

Date: 16 August 1999  
 To: Bechtel Hanford, Inc. (technical representative)  
 From: TechLaw, Inc.  
 Project: 100-BC Areas - Full Protocol - Waste Site 116-B-12  
 Subject: Radiochemistry - Data Package No. H0377-TNU (SDG No. H0377)

## INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. H0377-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
BOV1W7	04/01/99	Soil	C	See note 1
BOV1W8	04/01/99	Soil	C	See note 1
BOV1W9	04/01/99	Soil	C	See note 1
BOV1X0	04/01/99	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.

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**EDMC**

Due to the sample being analyzed six days after the SDG, all isotopic uranium (aspec) results in sample BOV1W7 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 elevated to the MDA and qualified as undetected and flagged "U"; sample results above the MDA and greater than five times the highest blank concentration are not qualified.

All blank results were acceptable, although the target detection limit (TDL) was exceeded for uranium-235 (alpha spec) and uranium-238 (GEA).

- **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 70-130% or  $\pm 3$  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 than five

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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.

Due to the duplicate analysis being conducted 5 days after the SDG, all isotopic uranium (aspec) results were qualified as estimates and flagged "J".

All other duplicate results were acceptable.

#### Field Duplicate Samples

One pair of field duplicate samples (samples BOV1W8/BOV1W9) 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. The following analytes had RPDs outside QC limits: Uranium-238 (alpha spectroscopy). Under the BHI statement of work, no qualification is required. All other 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 in the following: Uranium-238 (GEA) in all samples; americium-241 (alpha spec) in sample BOV1W8; and uranium-235 (alpha spec) and europium-155 in sample BOV1X0. 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. H0377 (SDG No. H0377) was submitted for validation and verified for completeness. The completion rate was 100%.

#### **MAJOR DEFICIENCIES**

None found.

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## **MINOR DEFICIENCIES**

Due to the sample being analyzed six days after the SDG, all isotopic uranium (aspec) results in sample BOV1W7 were qualified as estimates and flagged "J". Due to the duplicate analysis being conducted 5 days after the SDG, all isotopic uranium (aspec) 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 in the following: Uranium-238 (GEA) in all samples; americium-241(alpha spec) in sample BOV1W8; and uranium-235 (alpha spec) and europium-155 in sample BOV1X0. 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**

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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**

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**DATA QUALIFICATION SUMMARY**

SDG: H0377	REVIEWER: TLI	DATE: 8/16/99	PAGE <u>1</u> OF <u>1</u>
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Isotopic Uranium (aspec)	J	BOV1W7	Not analyzed with the SDG
Isotopic Uranium (aspec)	J	All	Duplicate not analyzed with the SDG

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**Appendix 3**

**Qualified Data Summary and Annotated Laboratory Reports**

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Project: BECHTEL-HANFORD																
Laboratory: TNU																
Case		SDG: H0377														
Sample Number	BOV1W7		BOV1W8		BOV1W9		BOV1X0									
Location	116-B-12		116-B-12		116-B-12		116-B-12									
Remarks	A1		A2		Duplicate		A3									
Sample Date	04/01/99		04/01/99		04/01/99		04/01/99									
Radiochemistry	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	
Uranium-234	0.1	0.489	J	0.485	J	0.494	J	0.616	J							
Uranium-235	0.1	0.024	UJ	0.014	UJ	0.050	UJ	0.016	UJ							
Uranium-238	0.1	0.479	J	0.688	J	0.412	J	0.630	J							
Plutonium-238	0.1	-0.006	U	0	U	0.012	U	0.003	U							
Plutonium-239/40	0.1	0.019	U	0.018	U	-0.004	U	-0.003	U							
Nickel-63	30	2.2	U	1.41	U	1.04	U	2.12	U							
Americium-241	0.1	0.007	U	0.011	U	-0.008	U	0.006	U							
Strontium (total)	1	0.044	U	0.108	U	0.058	U	0.070	U							
Potassium-40		12.1		10.7		11.6		11.5								
Cobalt 60	0.05		U		U		U		U							
Cesium 137	0.05	0.019			U		U		U							
Europium 152	0.1		U		U		U		U							
Europium 154	0.1		U		U		U		U							
Europium 155	0.05		U		U		U		U							
Radium-226		0.472		0.383		0.422		0.411								
Radium-228		0.657		0.596		0.618		0.648								
Thorium-228		0.609		0.516		0.584		0.616								
Thorium-232		0.657		0.596		0.618		0.648								
Americium-241 (GEA)	0.1		U		U		U		U							
Uranium-238 (GEA)	0.1		U		U		U		U							
Uranium-235 (GEA)	0.1		U		U		U		U							

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 SAMPLE DELIVERY GROUP H0377

N904039-01

BOV1W7

DATA SHEET

SDG <u>7111</u>	Client/Case no <u>Hanford</u>	<u>SDG-H0377</u>
Contact <u>L.A. Johnson</u>	Case no <u>TRB-SBB-207925</u>	
Lab sample id <u>N904039-01</u>	Client sample id <u>BOV1W7</u>	
Dept sample id <u>7111-001</u>	Location/Matrix <u>100 B/C 116-B-12 deep zn SOLID</u>	
Received <u>04/07/99</u>	Collected <u>04/01/99 08:45</u>	
‡ solids <u>95.1</u>	Custody/SAF No <u>B99-002-79</u>	<u>B99-002</u>

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	NDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Uranium 233/234	U-233/234	0.489	0.14	0.075	1.0	<del>U</del> J	U
Uranium 235	15117-96-1	0.024	0.024	0.091	1.0	U	U
Uranium 238	U-238	0.479	0.14	0.075	1.0	<del>U</del> J	U
Plutonium 238	13981-16-3	-0.006	0.017	0.037	1.0	U	PU
Plutonium 239/240	PU-239/240	0.019	0.017	0.027	1.0	U	PU
Nickel 63	13981-37-8	2.20	1.8	2.9	30	U	NI_L
Americium 241	14596-10-2	0.007	0.028	0.054	1.0	U	AM
Total Strontium	SR-RAD	0.044	0.11	0.15	1.0	U	SR
Potassium 40	13966-00-2	12.1	0.39	0.19			GAM
Cobalt 60	10198-40-0	U		0.018	0.050	U	GAM
Cesium 137	10045-97-3	0.019	0.012	0.016	0.10	<del>U</del>	GAM
Europium 152	14683-23-9	U		0.045	0.10	U	GAM
Europium 154	15585-10-1	U		0.064	0.10	U	GAM
Europium 155	14391-16-3	U		0.047	0.10	U	GAM
Radium 226	13982-63-3	0.472	0.037	0.036	0.10		GAM
Radium 228	15262-20-1	0.657	0.086	0.086	0.20		GAM
Thorium 228	14274-82-9	0.609	0.023	0.022			GAM
Thorium 232	TH-232	0.657	0.086	0.086			GAM
Americium 241	14596-10-2	U		0.070		U	GAM
Uranium 238	U-238	U		2.2		U	GAM
Uranium 235	15117-96-1	U		0.076		U	GAM

100 BC Areas-Full Protocol

**PