~U~~ J	U
Uranium 235	15117-96-1	0.034	0.045	0.086	1.0	U J	U
Uranium 238	U-238	0.522	0.14	0.071	1.0	~~U~~ J	U
Plutonium 238	13981-16-3	0.018	0.037	0.061	1.0	U J	PU
Plutonium 239/240	PU-239/240	0.028	0.028	0.044	1.0	U J	PU
Nickel 63	13981-37-8	-0.259	1.4	2.5	30	U J	NI_L
Americium 241	14596-10-2	0	0.026	0.052	1.0	U	AM
Total Strontium	SR-RAD	0.131	0.13	0.16	1.0	U	SR
Potassium 40	13966-00-2	11.6	0.49	0.25			GAM
Cobalt 60	10198-40-0	U		0.022	0.050	U	GAM
Cesium 137	10045-97-3	2.36	0.054	0.032	0.10		GAM
Europium 152	14683-23-9	U		0.073	0.10	U	GAM
Europium 154	15585-10-1	U		0.074	0.10	U	GAM
Europium 155	14391-16-3	U		0.065	0.10	U	GAM
Radium 226	13982-63-3	0.437	0.043	0.047	0.10		GAM
Radium 228	15262-20-1	0.700	0.12	0.11	0.20		GAM
Thorium 228	14274-82-9	0.576	0.030	0.032			GAM
Thorium 232	TH-232	0.700	0.12	0.11			GAM
Americium 241	14596-10-2	U		0.094		U	GAM
Uranium 238	U-238	U		2.9		U	GAM
Uranium 235	15117-96-1	U		0.094		U	GAM

100 B/C Areas-Full Protocol

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SAMPLE DELIVERY GROUP H0409

N905124-05 L0VFL5

DATA SHEET

SDG	7128	Client/Case no	Hanford SDG-H0409
Contact	L.A. Johnson	Case no	TRB-SBB-207925
Lab sample id	N905124-05	Client sample id	B0VFL5
Dept sample id	7128-005	Location/Matrix	100-B/C Overburden "B" SOLID
Received	05/21/99	Collected	05/18/99 10:20
% solids	96.4	Custody/SAF No	B99-002-106 B99-002

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Uranium 233/234	U-233/234	0.549	0.14	0.064	1.0		U
Uranium 235	15117-96-1	0.020	0.020	0.077	1.0	U	U
Uranium 238	U-238	0.682	0.16	0.064	1.0		U
Plutonium 238	13981-16-3	0.008	0.031	0.075	1.0	U	PU
Plutonium 239/240	PU-239/240	0.039	0.047	0.087	1.0	U	PU
Nickel 63	13981-37-8	1.42	1.7	2.8	30	U	NI_L
Americium 241	14596-10-2	0	0.018	0.035	1.0	U	AM
Total Strontium	SR-RAD	0.166	0.11	0.15	1.0		SR
Potassium 40	13966-00-2	11.4	0.30	0.12			GAM
Cobalt 60	10198-40-0	U		0.012	0.050	U	GAM
Cesium 137	10045-97-3	1.14	0.023	0.011	0.10		GAM
Europium 152	14683-23-9	U		0.037	0.10	U	GAM
Europium 154	15585-10-1	U		0.042	0.10	U	GAM
Europium 155	14391-16-3	U		0.045	0.10	U	GAM
Radium 226	13982-63-3	0.424	0.028	0.026	0.10		GAM
Radium 228	15262-20-1	0.589	0.058	0.056	0.20		GAM
Thorium 228	14274-82-9	0.599	0.018	0.018			GAM
Thorium 232	TH-232	0.589	0.058	0.056			GAM
Americium 241	14596-10-2	U		0.043		U	GAM
Uranium 238	U-238	U		1.6		U	GAM
Uranium 235	15117-96-1	U		0.077		U	GAM

100 B/C Areas-Full Protocol

8/11/99

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	07/22/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0409

N905124-06 B0VFL6

DATA SHEET

SDG	7128	Client/Case no	Hanford SDG-H0409
Contact	L.A. Johnson	Case no	TRB-SBB-207925
Lab sample id	N905124-06	Client sample id	B0VFL6
Dept sample id	7128-006	Location/Matrix	100 B/C Overburden "B" SOLID
Received	05/21/99	Collected	05/18/99 10:40
% solids	95.5	Custody/SAF No	B99-002-106 B99-002

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Uranium 233/234	U-233/234	0.504	0.14	0.064	1.0	~~U~~ J	U
Uranium 235	15117-96-1	0.020	0.020	0.078	1.0	U J	U
Uranium 238	U-238	0.588	0.14	0.064	1.0	~~U~~ J	U
Plutonium 238	13981-16-3	0.008	0.015	0.029	1.0	U	PU
Plutonium 239/240	PU-239/240	0.008	0.023	0.042	1.0	U	PU
Nickel 63	13981-37-8	0.680	1.8	3.0	30	U	NI_L
Americium 241	14596-10-2	0.003	0.012	0.022	1.0	U	AM
Total Strontium	SR-RAD	0.023	0.12	0.15	1.0	U	SR
Potassium 40	13966-00-2	11.6	0.55	0.29			GAM
Cobalt 60	10198-40-0	U		0.030	0.050	U	GAM
Cesium 137	10045-97-3	0.394	0.036	0.030	0.10		GAM
Europium 152	14683-23-9	U		0.054	0.10	U	GAM
Europium 154	15585-10-1	U		0.094	0.10	U	GAM
Europium 155	14391-16-3	U		0.067	0.10	U	GAM
Radium 226	13982-63-3	0.487	0.048	0.045	0.10		GAM
Radium 228	15262-20-1	0.607	0.12	0.13	0.20		GAM
Thorium 228	14274-82-9	0.590	0.028	0.026			GAM
Thorium 232	TH-232	0.607	0.12	0.13			GAM
Americium 241	14596-10-2	U		0.031		U	GAM
Uranium 238	U-238	U		3.2		U	GAM
Uranium 235	15117-96-1	U		0.084		U	GAM

100 B/C Areas-Full Protocol

JW 8/16/99

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	07/22/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0409

N905124-07

B0VFM3

DATA SHEET

SDG	7128	Client/Case no	Hanford SDG-H0409
Contact	L.A. Johnson	Case no	TRB-SBB-207925
Lab sample id	N905124-07	Client sample id	B0VFM3
Dept sample id	7128-007	Location/Matrix	100 B/C Overburden "B" SOLID
Received	05/21/99	Collected	05/18/99 12:40
% solids	96.9	Custody/SAF No	B99-002-108 B99-002

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Uranium 233/234	U-233/234	0.519	0.15	0.098	1.0	~~U~~ J	U
Uranium 235	15117-96-1	0.086	0.074	0.094	1.0	U J	U
Uranium 238	U-238	0.550	0.15	0.078	1.0	~~U~~ J	U
Plutonium 238	13981-16-3	0	0.028	0.067	1.0	U	PU
Plutonium 239/240	PU-239/240	-0.007	0.028	0.067	1.0	U	PU
Nickel 63	13981-37-8	-1.06	1.6	2.8	30	U	NI_L
Americium 241	14596-10-2	0.008	0.017	0.021	1.0	U	AM
Total Strontium	SR-RAD	-0.033	0.11	0.16	1.0	U	SR
Potassium 40	13966-00-2	12.2	0.49	0.24			GAM
Cobalt 60	10198-40-0	0.051	0.023	0.026	0.050		GAM
Cesium 137	10045-97-3	1.63	0.045	0.029	0.10		GAM
Europium 152	14683-23-9	U		0.069	0.10	U	GAM
Europium 154	15585-10-1	U		0.080	0.10	U	GAM
Europium 155	14391-16-3	U		0.063	0.10	U	GAM
Radium 226	13982-63-3	0.463	0.048	0.051	0.10		GAM
Radium 228	15262-20-1	0.740	0.092	0.092	0.20		GAM
Thorium 228	14274-82-9	0.654	0.029	0.031			GAM
Thorium 232	TH-232	0.740	0.092	0.092			GAM
Americium 241	14596-10-2	U		0.093		U	GAM
Uranium 238	U-238	U		2.8		U	GAM
Uranium 235	15117-96-1	U		0.10		U	GAM

100 B/C Areas-Full Protocol

8/16/99

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	07/22/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0409

N905124-08 B0VFM4

DATA SHEET

SDG	7128	Client/Case no	Hanford SDG-H0409
Contact	L.A. Johnson	Case no	TRB-SBB-207925
Lab sample id	N905124-08	Client sample id	B0VFM4
Dept sample id	7128-008	Location/Matrix	100 B/C Overburden "B" SOLID
Received	05/21/99	Collected	05/18/99 13:00
% solids	97.1	Custody/SAF No	B99-002-108 B99-002

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Uranium 233/234	U-233/234	0.430	0.15	0.11	1.0	~~U~~ J	U
Uranium 235	15117-96-1	0.073	0.073	0.093	1.0	U J	U
Uranium 238	U-238	0.490	0.15	0.076	1.0	~~U~~ J	U
Plutonium 238	13981-16-3	-0.007	0.028	0.068	1.0	U	PU
Plutonium 239/240	PU-239/240	-0.007	0.028	0.068	1.0	U	PU
Nickel 63	13981-37-8	0.987	1.5	2.5	30	U	NI_L
Americium 241	14596-10-2	0	0.023	0.042	1.0	U	AM
Total Strontium	SR-RAD	0.001	0.14	0.18	1.0	U	SR
Potassium 40	13966-00-2	11.8	0.32	0.14			GAM
Cobalt 60	10198-40-0	U		0.013	0.050	U	GAM
Cesium 137	10045-97-3	0.029	0.009	0.011	0.10	~~U~~	GAM
Europium 152	14683-23-9	U		0.033	0.10	U	GAM
Europium 154	15585-10-1	U		0.042	0.10	U	GAM
Europium 155	14391-16-3	U		0.038	0.10	U	GAM
Radium 226	13982-63-3	0.452	0.028	0.025	0.10		GAM
Radium 228	15262-20-1	0.674	0.062	0.059	0.20		GAM
Thorium 228	14274-82-9	0.609	0.019	0.017			GAM
Thorium 232	TH-232	0.674	0.062	0.059			GAM
Americium 241	14596-10-2	U		0.044		U	GAM
Uranium 238	U-238	U		1.6		U	GAM
Uranium 235	15117-96-1	U		0.056		U	GAM

100 B/C Areas-Full Protocol

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	07/22/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0409

N905124-09 B0VFM5

DATA SHEET

SDG	7128	Client/Case no	Hanford SDG-H0409
Contact	L.A. Johnson	Case no	TRB-SBB-207925
Lab sample id	N905124-09	Client sample id	B0VFM5
Dept sample id	7128-009	Location/Matrix	100 B/C Overburden "B" SOLID
Received	05/21/99	Collected	05/18/99 13:00
% solids	97.1	Custody/SAF No	B99-002-108 B99-002

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Uranium 233/234	U-233/234	0.432	0.12	0.064	1.0	~~U~~ J	U
Uranium 235	15117-96-1	0.040	0.040	0.077	1.0	U J	U
Uranium 238	U-238	0.515	0.14	0.064	1.0	~~U~~ J	U
Plutonium 238	13981-16-3	0.013	0.025	0.061	1.0	U	PU
Plutonium 239/240	PU-239/240	0	0.025	0.070	1.0	U	PU
Nickel 63	13981-37-8	-1.14	2.0	3.4	30	U	NI_L
Americium 241	14596-10-2	0.003	0.016	0.026	1.0	U	AM
Total Strontium	SR-RAD	0.028	0.11	0.15	1.0	U	SR
Potassium 40	13966-00-2	11.3	0.40	0.19			GAM
Cobalt 60	10198-40-0	U		0.022	0.050	U	GAM
Cesium 137	10045-97-3	0.023	0.017	0.020	0.10	~~U~~	GAM
Europium 152	14683-23-9	U		0.039	0.10	U	GAM
Europium 154	15585-10-1	U		0.074	0.10	U	GAM
Europium 155	14391-16-3	U		0.047	0.10	U	GAM
Radium 226	13982-63-3	0.476	0.039	0.038	0.10		GAM
Radium 228	15262-20-1	0.653	0.096	0.094	0.20		GAM
Thorium 228	14274-82-9	0.643	0.022	0.020			GAM
Thorium 232	TH-232	0.653	0.096	0.094			GAM
Americium 241	14596-10-2	U		0.024		U	GAM
Uranium 238	U-238	U		2.5		U	GAM
Uranium 235	15117-96-1	U		0.064		U	GAM

100 B/C Areas-Full Protocol

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	07/22/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0409

N905124-10 B0VFM6

DATA SHEET

SDG	7128	Client/Case no	Hanford SDG-H0409
Contact	L.A. Johnson	Case no	TRB-SBB-207925
Lab sample id	N905124-10	Client sample id	B0VFM6
Dept sample id	7128-010	Location/Matrix	100-B/C Overburden "B" SOLID
Received	05/21/99	Collected	05/18/99 08:15
% solids	100.0	Custody/SAF No	B99-002-108 B99-002

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Uranium 233/234	U-233/234	0.237	0.10	0.094	1.0	~~U~~ J	U
Uranium 235	15117-96-1	0.021	0.041	0.078	1.0	U J	U
Uranium 238	U-238	0.229	0.087	0.065	1.0	~~U~~ J	U
Plutonium 238	13981-16-3	0	0.028	0.066	1.0	U	PU
Plutonium 239/240	PU-239/240	-0.014	0.014	0.066	1.0	U	PU
Nickel 63	13981-37-8	-0.379	1.3	2.3	30	U	NI_L
Americium 241	14596-10-2	-0.003	0.016	0.033	1.0	U	AM
Total Strontium	SR-RAD	-0.007	0.11	0.16	1.0	U	SR
Potassium 40	13966-00-2	16.8	0.59	0.23			GAM
Cobalt 60	10198-40-0	U		0.026	0.050	U	GAM
Cesium 137	10045-97-3	U		0.020	0.10	U	GAM
Europium 152	14683-23-9	U		0.049	0.10	U	GAM
Europium 154	15585-10-1	U		0.087	0.10	U	GAM
Europium 155	14391-16-3	U		0.051	0.10	U	GAM
Radium 226	13982-63-3	0.198	0.033	0.037	0.10		GAM
Radium 228	15262-20-1	0.232	0.12	0.13	0.20		GAM
Thorium 228	14274-82-9	0.224	0.023	0.024			GAM
Thorium 232	TH-232	0.232	0.12	0.13			GAM
Americium 241	14596-10-2	U		0.076		U	GAM
Uranium 238	U-238	U		3.2		U	GAM
Uranium 235	15117-96-1	U		0.082		U	GAM

100 B/C Areas-Full Protocol

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	07/22/99

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

Case Narrative

1.0 GENERAL

Bechtel Hanford Inc. Sample Delivery Group H0409 is comprised of ten solid (soil) samples designated under SAF No. B99-002 with a Project Designation of: 100 BC Areas-Full Protocol.

The samples were received as stated on the Chain-of-Custody documents. Any discrepancies are noted on the TNU Sample Receipt Checklist. Preliminary results for Isotopic Uranium, Nickel-63 and Total Strontium were transmitted to Bechtel Hanford via fax on June 9, 1999.

2.0 ANALYSIS NOTES

2.1 Nickel-63 Analyses
No problems were encountered during the processing of the samples.

2.2 Total Strontium Analyses
No problems were encountered during the processing of the samples.

2.3 Isotopic Plutonium Analyses
No problems were encountered during the processing of the samples.

2.4 Gamma Scan Analyses
No problems were encountered during the processing of the samples.

2.5 Isotopic Uranium Analyses
No problems were encountered during the processing of the samples.

2.6 Americium-241 Analyses
No problems were encountered during the processing of the samples.

Thermo NUtech
2030 Wright Avenue
P.O. Box 4040
Richmond, CA 94804-0040
(510) 235-2633 • FAX (510) 235-0438

August 14, 1999

Ms. Joan Kessner
3190 George Washington Way
Richland, WA 99352
MSIN: H9-03

Reference: P.O. #TRB-SBB-207925
Thermo Nutech N9-05-124-7128, SDG H0409, Supplemental Report

Dear Ms. Kessner:

The gamma spectroscopy planchets for the above referenced SDG were counted on dates from June 2 through June 7 with the QC LCS and blank counted on June 5 and 7 respectively. The planchet for sample B0VFL1, however, was recounted on June 14, seven days after the last sample in the batch and the recount data was reported. Enclosed is additional gamma spectroscopy data for Quality Control samples counted on or near June 14, 1999. The data is supplied to support the gamma spectroscopy data for sample B0VFL1. The additional gamma spectroscopy data was originally reported in BHI SDG H0422 (TNU N905124-7137). The QC LCS was counted on June 14 and the QC Blank was counted on June 15. No other gamma spectroscopy QC samples were analyzed on June 14 or 15 at Thermo Nutech.

Please call if you have any questions concerning this aditional data.

Sincerely,

N. Joseph Verville
Senior Program Manager

/njv

Enclosure: data

Bechtel Hanford Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

B99-002-105

Collector: Fahlberg/Kerkow	Company Contact: R Coffman	Telephone No.: 373-6425	Project Coordinator: TRENT, SJ
Price Code:	Data Turnaround: 15 Days		
Project Designation: 100 BC Areas - Full Protocol	Sampling Location: 100 B/C Overburden "A"		SAF No.: B99-002
Ice Chest No.: 3ML 395	Field Logbook No.: EL 1327-3		Method of Shipment: FEDEX
Shipped To: TMA/~~REGRA~~ R.F. 5/18/99	Offsite Property No.: A990144		Bill of Lading/Air Bill No.: 4235 7952 6231
			COA R116B4 ZF00

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

SAMPLE ANALYSIS												
Preservation				None	None	Cool 4C	None	None				
Type of Container				P	aG	aG	aG	aG				
No. of Container(s)				1	1	1	1	1				
Volume				20mL	60mL	125mL	250mL	1000mL				
				Activity Scan	See item (1) in Special Instructions.	Chromium Hex - 7196	ICP Metals - 6010A (SW-846) (Chromium, Lead); Mercury - 7471 - (CV)	See item (2) in Special Instructions.				
Sample No.	Matrix *	Sample Date	Sample Time									
B0VFL1	Soil	5/18/99	0850	X	X			X				tie to B0V939
B0VFL2	Soil	5/18/99	0915	X	X			X				B0V948
B0VFL3	Soil	5/18/99	0940	X	X			X				B0V950
B0VFL4	Soil	5/18/99	1000	X	X			X				B0V956

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By: R. Fahlberg / R. Fahlberg	Date/Time: 1615 5/18/99	Received By: Ref #1-C	Date/Time: 1615 5.18.99
Relinquished By: REF 1-C	Date/Time: 52099 1030	Received By: SIGNATURE	Date/Time: 52099 1030
Relinquished By: SIGNATURE	Date/Time: 52099 1030	Received By: FEDEX	Date/Time: 5/20/99
Relinquished By: FedEx	Date/Time: 9:45 5/21/99	Received By: TNV M. Goldenberg	Date/Time: 9:45 5/21/99

SPECIAL INSTRUCTIONS

(1) Americium-241; Isotopic Plutonium; Isotopic Uranium; Strontium-89,90 – Total Sr; Nickel-63
(2) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Uranium-238)

COLLECTOR UNAVAILABLE TO SIGN COC

Matrix *
Soil
Water
Vapor
Other Solid
Other Liquid

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B99-002-106	Page 1 of 1

Collector Fahlberg/Kerkow	Company Contact R Coffman	Telephone No. 373-6425	Project Coordinator TRENT, SJ	Price Code	Data Turnaround 15 Days
Project Designation 100 BC Areas - Full Protocol	Sampling Location 100 B/C Overburden ~~"A"~~ "B" R.F 5-18-99		SAF No. B99-002		
Ice Chest No. SML 395	Field Logbook No. EL 1327-3		Method of Shipment Fed Ex		
Shipped To TMA/~~RECRA~~ RE 5/18/99	Offsite Property No. A990144		Bill of Lading/Air Bill No. 4235 7952 6231		
			COA R16B12 2F00		

POSSIBLE SAMPLE HAZARDS/REMARKS											
	Preservation	None	None	Cool 4C	None	None					
	Type of Container	P	aG	aG	aG	aG					
	No. of Container(s)	1	1	1	1	1					
Special Handling and/or Storage	Volume	20mL	60mL	125mL	250mL	1000mL					
SAMPLE ANALYSIS		Activity Scan	See item (1) in Special Instructions.	Chromium Hex - 7196	ICP Metals - 6010A (SW-846) (Chromium, Lead); Mercury - 7471 - (CV)	See item (2) in Special Instructions.					
Sample No.	Matrix *	Sample Date	Sample Time								
B0VFL5	Soil	5/18/99	1020	X	X	X			tie to	BOV	964
B0VFL6	Soil	5/18/99	1040	X	X	X				BOV	968

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By R.F. Fahlberg / R.F. Fahlberg 5/18/99	Date/Time REF 1615 ~~1640~~	Received By REF / C / R.F. Fahlberg / R.F. Fahlberg 5-18-99	Date/Time 1615
Relinquished By REF / C 52099	Date/Time 1030	Received By Sionle Mahl 52099	Date/Time 1030
Relinquished By Sionle Mahl 52099	Date/Time 1030	Received By FED EX	Date/Time 5/20/99
Relinquished By Fed Ex 9:45	Date/Time 5/21/99	Received By TNV M. Goldenberg 9:45	Date/Time 5/21/99
LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

SPECIAL INSTRUCTIONS

(1) Americium-241; Isotopic Plutonium; Isotopic Uranium; Strontium-89,90 -- Total Sr; Nickel-63
(2) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Uranium-238)

COLLECTOR UNAVAILABLE TO SIGN COC

Matrix *
Soil
Water
Vapor
Other Solid
Other Liquid

00 8026

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B99-002-108	Page 1 of 1

Collector: Fahlberg/Kerkow	Company Contact: R Coffman	Telephone No.: 373-6425	Project Coordinator: TRENT, SJ
Price Code	Data Turnaround: 15 Days		
Project Designation: 100 BC Areas - Full Protocol	Sampling Location: 100 B/C Overburden "B"		SAF No.: B99-002
Ice Chest No.: SML 395	Field Logbook No.: EL 1327-3		Method of Shipment: Fed Ex
Shipped To: TMA/~~RCRA~~ RE 5/18/99	Offsite Property No.: A990144		Bill of Lading/Air Bill No.: 4235 7952 6231
			COA: R16<2A 2FDQ

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

SAMPLE ANALYSIS													
			Preservation	None	None	Cool 4C	None	None					
			Type of Container	P	aG	aG	aG	aG					
			No. of Container(s)	1	1	1	1	1					
			Volume	20mL	60mL	125mL	250mL	1000mL					
				Activity Scan	See item (1) in Special Instructions.	Chromium Hex - 7196	ICP Metals - 6010A (SW-846) (Chromium, Lead); Mercury - 7471 - (CV)	See item (2) in Special Instructions.					
Sample No.	Matrix *	Sample Date	Sample Time										
B0VFM3	Soil	5/18/99	1240	X	X			X				tie to B01975	
B0VFM4	Soil	5/18/99	1300	X	X			X				B01984	
B0VFM5	Soil	5/18/99	1300	X	X			X				B01984	
B0VFM6	Soil	5/18/99	0815	X	X			X				—	

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By: R. Fahlberg / R. Fahlberg	Date/Time: 1615 5/18/99	Received By: R. Fahlberg	Date/Time:
Relinquished By: R. Fahlberg / R. Fahlberg	Date/Time: 1615 5.18.99	Received By: Ref #1-C	Date/Time: 1615 5.18.99
Relinquished By: REF 1-C	Date/Time: 52099 1030	Received By: SJGALE	Date/Time: 52099 1030
Relinquished By: SJGALE	Date/Time: 52099 1030	Received By: FED EX	Date/Time: 5/20/99
LABORATORY SECTION	Received By: TNV M. Goldberg	Title:	Date/Time: 5/21/99 9:45
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

SPECIAL INSTRUCTIONS

(1) Americium-241; Isotopic Plutonium; Isotopic Uranium; Strontium-89,90 -- Total Sr; Nickel-63

(2) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Uranium-238)

COLLECTOR UNAVAILABLE TO SIGN COC

Matrix *

Soil
Water
Vapor
Other Solid
Other Liquid

00025000

Appendix 5

Data Validation Supporting Documentation

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E

PROJECT: 100BC WSG 3 OB	DATA PACKAGE: H0409
VALIDATOR: TLI	LAB: TNU	DATE: 7/22/99
CASE:	SDG: H0409

ANALYSES PERFORMED

☐ Gross Alpha/Beta	☒ Strontium-90	☐ Technetium-99	☒ Alpha Spectroscopy	☒ Gamma Spectroscopy	
☐ Total Uranium	☐ Radium-22	☐ Tritium	☒ Ni 63		

SAMPLES/MATRIX BOUFL1 BOUFL2 BOUFL3 BOUFL4 BOUFL5 BOUFL6 BOUFM3 BOUFM4 BOUFM5 BOUFM6

1. Completeness . . . . . ☒ N/A

Technical verification forms present? . . . . . Yes No N/A

Comments:

2. Initial Calibration . . . . . ☒ N/A

Instruments/detectors calibrated within one year of sample analysis? . . . . . Yes No N/A

Initial calibration acceptable? . . . . . Yes No N/A

Standards NIST traceable? . . . . . Yes No N/A

Standards Expired? . . . . . Yes No N/A

Comments:

A-12

3. Continuing Calibration . . . . . ☒ N/A

Calibration checked within one week of sample analysis? . . . Yes No N/A
Calibration check acceptable? . . . . . Yes No N/A
Calibration check standards NIST traceable? . . . . . Yes No N/A
Calibration check standards expired? . . . . . Yes No N/A

Comments:

4. Blanks . . . . . ☐ N/A

Method blank analyzed? . . . . . Yes No N/A
Method blank results acceptable? . . . . . Yes No N/A
Analytes detected in method blank? . . . . . Yes No N/A
Field blank(s) analyzed? . . . . . Yes No N/A
Field blank results acceptable? . . . . . Yes No N/A
Analytes detected in field blank(s)? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments: 1R - check the MDA's
FLU - its own blank - MDA's way over J
isotopic uranium - 3 days after SDG - J

MG - EB - U233/34, 238 (trace), K-40 Rad + thor (U238 Gross alpha + DL) hence U

5. Matrix Spikes . . . . . ☒ N/A

Matrix spike analyzed? . . . . . Yes No N/A
Spike recoveries acceptable? . . . . . Yes No N/A
Spike source traceable? . . . . . Yes No N/A
Spike source expired? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments: Ni-63 was yield

6. Laboratory Control Samples . . . . . ☐ N/A

LCS analyzed? . . . . . Yes No N/A
LCS recoveries acceptable? . . . . . Yes No N/A
LCS traceable? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments: FLI - analyzed w/H
LCS w/s

7. Chemical Recovery . . . . . ☐ N/A

Chemical carrier added? . . . . . Yes No N/A
Chemical recovery acceptable? . . . . . Yes No N/A
Chemical carrier traceable? . . . . . Yes No N/A
Chemical carrier expired? . . . . . Yes No N/A
Transcription/Calculation errors? . . . . . Yes No N/A

Comments:

8. Duplicates . . . . . ☐ N/A

Duplicates Analyzed? . . . . . Yes No N/A
RPD Values Acceptable? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments: dups ok except for as follows

*IR dup run 7 days apart (gamma) - no dup
" " " " ~~(Am-241)~~
MS-FD Isotopic Uran - no qual req but
not run w/SDG

9. Field QC Samples . . . . . ☐ N/A

Field duplicate sample(s) analyzed? . . . . . Yes No N/A
Field duplicate RPD values acceptable? . . . . . Yes No N/A
Field split sample(s) analyzed? . . . . . Yes No N/A
Field split RPD values acceptable? . . . . . Yes No N/A
Performance audit sample(s) analyzed? . . . . . Yes No N/A
Performance audit sample results acceptable? . . . . . Yes No N/A

Comments:

M4/M5

10. Holding Times

Are sample holding times acceptable? . . . . . Yes No N/A

Comments: FL4 - run 5 days late - J

11. Results and Detection Limits (Levels D & E) . . . . . ☐ N/A

Results reported for all required sample analyses? . . . . Yes No N/A
Results supported in raw data? . . . . . Yes No N/A
Results Acceptable? . . . . . Yes No N/A
Transcription/Calculation errors? . . . . . Yes No N/A
MDA's meet required detection limits? . . . . . Yes No N/A
Transcription/calculation errors? . . . . . Yes No N/A

Comments: gea U238 - cell out
L1 EU152 EU155 U235(gea) U235-Aspec
L2 EU155 U235 (gea)
L3 U235- Aspec
EU155 L1, L2, L3, L4, L6, M3, M6

A-#2

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0409

N905124-12

Method Blank

METHOD BLANK

SDG 7128 Client/Case no Hanford SDG-H0409
Contact L.A. Johnson Case no TRB-SBB-207925

Lab sample id N905124-12 Client sample id Method Blank
Dept sample id 7128-012 Material/Matrix SOLID
SAF No B99-002

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Uranium 233/234	U-233/234	0.029	0.038	0.073	1.0	U	U
Uranium 235	15117-96-1	0	0.023	0.089	1.0	U	U
Uranium 238	U-238	0	0.019	0.073	1.0	U	U
Plutonium 238	13981-16-3	0.005	0.028	0.051	1.0	U	PU
Plutonium 239/240	PU-239/240	-0.005	0.019	0.051	1.0	U	PU
Nickel 63	13981-37-8	0.410	3.5	5.8	30	U	NI_L
Americium 241	14596-10-2	0.009	0.028	0.051	1.0	U	AM
Total Strontium	SR-RAD	-0.011	0.12	0.17	1.0	U	SR
Potassium 40	13966-00-2	U		0.13		U	GAM
Cobalt 60	10198-40-0	U		0.014	0.050	U	GAM
Cesium 137	10045-97-3	U		0.010	0.10	U	GAM
Europium 152	14683-23-9	U		0.026	0.10	U	GAM
Europium 154	15585-10-1	U		0.037	0.10	U	GAM
Europium 155	14391-16-3	U		0.015	0.10	U	GAM
Radium 226	13982-63-3	U		0.017	0.10	U	GAM
Radium 228	15262-20-1	U		0.047	0.20	U	GAM
Thorium 228	14274-82-9	U		0.013		U	GAM
Thorium 232	TH-232	U		0.047		U	GAM
Americium 241	14596-10-2	U		0.007		U	GAM
Uranium 238	U-238	U		1.3		U	GAM
Uranium 235	15117-96-1	U		0.028		U	GAM

100 B/C Areas-Full Protocol

QC-BLANK 30856

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 07/22/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0409

N905124-11 Lab Control Sample

LAB CONTROL SAMPLE

SDG 7128 Client/Case no Hanford SDG-H0409
Contact L.A. Johnson Case no TRB-SBB-207925

Lab sample id N905124-11 Client sample id Lab Control Sample
Dept sample id 7128-011 Material/Matrix SOLID
SAF No B99-002

ANALYTE	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST	ADDED pCi/g	2σ ERR pCi/g	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Uranium 233/234	4.72	0.58	0.28	1.0		U	4.64	0.19	102	79-121	80-120
Uranium 235	3.89	0.51	0.078	1.0		U	3.77	0.15	103	77-123	80-120
Uranium 238	5.00	0.61	0.27	1.0		U	5.04	0.20	99	80-120	80-120
Plutonium 238	10.3	0.86	0.045	1.0		PU	10.1	0.40	102	84-116	80-120
Plutonium 239/240	10.5	0.87	0.045	1.0		PU	10.6	0.42	99	84-116	80-120
Nickel 63	173	4.0	2.3	30		NI_L	168	6.7	103	83-117	
Americium 241	9.17	0.76	0.038	1.0		AM	9.58	0.38	96	85-115	80-120
Total Strontium	12.0	0.41	0.19	1.0		SR	11.4	0.46	105	82-118	
Cobalt 60	0.219	0.016	0.007	0.050		GAM	0.236	0.009	93	77-123	80-120
Cesium 137	0.261	0.013	0.009	0.10		GAM	0.272	0.011	96	76-124	80-120

100 B/C Areas-Full Protocol

QC-LCS 30855

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-LCS
Version 3.06
Report date 07/22/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0409

N905124-13

B0VFL1

DUPLICATE

SDG 7128

Contact L.A. Johnson

Client/Case no Hanford SDG-H0409

Case no TRB-SBB-207925

DUPLICATE		ORIGINAL		
Lab sample id N905124-13		Lab sample id N905124-01	Client sample id B0VFL1	
Dept sample id 7128-013		Dept sample id 7128-001	Location/Matrix 100 B/C Overburden "A"	SOLID
		Received 05/21/99	Collected 05/18/99 08:50	
% solids 96.0		% solids 96.0	Custody/SAF No B99-002-105	B99-002

ALYTE	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
anium 233/234	0.501	0.14	0.062	1.0	J	U	0.652	0.19	0.12	J	26	62	
anium 235	0.039	0.039	0.075	1.0	U	U	0.093	0.063	0.12	U	-		
anium 238	0.428	0.12	0.062	1.0	J	U	0.371	0.16	0.098	J	14	76	
lutonium 238	0.017	0.034	0.062	1.0	U	PU	-0.014	0.014	0.068	U	-		
lutonium 239/240	0.034	0.045	0.069	1.0	U	PU	0.035	0.043	0.054	U	-		
ickel 63	-0.435	1.5	2.5	30	U	NI_L	-0.027	1.8	3.1	U	-		
mericium 241	0.007	0.015	0.028	1.0	U	AM	-0.004	0.017	0.040	U	-		
otal Strontium	0.091	0.12	0.15	1.0	U	SR	0.146	0.14	0.18	U	-		
otassium 40	12.2	0.48	0.22			GAM	12.1	0.52	0.26		1	33	
obalt 60	U		0.023	0.050	U	GAM	U		0.024	U	-		
esium 137	15.4	0.12	0.045	0.10		GAM	17.2	0.14	0.055		11	32	
uropium 152	U		0.14	0.10	U	GAM	U		0.16	U	-		
uropium 154	U		0.076	0.10	U	GAM	U		0.083	U	-		
uropium 155	U		0.11	0.10	U	GAM	U		0.13	U	-		
adium 226	0.483	0.067	0.079	0.10		GAM	0.420	0.078	0.096		14	47	
adium 228	0.752	0.11	0.10	0.20		GAM	0.764	0.11	0.11		2	44	
horium 228	0.625	0.043	0.059			GAM	0.671	0.049	0.067		7	35	
horium 232	0.752	0.11	0.10			GAM	0.764	0.11	0.11		2	44	
mericium 241	U		0.17		U	GAM	U		0.19	U	-		
anium 238	U		2.6		U	GAM	U		3.1	U	-		
anium 235	U		0.17		U	GAM	U		0.19	U	-		

0 B/C Areas-Full Protocol

-DUP#1 30857

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DUP
Version 3.06
Report date 07/22/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0422

N905178-03 Lab Control Sample

LAB CONTROL SAMPLE

SDG 7137 Client/Case no Hanford SDG-H0422
Contact L.A. Johnson Case no TRB-SBB-207925

Lab sample id N905178-03 Client sample id Lab Control Sample
Dept sample id 7137-005 Material/Matrix SOLID
SAF No BBB-041

ANALYTE	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST	ADDED pCi/g	2σ ERR pCi/g	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Uranium 233/234	4.98	0.90	0.45	1.0		U	4.83	0.19	103	70-130	80-120
Uranium 235	3.93	0.76	0.17	1.0		U	3.92	0.16	102	69-131	80-120
Uranium 238	5.14	0.92	0.44	1.0		U	5.24	0.21	98	72-128	80-120
Plutonium 238	5.27	0.36	0.015	1.0		PU	5.65	0.23	93	87-113	80-120
Plutonium 239/240	5.66	0.38	0.015	1.0		PU	5.95	0.24	95	87-113	80-120
Nickel 63	185	3.9	1.9	30		NI_L	168	6.7	98	84-116	
Total Strontium	13.1	0.41	0.17	1.0		SR	12.6	0.50	104	92-127	
Potassium 40	U		47		U	GAM					
Cobalt 60	177	9.6	5.4	0.050		GAM	187	7.5	95	77-123	80-120
Cesium 137	203	8.7	5.6	0.10		GAM	208	8.3	98	76-124	80-120
Europium 152	U		22	0.10	U	GAM					
Europium 154	U		33	0.10	U	GAM					
Europium 155	U		10	0.10	U	GAM					
Radium 226	U		7.7	0.10	U	GAM					
Radium 228	U		22	0.20	U	GAM					
Thorium 228	U		6.5		U	GAM					
Thorium 232	U		22		U	GAM					
Americium 241	U		9.4		U	GAM					
Uranium 238	U		690		U	GAM					
Uranium 235	U		15		U	GAM					

100 H Area - Quick Turn

QC-LCS 30985

Lab id TMARC
Prococol Hanford
Version Ver 1.0
Form DVD-LCS
Version 3.06
Report date 08/14/99

G-8/14

LAB CONTROL SAMPLES
Page 1
SUMMARY DATA SECTION
Page 7

TMA/RICHMOND
SAMPLE DELIVERY GROUP H0422

N905178-04 Method Blank

METHOD BLANK

SDG 7137	Client/Case no Hanford	SDG-H0422	
Contact L.A. Johnson	Case no TRB-SBB-207925		
Lab sample id N905178-04	Client sample id Method Blank		
Dept sample id 7137-004	Material/Matrix	SOLID	
	SAF No B99-041		

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Uranium 233/234	U-233/234	0	0.024	0.092	1.0	U	U
Uranium 235	15117-96-1	0.029	0.029	0.11	1.0	U	U
Uranium 238	U-238	0	0.024	0.092	1.0	U	U
Plutonium 238	13981-16-3	0.005	0.010	0.017	1.0	U	PU
Plutonium 239/240	PU-239/240	0	0.007	0.017	1.0	U	PU
Nickel 63	13981-37-8	-0.451	1.1	2.0	30	U	NI_L
Total Strontium	SR-RAD	0.016	0.14	0.19	1.0	U	SR
Potassium 40	13966-00-2	U		100		U	GAM
Cobalt 60	10198-40-0	U		11	0.050	U	GAM
Cesium 137	10045-97-3	U		8.7	0.10	U	GAM
Europium 152	14683-23-9	U		19	0.10	U	GAM
Europium 154	15585-10-1	U		19	0.10	U	GAM
Europium 155	14391-16-3	U		11	0.10	U	GAM
Radium 226	13982-63-3	U		18	0.10	U	GAM
Radium 228	15262-20-1	U		33	0.20	U	GAM
Thorium 228	14274-82-9	U		9.0		U	GAM
Thorium 232	TH-232	U		33		U	GAM
Americium 241	14596-10-2	U		6.0		U	GAM
Uranium 238	U-238	U		1000		U	GAM
Uranium 235	15117-96-1	U		20		U	GAM

100 H Area - Quick Turn

QC-BLANK 30986

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 08/14/99

QV 8/14

METHOD BLANKS
Page 1
SUMMARY DATA SECTION
Page 6

Date: 16 August 1999
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 100-BC Areas - Full Protocol - Waste Site Group 3 Overburden
Subject: Inorganics - Data Package No. H0409-RLN (SDG No. H0409)

INTRODUCTION

This memo presents the results of data validation on Data Package No. H0409-RLN prepared by RECRA LabNet (RLN). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analysis
B0VFL1	05/18/99	Soil	C	See note 1
B0VFL2	05/18/99	Soil	C	See note 1
B0VFL3	05/18/99	Soil	C	See note 1
B0VFL4	05/18/99	Soil	C	See note 1
B0VFL5	05/18/99	Soil	C	See note 1
B0VFL6	05/18/99	Soil	C	See note 1
B0VFM3	05/18/99	Soil	C	See note 1
B0VFM4	05/18/99	Soil	C	See note 1
B0VFM5	05/18/99	Soil	C	See note 1
B0VFM6	05/18/99	Soil	C	See note 1

1 - ICP metals by 6010A (lead and total chromium); hexavalent chromium by 7196; mercury by 7471

Data validation was conducted in accordance with the BHI validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL May 1998). Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- **Holding Times**

Analytical holding times for metals are assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Soil samples must be analyzed within six (6) months for lead & total chromium; 30 days for chromium VI; and 28 days for mercury.

All holding times were acceptable.

- **Blanks**

Preparation Blanks

At least one preparation blank, consisting of deionized distilled water processed through each sample preparation and analysis procedure, must be prepared and analyzed with every sample delivery group. In the case of positive blank results, samples with digestate concentrations less than five times the preparation blank value have had their associated values qualified as non-detected and flagged "U". Samples with concentrations of greater than five times the highest blank concentration do not require qualification.

In the case of negative blank results, if the absolute value exceeds the Contract Required Detection Limit (CRDL), all nondetects are rejected and flagged "UR" and all detects that are less than ten times the absolute value of the associated preparation blank result are qualified as estimates and flagged "J". If the absolute value of the negative preparation blank is greater than the IDL and less than or equal to the CRDL, all nondetects are qualified as estimates and flagged "UJ" and all detects less than ten times the absolute value of the blank are qualified as estimates and flagged "J". If the sample results are greater than ten times the absolute value of the preparation blank, no qualification is necessary.

All preparation blank results were acceptable although the target detection limits (TDLs) for lead and chromium VI were exceeded.

Equipment Blanks

One equipment blank (B0VFM6) was submitted for analysis. Chromium VI was detected in the equipment blank and the target detection limit for lead was exceeded. Under the BHI statement of work, no qualification is required.

- **Accuracy**

Matrix Spike

Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must fall within the range of 70% to 130%. Samples with a spike recovery of less than 30% and a sample result below the IDL are rejected and flagged "UR". Samples with a spike recovery of 30% to 69% and a sample result less than the IDL are qualified "UJ". Samples with a spike recovery of greater than 130% or less than 70% and a sample result greater than the IDL are qualified as estimates and flagged "J". Finally, for samples with a spike recovery greater than 130% and a sample result less than the IDL, no qualification is required.

All matrix spike recovery results were acceptable.

- **Precision**

Laboratory Duplicate Samples

Laboratory duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Results must be within RPD limits of plus or minus 30% for solid samples. If RPD values are out of specification and the sample concentration is greater than five times the CRDL, all associated sample results are qualified as estimated and flagged "J". If RPD values are plus or minus two times the CRDL and the sample concentration is less than five times the CRDL, all associated sample results are qualified as estimated and flagged "J/UJ". The performance criteria for aqueous laboratory duplicates are an RPD less than 30% for positive sample results greater than five times the CRDL or plus or minus the CRDL for positive sample results less than five times the CRDL. Sample results outside the criteria are qualified as estimates and flagged "J/UJ".

All laboratory duplicate results were acceptable.

Field Duplicates

One sample duplicate pair (B0VFM4/B0VFM5) was submitted for analysis. The samples were compared using the same criteria as for a laboratory duplicate. All field duplicate results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the 100 Area Remedial Action Sampling and Analysis Plan TDLs or the CRDL if no TDL was specified, to

ensure that laboratory detection levels meet the required criteria. The following had reported detection limits above their TDL: Chromium VI in all samples and lead in sample B0VFL2, B0VFL5 and B0VFM6. Under the BHI statement of work, no qualification is required. All other reported laboratory detection levels met the analyte specific TDL or CRDL.

- **Completeness**

Data package No. H0409-RLN (SDG No. H0409) was submitted for validation and verified for completeness. The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

The following had reported detection limits above their TDL: Chromium VI in all samples and lead in sample B0VFL2, B0VFL5 and B0VFM6. Under the BHI statement of work, no qualification is required.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-96-22, Rev. 1, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, May 1998.

Interoffice Memorandum 056910, Joan Kessner to Distribution, *Hexavalent Chromium Analytical Holding Time*, 4 March 1998.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with BHI validation SOW are as follows:

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

J - Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

BJ - Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: H0409	REVIEWER: TLI	DATE: 8/16/99	PAGE 1 OF 1
COMMENTS: No qualifiers assigned.			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

Project: BECHTEL-HANFORD																					
Laboratory: RECRA LabNet																					
Case	SDG: H0409																				
Sample Number		B0VFL1		B0VFL2		B0VFL3		B0VFL4		B0VFL5		B0VFL6		B0VFM3		B0VFM4		B0VFM5		B0VFM6	
Location		Overburden		Overburden		Overburden		Overburden		Overburden		Overburden		Overburden		Overburden		Overburden		Overburden	
Remarks		A1		A2		A3		A4		B5		B6		B7		B8		Duplicate		Equip. Blank	
Sample Date		5/18/99		5/18/99		5/18/99		5/18/99		5/18/99		5/18/99		5/18/99		5/18/99		5/18/99		5/18/99	
Inorganics	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Chromium (total)	0.5	8.4		7.8		8.6		9.1		8.9		8.9		8.5		7.8		9.3		0.33	U
Mercury	0.05	0.02	U	0.01	U	0.02	U	0.02	U	0.02	U	0.05		0.02	U	0.02	U	0.02	U	0.02	U
Lead	2	3.8		3.9	U	5.9		4.3		4.0	U	4.5		5.2		4.9		4.6		3.9	U
Chromium VI	0.1	0.41	U	0.42	U	0.42	U	0.41	U	0.42	U	0.42	U	0.41	U	0.41	U	0.41	U	1.3	

000010

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 06/04/99

CLIENT: TMU-HANFORD B99-002 RECRA LOT #: 99051041

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	B0VFL1	Chromium, Total	8.4	MG/KG	0.31	1.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Lead, Total	3.8	MG/KG	3.7	1.0
-002	B0VFL2	Chromium, Total	7.8	MG/KG	0.34	1.0
		Mercury, Total	0.01 u	MG/KG	0.01	1.0
		Lead, Total	3.9 u	MG/KG	3.9	1.0
-003	B0VFL3	Chromium, Total	8.6	MG/KG	0.32	1.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Lead, Total	5.9	MG/KG	3.7	1.0
-004	B0VFL4	Chromium, Total	9.1	MG/KG	0.34	1.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Lead, Total	4.3	MG/KG	3.9	1.0
-005	B0VFL5	Chromium, Total	8.9	MG/KG	0.34	1.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Lead, Total	4.0 u	MG/KG	4.0	1.0
-006	B0VFL6	Chromium, Total	8.9	MG/KG	0.33	1.0
		Mercury, Total	0.05	MG/KG	0.02	1.0
		Lead, Total	4.5	MG/KG	3.8	1.0
-007	B0VFM3	Chromium, Total	8.5	MG/KG	0.35	1.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Lead, Total	5.2	MG/KG	4.1	1.0
-008	B0VFM4	Chromium, Total	7.8	MG/KG	0.30	1.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Lead, Total	4.9	MG/KG	3.4	1.0

RW 6/4/99

~~008~~

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 06/04/99

CLIENT: TWU-HANFORD B99-002 RECRA LOT #: 9905L041

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-009	B0VFM5	Chromium, Total	9.3	MG/KG	0.36	1.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Lead, Total	4.6	MG/KG	4:1	1.0
-010	B0VFM6	Chromium, Total	0.33 u	MG/KG	0.33	1.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Lead, Total	3.9 u	MG/KG	3.9	1.0

8/4/99

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 05/28/99

CLIENT: TNU-HANFORD B99-002

RECRA LOT #: 9905L041

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	B0VFL1	% Solids	96.8	%	0.01	1.0
		Chromium VI	0.41 u	MG/KG	0.41	1.0
-002	B0VFL2	% Solids	95.7	%	0.01	1.0
		Chromium VI	0.42 u	MG/KG	0.42	1.0
-003	B0VFL3	% Solids	95.5	%	0.01	1.0
		Chromium VI	0.42 u	MG/KG	0.42	1.0
-004	B0VFL4	% Solids	96.8	%	0.01	1.0
		Chromium VI	0.41 u	MG/KG	0.41	1.0
-005	B0VFL5	% Solids	95.9	%	0.01	1.0
		Chromium VI	0.42 u	MG/KG	0.42	1.0
-006	B0VFL6	% Solids	95.3	%	0.01	1.0
		Chromium VI	0.42 u	MG/KG	0.42	1.0
-007	B0VFM3	% Solids	97.8	%	0.01	1.0
		Chromium VI	0.41 u	MG/KG	0.41	1.0
-008	B0VFM4	% Solids	97.2	%	0.01	1.0
		Chromium VI	0.41 u	MG/KG	0.41	1.0
-009	B0VFM5	% Solids	97.2	%	0.01	1.0
		Chromium VI	0.41 u	MG/KG	0.41	1.0
-010	B0VFM6	% Solids	100	%	0.01	1.0
		Chromium VI	1.3	MG/KG	0.40	1.0

pr
8/4/99

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Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

RECRA LabNet
a division of Recra Environmental, Inc.
Virtual Laboratories Everywhere

JUN 1999
RECEIVED
Data
Log In

Recra LabNet Philadelphia
Analytical Report

Client : TNU-HANFORD B99-002
RFW# : 9905L041
SDG/SAF# : H0409/B99-002

W.O.# : 10985-001-001-9999-00
Date Received: 05-21-99

METALS CASE NARRATIVE

1. This narrative covers the analyses of 10 soil samples.

2. The samples were prepared and analyzed in accordance with methods checked on the attached glossary.

3. All analyses were performed within the required holding times.

4. The cooler temperature has been recorded on the Chain of Custody.

5. All Initial and Continuing Calibration Verifications (ICV/CCVs) were within the control limits of 90-110% (80-120% for Mercury).

6. All Initial and Continuing Calibration Blanks (ICB/CCBs) were within control limits (less than the PQL).

7. All preparation/method blanks were within method criteria {less than the Practical Quantitation Limit (3X the IDL) or samples greater than 20X MB value}. Refer to the Inorganics Method Blank Data Summary.

8. All ICP Interference Check Standards were within control limits.

9. All laboratory control samples (LCS) were within the laboratory control limits. Refer to the Inorganics Laboratory Control Standards Report.

10. All matrix spike (MS) recoveries were within the 75-125% control limits. Refer to the Inorganics Accuracy Report.

11. The duplicate analysis for 1 analyte was outside the 20% Relative Percent Difference (RPD) control limits. Refer to the Inorganics Precision Report.

The results presented in this report relate only to the analytical testing and conditions of the samples at receipt and during storage. All pages of this report are integral parts of the analytical data. Therefore, this report should only be reproduced in its entirety of 15 pages.

208 Welsh Pool Road • Lionville, PA 19341-1333 • (610)-280-3000 • Fax (610) 280-3041

12. For the purposes of this report, the data has been reported to the Instrument Detection Limit (IDL). Values between the IDL and the Practical Quantitation Limit (PQL) are acquired in a region of less-certain quantification.

J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory

6-4-99
Date

mld/m05-041

RECRA LabNet
a division of Recra Environmental, Inc.
Virtual Laboratories Everywhere

JUN 1999
RECEIVED
Data
Log In

Recra LabNet Philadelphia
Analytical Report

Client : TNU-HANFORD B99-002
RFW# : 9905L041
SDG# : H0409
SAF# : B99-002

W.O. # : 10985-001-001-9999-00
Date Received: 05-21-99

INORGANIC CASE NARRATIVE

1. This narrative covers the analyses of 10 soil samples.
2. The sample was prepared and analyzed in accordance with the methods indicated on the attached glossary.
3. Sample holding times as required by the method and/or contract were met.
4. The cooler temperature was recorded on the chain-of-custody.
5. The method blank for Chromium VI was within method criteria.
6. The Laboratory Control Samples (LCS) for Chromium VI were within the laboratory control limits.
7. The matrix spike recoveries for Chromium VI were within the 75-125% control limits.
8. The replicate analyses were within the 20% Relative Percent Difference (RPD) control limit.
9. Results for solid samples are reported on a dry weight basis.

Pat E

J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory

6-9-99
Date

njp\i05-041

The results presented in this report relate only to the analytical testing and conditions of the samples at receipt and during storage. All pages of this report are integral parts of the analytical data. Therefore, this report should only be reproduced in its entirety of 13 pages.

Collector Fahlberg/Kerkow	Company Contact R Coffman	Telephone No. 373-6425	Project Coordinator TRENT, SJ
Project Designation 100 BC Areas - Full Protocol	Sampling Location 100 B/C Overburden "A"		SAF No. B99-002
Ice Chest No. SML 136	Field Logbook No. EL 1327-3		Method of Shipment FED EX
Shipped To TMA/RECRA RE 5/18/99	Offsite Property No. A990145		Bill of Lading/Air Bill No. 4235 7952 6242
			COA R116B4 2F00

Price Code

Data Turnaround: 15 Days !

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	None	None	Cool 4C	None	None						
Type of Container	P	aG	aG	aG	aG						
No. of Container(s)	1	1	1	1	1						
Volume	20mL	60mL	125mL	250mL	1000mL						
SAMPLE ANALYSIS	Activity Scan	See item (1) in Special Instructions	Chromium Hex - 7196	ICP Metals - 6010A (SW-846) (Chromium, Lead); Mercury - 7471 - (CV)	See item (2) in Special Instructions						

	Sample No.	Matrix *	Sample Date	Sample Time										
1	B0VFL1	Soil	5/18/99	0850			X	X					tie to	B01939
2	B0VFL2	Soil	5/18/99	0915			X	X						B01948
3	B0VFL3	Soil	5/18/99	0940			X	X						B01950
4	B0VFL4	Soil	5/18/99	1000			X	X						B01956

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
R. Fahlberg / R. Fahlberg	1615 5.18.99	Ref #1-C	1615 5.18.99
Ref 1-C	5/20/99 1045	S. Gale	5/20/99 1045
S. Gale	5/20/99 1045	FED EX	
FED EX	5/21/99 0930		5/21/99 0930

SPECIAL INSTRUCTIONS

(1) Americium-241; Isotopic Plutonium; Isotopic Uranium; Strontium-89,90 – Total Sr; Nickel-63

(2) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Uranium-238)

6.2

COLLECTOR UNAVAILABLE TO SIGN COC

Matrix *: Soil, Water, Vapor, Other Solid, Other Liquid

LABORATORY SECTION — Received By — Title — Date/Time

FINAL SAMPLE DISPOSITION — Disposal Method — Disposed By — Date/Time

Collector	Company Contact	Telephone No.	Project Coordinator	Price Code	Data Turnaround
Fahlberg/Kerkow	R Coffman	373-5425	TRENT, SJ		15 Days

Project Designation	Sampling Location	SAF No.
100 BC Areas - Full Protocol	100 B/C Overburden "A" "B" R.F 5-13-99	B99-002

Ice Chest No.	Field Logbook No.	Method of Shipment
SML 136	EL 1327-3	Fed Ex

Shipped To	Offsite Property No.	Bill of Lading/Air Bill No.
~~TMA/RECRA~~ RF 5/18/99	A990145	4235 7952 6242

COA R16B12 ZF020

POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	None	None	Cool 4C	None	None					
	Type of Container	P	sG	sG	sG	sG					
	No. of Container(s)	1	1	1	1	1					
Special Handling and/or Storage	Volume	20mL	60mL	125mL	250mL	1000mL					

SAMPLE ANALYSIS	Activity Scan	See item (1) in Special Instructions.	Chromium Hex - 7196	ICP Metals - 6010A (SW-846) (Chromium, Lead); Mercury - 7471 - (CV)	See item (2) in Special Instructions.					

Sample No.	Matrix *	Sample Date	Sample Time										
B0VFL5	Soil	5/18/99	1020			X	X				tiato	BOV	964
B0VFL6	Soil	5/18/99	1040			X	X					BOV	968

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By: R. Fahlberg / R. Fahlberg	Date/Time 1615 5-18-99	Received By: Raf. #1-C	Date/Time 1615 5.18.99
Relinquished By: REF 1-C	Date/Time 52099 1045	Received By: SJGALE	Date/Time 52099 1045
Relinquished By: SJGALE	Date/Time 52099 1045	Received By: FED EX	Date/Time
Relinquished By: Fed Ex	Date/Time 5/21/99 0930	Received By: B Mulley	Date/Time 5/21/99 0930

SPECIAL INSTRUCTIONS

(1) Americium-241; Isotopic Plutonium; Isotopic Uranium; Strontium-89,90 -- Total Sr; Nickel-63
(2) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Uranium-238)

COLLECTOR UNAVAILABLE TO SIGN COC

Matrix *
Soil
Water
Vapor
Other Solid
Other Liquid

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Collector	Company Contact	Telephone No.	Project Coordinator	Price Code	Data Turnaround
Fahlberg/Kerkow	R Coffman	373-6425	TRENT, SJ		15 Days

Project Designation	Sampling Location	SAF No.
100 BC Areas - Full Protocol	100 B/C Overburden "B"	B99-002

Ice Chest No.	Field Logbook No.	Method of Shipment
SML 136	EL 1327-3	Fed Ex

Shipped To	Offsite Property No.	Bill of Lading/Air Bill No.
~~TMA~~/RECRA R.F. 5/18/99	4990145	4235 7952 6242

COA R16C2A 2FQQ

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	None	None	Cool 4C	None	None						
Type of Container	P	sG	sG	sG	sG						
No. of Container(s)	1	1	1	1	1						
Volume	20mL	60mL	125mL	250mL	1000mL						
SAMPLE ANALYSIS	Activity Scan	See item (1) in Special Instructions.	Chromium Hex - 7196	ICP Metals - 6010A (SW-846) (Chromium, Lead); Mercury - 7471 - (CV)	See item (2) in Special Instructions.						

Sample No.	Matrix *	Sample Date	Sample Time										
B0VFM3	Soil	5/18/99	1240			X	X				Hold	B0V975	
B0VFM4	Soil	5/18/99	1300			X	X					B0V984	
B0VFM5	Soil	5/18/99	1300			X	X					B0V984	
B0VFM6	Soil	5/18/99	0815			X	X					—	

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
R. Fahlberg / R. Fahlberg	5-18-99 1645	Ref # 1-C	5-18-99 1645
REF 1-C	5/20/99 1045	Steve Hale	5/20/99 1045
Steve Hale	5/20/99 1045	FED EX	
FED EX	5/21/99 0930	[illegible]	5/21/99 0930

SPECIAL INSTRUCTIONS

(1) Americium-241; Isotopic Plutonium; Isotopic Uranium; Strontium-89,90 -- Total Sr; Nickel-63
(2) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Uranium-238)

COLLECTOR UNAVAILABLE TO SIGN COC

Matrix *: Soil, Water, Vapor, Other Solid, Other Liquid

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Appendix 5

Data Validation Supporting Documentation

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E

PROJECT: 100BC WSG 3 OB		DATA PACKAGE: H0409	
VALIDATOR: TLI	LAB: RecRx	DATE: 7/22/95	
CASE:		SDG: H0409	

ANALYSES PERFORMED

☐ CLP/ICP	☐ CLP/GFAA	☐ CLP/Hg	☐ CLP/Cyanide	☐	☐
☒ SW-846/ICP	☐ SW-846/GFAA	☒ SW-846/Hg	☐ SW-846 Cyanide	☒ CrVI	☐

SAMPLES/MATRIX BOVFL1 BOVFL2 BOVFL3 BOVFL4 BOVFL5 BOVFL6 BOVFM3 BOVFM4 BOVFM5 BOVFM6

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . Yes No N/A

Is a case narrative present? . . . . . Yes No N/A

Comments:

2. HOLDING TIMES

Are sample holding times acceptable? . . . . . Yes No N/A

Comments:

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

Were initial calibrations performed on all instruments? . . . . Yes No N/A
Are initial calibrations acceptable? . . . . . Yes No N/A
Are ICP interference checks acceptable? . . . . . Yes No N/A
Were ICV and CCV checks performed on all instruments? . . . . . Yes No N/A
Are ICV and CCV checks acceptable? . . . . . Yes No N/A

Comments:

4. BLANKS

Were ICB and CCB checks performed for all applicable analyses? Yes No N/A
Are ICB and CCB results acceptable? . . . . . Yes No N/A
Were preparation blanks analyzed? . . . . . Yes No N/A
Are preparation blank results acceptable? . . . . . Yes No N/A
Were field/trip blanks analyzed? . . . . . Yes No N/A
Are field/trip blank results acceptable? . . . . . Yes No N/A

Comments:

MG - EB CRVI in ED

5. ACCURACY

Were spike samples analyzed? . . . . . Yes No N/A
Are spike sample recoveries acceptable? . . . . . Yes No N/A
Were laboratory control samples (LCS) analyzed? . . . . . Yes No N/A
Are LCS recoveries acceptable? . . . . . Yes No N/A

Comments:

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

6. PRECISION

Were laboratory duplicates analyzed? . . . . . Yes No N/A
Are laboratory duplicate samples RPD values acceptable? . . . . Yes No N/A
Were ICP serial dilution samples analyzed? . . . . . Yes No N/A
Are ICP serial dilution %D values acceptable? . . . . . Yes No N/A
Are field duplicate RPD values acceptable? . . . . . Yes No N/A
Are field split RPD values acceptable? . . . . . Yes No N/A

Comments:

7. FURNACE AA QUALITY CONTROL

Were duplicate injections performed as required? . . . . . Yes No N/A
Are duplicate injection %RSD values acceptable? . . . . . Yes No N/A
Were analytical spikes performed as required? . . . . . Yes No N/A
Are analytical spike recoveries acceptable? . . . . . Yes No N/A
Was MSA performed as required? . . . . . Yes No N/A
Are MSA results acceptable? . . . . . Yes No N/A

Comments:

8. REPORTED RESULTS AND DETECTION LIMITS

Are results reported for all requested analyses? . . . . . Yes No N/A
Are all results supported in the raw data? . . . . . Yes No N/A
Are results calculated properly? . . . . . Yes No N/A
Do results meet the CRDLs? . . . . . Yes No N/A

Comments: CR VI all out
Lead 62 25 116 out

Recra LabNet - Lionville

INORGANICS METHOD BLANK DATA SUMMARY PAGE 06/04/99

CLIENT: TMU-HANFORD B99-002 RECRA LOT #: 9905L041

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK1	99L0348-MB1	Chromium, Total	0.35 u	MG/KG	0.35	1.0
		Lead, Total	4.1 u	MG/KG	4.1	1.0
BLANK1	99C0156-MB1	Mercury, Total	0.02 u	MG/KG	0.02	1.0

D02

Recra LabNet - Lionville

INORGANICS ACCURACY REPORT 06/04/99

CLIENT: TNU-HANFORD B99-002 RECRA LOT #: 9905L041

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR(SPK)
-001	B0VFL1	Chromium, Total	26.0	8.4	18.3	96.2	1.0
		Mercury, Total	0.19	0.02u	0.17	109.9	1.0
		Lead, Total	46.2	3.8	45.7	92.8	1.0

Recra LabNet - Lionville

INORGANICS PRECISION REPORT 06/04/99

CLIENT: TNU-HANFORD B99-002 RECRA LOT #: 9905L041

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR(REP)
-001REP	B0VFL1	Chromium, Total	8.4	9.0	6.9	1.0
		Mercury, Total	0.02u	0.02u	NC	1.0
		Lead, Total	3.8	3.7 u	~~NC~~ 200	1.0

Corrections
AD 6/4/99

~~008~~

Recra LabNet - Lionville

INORGANICS METHOD BLANK DATA SUMMARY PAGE 05/28/99

CLIENT: TNU-HANFORD B99-002 RECRA LOT #: 9905L041

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK10	99LVI042-MB1	Chromium VI	0.40 u	MG/KG	0.40	1.0

005

Recra LabNet - Lionville

INORGANICS ACCURACY REPORT 05/28/99

CLIENT: TNU-HANFORD B99-002

WORK ORDER: 10985-001-001-9999-00

RECRA LOT #: 9905L041

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR(SPK)
-010	B0VFM6	Soluble Chromium VI	5.5	1.3	4.0	104.5	1.0
		Insoluble Chromium VI	1350	1.3	1160	115.8	100
BLANK10	99LVI042-MB1	Soluble Chromium VI	3.7	0.40u	4.0	92.1	1.0
		Insoluble Chromium VI	1300	0.40u	1160	111.8	100

006

Recra LabNet - Lionville

INORGANICS PRECISION REPORT 05/28/99

CLIENT: TNU-HANFORD B99-002

RECRA LOT #: 9905L041

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR(REP)
-010REP	B0VFM6	% Solids	100	99.9	0.070	1.0
		Chromium VI	1.3	1.4	7.3	1.0

Review Comment Record (RCR)

1. Date	2. Review No.
8/24/99	BHI/QA99016
3. Project	**4. Page**
Group 3 Overburden	Page 1 of 1

5. Document Number(s)/Title(s)	6. Program/Project/ Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
H0409-TNU&RLN (SDG No. H0409)	100-BC Areas – Full Protocol – Waste Site Group 3 Overburden	Claude Stacey	BHI/QA	H0-16/372-9208

17. Comment Submittal Approval:

Organization Manager (Optional) — Date

10. Agreement with indicated comment disposition(s)

Reviewer/Point of Contact — Author/Originator

11. CLOSED

8/31/99 Date — Reviewer/Point of Contact — Author/Originator

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
1	Inorganic: Page 2, Holding Times, first line has " . . . 30 days for chrome VI; . . ." The "chrome" should be "chromium".		corrected 8/23/99	
2	Inorganic: Page 010 needs paginated.		corrected 8/23/99	
3	Radiochemistry: Page 11, the CRDL for Eu-155, and Cs-137 should be 0.05 not 0.1.		corrected 8/25/99	
4				

AUG 24 '99 03:22PM BHI S&D MANAGEMENT 509 372 9487 P.1/2

SDG H0393 Inorganic – No comments.

SDG H0393 Rad

- 100-BC TDL for Eu-155 is 0.05 pCi/g. Sample numbers B0VD36, B0VD39, B0VB3 failed. Correct summary table and narrative.

SDG H0436 Inorganic – No comments.

SDG H0436 Rad

- 100-BC TDL for Eu-155 is 0.05 pCi/g. Sample numbers B0VLC4, B0VLC6 failed. Correct summary table and narrative.

SDG H0409 Inorganic – No comments.

SDG H0409 Rad

- 100-BC TDL for Eu-155 is 0.05 pCi/g. Sample numbers B0VFL1, B0VFL2, B0VFL3, B0VFL4, B0VFL6, B0VFM3, B0VFM6 failed. Correct summary table and narrative. Corrected

8/27/99

Comments – RL Weiss

SDG H0399 Rad

- 100-BC TDL for Eu-155 is 0.05 pCi/g. Sample numbers B0VD41, B0VD43, B0VD44 failed. Correct summary table and narrative.

- Minor Deficiencies - Remove 1st paragraph (does not reflect earlier statement in PRECISION and no "J" were applied to the data.

SDG H0434 Inorganic – No comments

SDG H0434 Rad

- 100-BC TDL for Eu-155 is 0.05 pCi/g. Sample numbers B0VF69, B0VF70, B0VF71, B0V72, failed. Correct summary table and narrative.

- Need to apply "J" flag to Am-241 results on pg. 14 (B0VF72).

SDG H0387 Inorganic – No comments

SDG H0387 Rad

- 100-BC TDL for Eu-155 is 0.05 pCi/g. Sample number B0V6N8 failed. Correct summary table and narrative.

SDG H0377 Inorganic – No comments.

SDG H0377 Rad

- 100-BC TDL for Eu-155 is 0.05 pCi/g. Sample number B0V1X0 failed. Correct summary table and narrative.

SDG H0437 Inorganic

- ACCURACY – MS failure was for Hg not Pb. Correct narrative, tables, and annotated results.

SDG H0437 Rad

- 100-BC TDL for Eu-155 is 0.05 pCi/g. Sample numbers B0VFK2, B0VFK4, B0VFK5 failed. Correct summary table and narrative.

- The package has 2 narrative sections. The one with the "wrong" waste site (116-B6A) appears to be more correct except for waste site identity.

SDG H0393 Inorganic – No comments.

SDG H0393 Rad

- 100-BC TDL for Eu-155 is 0.05 pCi/g. Sample numbers B0VD36, B0VD39, B0VB3 failed. Correct summary table and narrative.

SDG H0436 Inorganic – No comments.

SDG H0436 Rad

- 100-BC TDL for Eu-155 is 0.05 pCi/g. Sample numbers B0VLC4, B0VLC6 failed. Correct summary table and narrative.

SDG H0409 Inorganic – No comments.

SDG H0409 Rad

- 100-BC TDL for Eu-155 is 0.05 pCi/g. Sample numbers B0VFL1, B0VFL2, B0VFL3, B0VFL4, B0VFL6, B0VFM3, B0VFM6 failed. Correct summary table and narrative.

Review Comment Record (RCR)

1. Date	2. Review No.
8/24/99	BHI/QA99016
3. Project	4. Page
Group 3 Overburden	Page 1 of 1

5. Document Number(s)/Title(s)	6. Program/Project/ Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
H0409-TNU&RLN (SDG No. H0409)	100-BC Areas – Full Protocol – Waste Site Group 3 Overburden	Claude Stacey	BHI/QA	H0-16/372-9208

17. Comment Submittal Approval:

Organization Manager (Optional) _____ Date _____

10. Agreement with indicated comment disposition(s)

Reviewer/Point of Contact _____ Date _____

Author/Originator _____

11. CLOSED

Reviewer/Point of Contact _____

Author/Originator _____

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
1	Inorganic: Page 2, Holding Times, first line has " . . . 30 days for chrome VI; . . ." The "chrome" should be "chromium".			
2	Inorganic: Page 010 needs paginated.			
3	Radiochemistry: Page 11, the CRDL for Eu-155, and Cs-137 should be 0.05 not 0.1.			
4				

Post-It™ brand fax transmittal memo 7671 | # of pages ▸ 1

To J. Duncan	From R Christian
Co.	Co.
Dept.	Phone #
Fax #	Fax #

Duncan,

From:
Sent:
To:
Subject: burden)

Jeanette -

I have finished reviewing the H0409 validation report. I only have one change. In the radiochemistry package Bruce mentions analytes that are over the detection limit. There are a couple of analytes missing from his list.

Cesium-137 in sample B0VFL1 is above detection limits and europium-155 is greater than detection in samples B0VFL1, B0VFL2, B0VFL3, B0VFL4, B0VFL6, B0VFM3, and B0VFM6.

I don't have any other changes.

Thanks,

Tina Routt
CH2M Hill Richland Office
(509) 375-3444, ext. 211
(509) 375-5566 fax

B0VFL1 - CS-137 is a detected sample. ✓

EU-155 - corrected ~~per~~ per earlier RCR

RC
8/31/99

Duncan, Jeanette M

From: Routt, Tina/RLO [troutt@CH2M.com]
Sent: Thursday, August 26, 1999 5:43 PM
To: Duncan, Jeanette/RLO-HAN
Subject: Review of Validation Report H0409 (Group 3 Overburden)

Jeanette -

I have finished reviewing the H0409 validation report. I only have one change. In the radiochemistry package Bruce mentions analytes that are over the detection limit. There are a couple of analytes missing from his list.

Cesium-137 in sample B0VFL1 is above detection limits and europium-155 is greater than detection in samples B0VFL1, B0VFL2, B0VFL3, B0VFL4, B0VFL6, B0VFM3, and B0VFM6.

I don't have any other changes.

Thanks,

Tina Routt
CH2M Hill Richland Office
(509) 375-3444, ext. 211
(509) 375-5566 fax

FAX

TECHLAW, INC.
451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 23 July 1999

Information Request

H0409 - Radiochemistry

- Page 10 of the data package (gamma scan - method summary) indicates that sample B0VFL1 was run 9 days later than the other samples
  See attached sheets for additional GEA QC data
- Page 4 (method summaries - isotopic plutonium) of the data package indicates that samples B0VFL4 and B0VFL6 were not run analyzed with the other samples of the SDG.
  Apply qualifiers as per procedure
- Page 8 of the data package indicates that the strontium-90 analysis was conducted before preparation.
  Data previously provided

Rick Wear
8-16-99

Thermo NUtech
2030 Wright Avenue
P.O. Box 4040
Richmond, CA 94804-0040
(510) 235-2633 • FAX (510) 235-0438

August 14, 1999

Ms. Joan Kessner
3190 George Washington Way
Richland, WA 99352
MSIN: H9-03

Reference: P.O. #TRB-SBB-207925
Thermo Nutech N9-05-124-7128, SDG H0409, Supplemental Report

Dear Ms. Kessner:

The gamma spectroscopy planchets for the above referenced SDG were counted on dates from June 2 through June 7 with the QC LCS and blank counted on June 5 and 7 respectively. The planchet for sample B0VFL1, however, was recounted on June 14, seven days after the last sample in the batch and the recount data was reported. Enclosed is additional gamma spectroscopy data for Quality Control samples counted on or near June 14, 1999. The data is supplied to support the gamma spectroscopy data for sample B0VFL1. The additional gamma spectroscopy data was originally reported in BHI SDG H0422 (TNU N905124-7137). The QC LCS was counted on June 14 and the QC Blank was counted on June 15. No other gamma spectroscopy QC samples were analyzed on June 14 or 15 at Thermo Nutech.

Please call if you have any questions concerning this aditional data.

Sincerely,

N. Joseph Verville
Senior Program Manager

/njv

Enclosure: data

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0422

SAMPLE SUMMARY

SDG 7137
Contact L.A. Johnson

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0422

CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	LAB SAMPLE ID	SAF NO	CHAIN OF CUSTODY	COLLECTED
B0VHJ0	116-H-7	SOLID		N905178-01	B99-041	B99-041-035	05/20/99 08:55
B0VHJ1	116-H-7	SOLID		N905178-02	B99-041	B99-041-035	05/20/99 09:10
Method Blank		SOLID		N905178-04	B99-041		
Lab Control Sample		SOLID		N905178-03	B99-041		
Duplicate (N905178-01)	116-H-7	SOLID		N905178-05	B99-041		05/20/99 08:55

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CS
Version 3.06
Report date 08/14/99

QV 8/14

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0422

QC SUMMARY

SDG 7137
Contact L.A. Johnson

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0422

QC BATCH	CHAIN OF CUSTODY	CLIENT SAMPLE ID	MATRIX	% SOLIDS	SAMPLE AMOUNT	BASIS AMOUNT	DAYS SINCE RECEIVED	DAYS SINCE COLL	LAB SAMPLE ID	DEPARTMENT SAMPLE ID
7137	B99-041-035	B0VHJ0	SOLID	79.5			05/27/99	7	N905178-01	7137-001
		B0VHJ1	SOLID	93.1			05/27/99	7	N905178-02.	7137-002
		Method Blank	SOLID						N905178-04	7137-004
		Lab Control Sample	SOLID						N905178-03	7137-003
		Duplicate (N905178-01)	SOLID	79.5			05/27/99	7	N905178-05	7137-005

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-QS
Version 3.06
Report date 08/14/99

Q 8/14

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0422

N905178-04

Method Blank

METHOD BLANK

SDG	7137	Client/Case no	Hanford SDG-H0422
Contact	L.A. Johnson	Case no	TRB-SBB-207925
Lab sample id	N905178-04	Client sample id	Method Blank
Dept sample id	7137-004	Material/Matrix	SOLID
		SAF No	B99-041

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Uranium 233/234	U-233/234	0	0.024	0.092	1.0	U	U
Uranium 235	15117-96-1	0.029	0.029	0.11	1.0	U	U
Uranium 238	U-238	0	0.024	0.092	1.0	U	U
Plutonium 238	13981-16-3	0.005	0.010	0.017	1.0	U	PU
Plutonium 239/240	PU-239/240	0	0.007	0.017	1.0	U	PU
Nickel 63	13981-37-8	-0.451	1.1	2.0	30	U	NI_L
Total Strontium	SR-RAD	0.016	0.14	0.19	1.0	U	SR
Potassium 40	13966-00-2	U		100		U	GAM
Cobalt 60	10198-40-0	U		11	0.050	U	GAM
Cesium 137	10045-97-3	U		8.7	0.10	U	GAM
Europium 152	14683-23-9	U		19	0.10	U	GAM
Europium 154	15585-10-1	U		19	0.10	U	GAM
Europium 155	14391-16-3	U		11	0.10	U	GAM
Radium 226	13982-63-3	U		18	0.10	U	GAM
Radium 228	15262-20-1	U		33	0.20	U	GAM
Thorium 228	14274-82-9	U		9.0		U	GAM
Thorium 232	TH-232	U		33		U	GAM
Americium 241	14596-10-2	U		6.0		U	GAM
Uranium 238	U-238	U		1000		U	GAM
Uranium 235	15117-96-1	U		20		U	GAM

100 H Area - Quick Turn

QC-BLANK 30986

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	08/14/99

QN 8/14

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0422

N905178-03

Lab Control Sample

LAB CONTROL SAMPLE

SDG 7137

Contact L.A. Johnson

Client/Case no Hanford SDG-H0422

Case no TRB-SBB-207925

Lab sample id N905178-03

Dept sample id 7137-003

Client sample id Lab Control Sample

Material/Matrix SOLID

SAF No B99-041

ANALYTE	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST	ADDED pCi/g	2σ ERR pCi/g	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Uranium 233/234	4.98	0.90	0.45	1.0		U	4.83	0.19	103	70-130	80-120
Uranium 235	3.99	0.76	0.17	1.0		U	3.92	0.16	102	69-131	80-120
Uranium 238	5.14	0.92	0.44	1.0		U	5.24	0.21	98	72-128	80-120
Plutonium 238	5.27	0.36	0.015	1.0		PU	5.66	0.23	93	87-113	80-120
Plutonium 239/240	5.66	0.38	0.015	1.0		PU	5.95	0.24	95	87-113	80-120
Nickel 63	165	3.9	1.9	30		NI_L	168	6.7	98	84-116	
Total Strontium	13.1	0.41	0.17	1.0		SR	12.6	0.50	104	83-117	
Potassium 40	U		47		U	GAM					
Cobalt 60	177	9.6	5.4	0.050		GAM	187	7.5	95	77-123	80-120
Cesium 137	203	8.7	5.6	0.10		GAM	208	8.3	98	76-124	80-120
Europium 152	U		12	0.10	U	GAM					
Europium 154	U		11	0.10	U	GAM					
Europium 155	U		10	0.10	U	GAM					
Radium 226	U		7.7	0.10	U	GAM					
Radium 228	U		22	0.20	U	GAM					
Thorium 228	U		6.5		U	GAM					
Thorium 232	U		22		U	GAM					
Americium 241	U		9.4		U	GAM					
Uranium 238	U		690		U	GAM					
Uranium 235	U		15		U	GAM					

100 H Area - Quick Turn

QC-LCS 30985

Lab id TMANC

Protocol Hanford

Version Ver 1.0

Form DVD-LCS

Version 3.06

Report date 08/14/99

8/14

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0422

Test GAM Matrix SOLID
SDG 7137
Contact L.A. Johnson

METHOD SUMMARY

GAMMA SCAN

GAMMA SPECTROSCOPY

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0422

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	PLANCHET	Cobalt 60	Cesium 137
Preparation batch 6880-125						
B0VHJ0	N905178-01			7137-001	108	440
B0VHJ1	N905178-02			7137-002	U	0.153
BLK (QC ID=30986)	N905178-04			7137-004	U	U
LCS (QC ID=30985)	N905178-03			7137-003	ok	ok
Duplicate (N905178-01)	N905178-05			7137-005	ok	ok
Nominal values and limits from method 100 H Area - Quick Turn				RDLs (pCi/g)	0.050	0.10

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	PREPARED	ANAL-YZED	DETECTOR
Preparation batch 6880-125 2σ prep error 15.0 % Reference Lab Notebook 6880 pg.125																
B0VHJ0	N905178-01			4.8	669					394			25	06/07/99	06/14	MB,06,00
B0VHJ1	N905178-02			0.069	663					401			23	06/07/99	06/12	02,03,00
BLK (QC ID=30986)	N905178-04			16	1.00					410				06/07/99	06/15	01,01,00
LCS (QC ID=30985)	N905178-03			12	1.00					489				06/07/99	06/14	01,04,00
Duplicate (N905178-01) (QC ID=30987)	N905178-05			4.6	669					415			26	06/07/99	06/15	MB,06,00
Nominal values and limits from method				0.050	198					100			180			

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

AVERAGES ± 2 SD FOR 5 SAMPLES
MDA 7.5 ± 13
YIELD ____ ± ____

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 08/14/99

8/14

TRANSMISSION RESULT REPORT (AUG 16 '99 10:51AM)

BHI S&D MANAGEMENT 509 372 9487

(AUTO)

THE FOLLOWING FILE(S) ERASED

FILE	FILE TYPE	OPTION	TEL NO.	PAGE	RESULT
031	MEMORY TX		3755151	07/07	OK

ERRORS

1) HANG UP OR LINE FAIL 2) BUSY 3) NO ANSWER 4) NO FACSIMILE CONNECTION

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 23 July 1999

Information Request

H0409 - Radiochemistry

FAX

TECHLAW, INC.
451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 23 July 1999

Information Request

H0409 - Radiochemistry

- Page 10 of the data package (gamma scan - method summary) indicates that sample B0VFL1 was run 9 days later than the other samples
  See attached sheets for additional GEA QC data
- Page 4 (method summaries - isotopic plutonium) of the data package indicates that samples B0VFL4 and B0VFL6 were not run analyzed with the other samples of the SDG.
  Apply qualifiers as per procedure
- Page 8 of the data package indicates that the strontium-90 analysis was conducted before preparation.
  Data previously provided

Rich Wan
8-16-99

Thermo NUtech
2030 Wright Avenue
P.O. Box 4040
Richmond, CA 94804-0040
(510) 235-2633 • FAX (510) 235-0438

August 14, 1999

Ms. Joan Kessner
3190 George Washington Way
Richland, WA 99352
MSIN: H9-03

Reference: P.O. #TRB-SBB-207925
Thermo Nutech N9-05-124-7128, SDG H0409, Supplemental Report

Dear Ms. Kessner:

The gamma spectroscopy planchets for the above referenced SDG were counted on dates from June 2 through June 7 with the QC LCS and blank counted on June 5 and 7 respectively. The planchet for sample B0VFL1, however, was recounted on June 14, seven days after the last sample in the batch and the recount data was reported. Enclosed is additional gamma spectroscopy data for Quality Control samples counted on or near June 14, 1999. The data is supplied to support the gamma spectroscopy data for sample B0VFL1. The additional gamma spectroscopy data was originally reported in BHI SDG H0422 (TNU N905124-7137). The QC LCS was counted on June 14 and the QC Blank was counted on June 15. No other gamma spectroscopy QC samples were analyzed on June 14 or 15 at Thermo Nutech.

Please call if you have any questions concerning this aditional data.

Sincerely,

N. Joseph Verville
Senior Program Manager

/njv

Enclosure: data

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0422

SAMPLE SUMMARY

SDG 7137
Contact L.A. Johnson

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0422

CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	LAB SAMPLE ID	SAF NO	CHAIN OF CUSTODY	COLLECTED
B0VHJ0	116-H-7	SOLID		N905178-01	B99-041	B99-041-035	05/20/99 08:55
B0VHJ1	116-H-7	SOLID		N905178-02	B99-041	B99-041-035	05/20/99 09:10
Method Blank		SOLID		N905178-04	B99-041		
Lab Control Sample		SOLID		N905178-03	B99-041		
Duplicate (N905178-01)	116-H-7	SOLID		N905178-05	B99-041		05/20/99 08:55

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CS
Version 3.06
Report date 08/14/99

JV 8/14

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0422

QC SUMMARY

SDG 7137
Contact L.A. Johnson

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0422

QC BATCH	CHAIN OF CUSTODY	CLIENT SAMPLE ID	MATRIX	% SOLIDS	SAMPLE AMOUNT	BASIS AMOUNT	DAYS SINCE RECEIVED	DAYS SINCE COLL	LAB SAMPLE ID	DEPARTMENT SAMPLE ID
7137	B99-041-035	B0VHJ0	SOLID	79.5			05/27/99	7	N905178-01	7137-001
		B0VHJ1	SOLID	93.1			05/27/99	7	N905178-02	7137-002
		Method Blank	SOLID						N905178-04	7137-004
		Lab Control Sample	SOLID						N905178-03	7137-003
		Duplicate (N905178-01)	SOLID	79.5			05/27/99	7	N905178-05	7137-005

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-QS
Version 3.06
Report date 08/14/99

QS 8/14

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0422

N905178-04 Method Blank

METHOD BLANK

SDG	7137	Client/Case no	Hanford SDG-H0422
Contact	L.A. Johnson	Case no	TRB-SBB-207925
Lab sample id	N905178-04	Client sample id	Method Blank
Dept sample id	7137-004	Material/Matrix	SOLID
		SAF No	B99-041

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Uranium 233/234	U-233/234	0	0.024	0.092	1.0	U	U
Uranium 235	15117-96-1	0.029	0.029	0.11	1.0	U	U
Uranium 238	U-238	0	0.024	0.092	1.0	U	U
Plutonium 238	13981-16-3	0.005	0.010	0.017	1.0	U	PU
Plutonium 239/240	PU-239/240	0	0.007	0.017	1.0	U	PU
Nickel 63	13981-37-8	-0.451	1.1	2.0	30	U	NI_L
Total Strontium	SR-RAD	0.016	0.14	0.19	1.0	U	SR
Potassium 40	13966-00-2	U		100		U	GAM
Cobalt 60	10198-40-0	U		11	0.050	U	GAM
Cesium 137	10045-97-3	U		8.7	0.10	U	GAM
Europium 152	14683-23-9	U		19	0.10	U	GAM
Europium 154	15585-10-1	U		19	0.10	U	GAM
Europium 155	14391-16-3	U		11	0.10	U	GAM
Radium 226	13982-63-3	U		18	0.10	U	GAM
Radium 228	15262-20-1	U		33	0.20	U	GAM
Thorium 228	14274-82-9	U		9.0		U	GAM
Thorium 232	TH-232	U		33		U	GAM
Americium 241	14596-10-2	U		6.0		U	GAM
Uranium 238	U-238	U		1000		U	GAM
Uranium 235	15117-96-1	U		20		U	GAM

100 H Area - Quick Turn

QC-BLANK 30986

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	08/14/99

QN 8/14

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0422

N905178-03

Lab Control Sample

LAB CONTROL SAMPLE

SDG 7137

Contact L.A. Johnson

Client/Case no Hanford SDG-H0422

Case no TRB-SBB-207925

Lab sample id N905178-03

Dept sample id 7137-003

Client sample id Lab Control Sample

Material/Matrix SOLID

SAF No B99-041

ANALYTE	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST	ADDED pCi/g	2σ ERR pCi/g	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Uranium 233/234	4.98	0.90	0.45	1.0		U	4.83	0.19	103	70-130	80-120
Uranium 235	3.99	0.76	0.17	1.0		U	3.92	0.16	102	69-131	80-120
Uranium 238	5.14	0.92	0.44	1.0		U	5.24	0.21	98	72-128	80-120
Plutonium 238	5.27	0.36	0.015	1.0		PU	5.66	0.23	93	87-113	80-120
Plutonium 239/240	5.66	0.38	0.015	1.0		PU	5.95	0.24	95	87-113	80-120
Nickel 63	165	3.9	1.9	30		NI_L	168	6.7	98	84-116	
Total Strontium	13.1	0.41	0.17	1.0		SR	12.6	0.50	104	83-117	
Potassium 40	U		47		U	GAM					
Cobalt 60	177	9.6	5.4	0.050		GAM	187	7.5	95	77-123	80-120
Cesium 137	203	8.7	5.6	0.10		GAM	208	8.3	98	76-124	80-120
Europium 152	U		12	0.10	U	GAM					
Europium 154	U		11	0.10	U	GAM					
Europium 155	U		10	0.10	U	GAM					
Radium 226	U		7.7	0.10	U	GAM					
Radium 228	U		22	0.20	U	GAM					
Thorium 228	U		6.5		U	GAM					
Thorium 232	U		22		U	GAM					
Americium 241	U		9.4		U	GAM					
Uranium 238	U		690		U	GAM					
Uranium 235	U		15		U	GAM					

100 H Area - Quick Turn

QC-LCS 30985

Lab id TMANC

Protocol Hanford

Version Ver 1.0

Form DVD-LCS

Version 3.06

Report date 08/14/99

8/14

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0422

Test GAM Matrix SOLID
SDG 7137
Contact L.A. Johnson

METHOD SUMMARY

GAMMA SCAN

GAMMA SPECTROSCOPY

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0422

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	PLANCHET	Cobalt 60	Cesium 137
Preparation batch 6880-125						
B0VHJ0	N905178-01			7137-001	108	440
B0VHJ1	N905178-02			7137-002	U	0.153
BLK (QC ID=30986)	N905178-04			7137-004	U	U
LCS (QC ID=30985)	N905178-03			7137-003	ok	ok
Duplicate (N905178-01)	N905178-05			7137-005	ok	ok
Nominal values and limits from method				RDLs (pCi/g)	0.050	0.10
100 H Area - Quick Turn						

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	PREPARED	ANAL-YZED	DETECTOR
Preparation batch 6880-125 2σ prep error 15.0 % Reference Lab Notebook 6880 pg.125																
B0VHJ0	N905178-01			4.8	669					394			25	06/07/99	06/14	MB,06,00
B0VHJ1	N905178-02			0.069	663					401			23	06/07/99	06/12	02,03,00
BLK (QC ID=30986)	N905178-04			16	1.00					410				06/07/99	06/15	01,01,00
LCS (QC ID=30985)	N905178-03			12	1.00					489				06/07/99	06/14	01,04,00
Duplicate (N905178-01) (QC ID=30987)	N905178-05			4.6	669					415			26	06/07/99	06/15	MB,06,00
Nominal values and limits from method				0.050	198					100			180			

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

AVERAGES ± 2 SD FOR 5 SAMPLES
MDA 7.5 ± 13
YIELD ____ ± ____

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 08/14/99

8/14

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0409

METHOD SUMMARY

PLUTONIUM, ISOTOPIC IN SOLIDS

ALPHA SPECTROSCOPY

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0409

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	PREPARED	ANAL-YZED	DETECTOR
Preparation batch 6880-096	2σ prep error 5.0 %			Reference Lab Notebook 6880 pg.96												
B0VFL1	N905124-01			0.068	0.500			57		596			16	06/03/99	06/03	SS-016
B0VFL2	N905124-02			0.074	0.500			53		599			16	06/03/99	06/03	SS-001
B0VFL3	N905124-03			0.066	0.500			68		599			16	06/03/99	06/03	SS-002
B0VFL4	N905124-04			0.061	0.500			68		815			25	06/03/99	06/12	SS-034
B0VFL5	N905124-05			0.087	0.500			57		527			17	06/03/99	06/04	SS-008
B0VFL6	N905124-06			0.042	0.500			65		1027			20	06/03/99	06/07	SS-002
B0VFM3	N905124-07			0.067	0.500			65		526			17	06/03/99	06/04	SS-014
B0VFM4	N905124-08			0.068	0.500			66		526			17	06/03/99	06/04	SS-001
B0VFM5	N905124-09			0.070	0.500			72		526			17	06/03/99	06/04	SS-002
B0VFM6	N905124-10			0.066	0.500			64		526			17	06/03/99	06/04	SS-004
BLK (QC ID=30856)	N905124-12			0.051	0.500			67		793				06/03/99	06/04	SS-001
LCS (QC ID=30855)	N905124-11			0.045	0.500			85		596				06/03/99	06/03	SS-014
Duplicate (N905124-01) (QC ID=30857)	N905124-13			0.069	0.500			55		793			17	06/03/99	06/04	SS-002
Nominal values and limits from method				1.0	0.500			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 FOR 13 SAMPLES
MDA 0.064 ± 0.024
YIELD 65 ± 17

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 07/22/99

BHI Sample Management
Phone: (509) 372-9346
FAX: (509) 372-9487

facsimile transmittal

To: B. Christian Fax: 375-3157

From: R. Weiss Date: 8-3-95

Re: IR Info Pages: 3

CC:

☐ ~~Quick Turn / Priority Data~~ ☐ ~~Final Data Package~~

See comments & attached sheet

Rich

FAX

TECHLAW, INC.
451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 30 July 1999

Information Request - RESUBMITTAL

110409 - Radiochemistry

- Page 10 of the data package (gamma scan - method summary) indicates that sample B0VFL1 was run 9 days later than the other samples

  INFORMATION RECEIVED✓✓

- Page 4 (method summaries - isotopic plutonium) of the data package indicates that samples B0VFL4 and B0VFL6 were not run analyzed with the other samples of the SDG.

  SAMPLE BOVFL4 IS NOT MENTIONED IN THEIR RESPONSE (NEW CASE NARRATIVE)

  BOVFL4 was not recounted. Date shown is date for initial analysis (will work this out with the "recount" issue)

- Page 8 of the data package indicates that the strontium-90 analysis was conducted before preparation.

  THEIR RESPONSE DOES NOT PROVIDE ANY FURTHER INFORMATION AS TO PREPARATION DATES VERSUS ANALYSIS DATES

  Needed sheets attached

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0409

Test SR	Matrix SOLID
SDG 7128	
Contact L.A. Johnson	

METHOD SUMMARY

TOTAL STRONTIUM IN SOIL

BETA COUNTING

Client Hanford	
Contract TRB-SBB-207925	
Case no SDG-H0409	

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	PREPARED	ANAL-YZED	DETECTOR
Preparation batch 6880-096	2σ prep error 10.0 %	Reference Lab Notebook 6880 pg.96														
B0VFL1	N905124-01			0.18	1.00			84		400			14	05/31/99	06/01	GRB-201
B0VFL2	N905124-02			0.15	1.00			81		200			14	05/31/99	06/01	GRB-202
B0VFL3	N905124-03			0.43	1.00			30		400			14	05/31/99	06/01	GRB-203
B0VFL4	N905124-04			0.16	1.00			91		400			14	05/31/99	06/01	GRB-204
B0VFL5	N905124-05			0.15	1.00			90		400			14	05/31/99	06/01	GRB-205
B0VFL6	N905124-06			0.15	1.00			96		400			14	05/31/99	06/01	GRB-206
B0VFM3	N905124-07			0.16	1.00			90		400			14	05/31/99	06/01	GRB-207
B0VFM4	N905124-08			0.18	1.00			88		400			14	05/31/99	06/01	GRB-208
B0VFM5	N905124-09			0.15	1.00			92		400			14	05/31/99	06/01	GRB-229
B0VFM6	N905124-10			0.16	1.00			82		400			14	05/31/99	06/01	GRB-230
BLK (QC ID=30856)	N905124-12			0.17	1.00			75		400				05/31/99	06/01	GRB-203
LCS (QC ID=30855)	N905124-11			0.19	1.00			72		400				05/31/99	06/01	GRB-231
Duplicate (N905124-01) (QC ID=30857)	N905124-13			0.15	1.00			89		400			14	05/31/99	06/01	GRB-204
Nominal values and limits from method				1.0	1.00					100			180			

PROCEDURES	RP-500	Strontium - Initial Separation, rev 0
	RP-519	Strontium-89,90 Demounting and Yttrium Purification, rev 0

AVERAGES ± 2 SD	MDA 0.18	± 0.15
FOR 13 SAMPLES	YIELD 82	± 34

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-CMS
Version	3.06
Report date	07/22/99

TRANSMISSION RESULT REPORT (AUG 05 '99 09:49AM)

BHI S&D MANAGEMENT 509 372 9487

(AUTO)

THE FOLLOWING FILE(S) ERASED

FILE	FILE TYPE	OPTION	TEL NO.	PAGE	RESULT
074	MEMORY TX		3755151	03/03	OK

ERRORS

1) HANG UP OR LINE FAIL 2) BUSY 3) NO ANSWER 4) NO FACSIMILE CONNECTION

BHI Sample Management
Phone: (509) 372-9346
FAX: (509) 372-9487

facsimile transmittal

To: B. Christian Fax: 375-3157

From: R. Weiss Date: 8-5-99

Re: IR Info Pages: 3

CC:

☐ ~~Quick Turn / Priority Data~~ ☐ ~~Final Data Package~~

See comments & attached sheet

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 23 July 1999

Information Request

H0409 - Radiochemistry

- Page 10 of the data package (gamma scan - method summary) indicates that sample B0VFL1 was run 9 days later than the other samples

- Page 4 (method summaries - isotopic plutonium) of the data package indicates that samples B0VFL4 and B0VFL6 were not run analyzed with the other samples of the SDG.

- Page 8 of the data package indicates that the strontium-90 analysis was conducted before preparation.

FAX

TECHLAW, INC.
451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 30 July 1999

Information Request - RESUBMITTAL

110409 - Radiochemistry

- Page 10 of the data package (gamma scan - method summary) indicates that sample B0VFL1 was run 9 days later than the other samples

  INFORMATION RECEIVED✓✓

- Page 4 (method summaries - isotopic plutonium) of the data package indicates that samples B0VFL4 and B0VFL6 were not run analyzed with the other samples of the SDG.

  SAMPLE BOVFL4 IS NOT MENTIONED IN THEIR RESPONSE (NEW CASE NARRATIVE)

- Page 8 of the data package indicates that the strontium-90 analysis was conducted before preparation.

  THEIR RESPONSE DOES NOT PROVIDE ANY FURTHER INFORMATION AS TO PREPARATION DATES VERSUS ANALYSIS DATES

FAX

TECHLAW, INC.
451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 22 July 1999

Information Request

H0409 - Radiochemistry

Page 8 of the data package indicates that the strontium-90 analysis was conducted before preparation.

Superceded

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 22 July 1999

Information Request

H0409 - Radiochemistry

Page 10 of the data package indicates that the gamma spec duplicate was run 7 days before the original.

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 22 July 1999

Information Request

H0409 - Radiochemistry

Page 4 (method summaries - isotopic plutonium) of the data package indicates that samples B0VFL4 and B0VFL6 were not run with the sample data group.

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 22 July 1999

Information Request

H0409 - Radiochemistry

Page 10 of the data package (method summaries) indicates that sample B0VFL1 was run 9 days later than the other samples despite having the lowest sample number in the SDG.

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 22 July 1999

Information Request

H0409 - Radiochemistry

The method blank MDAs are up to 9200 times the TDL. Is this information accurate?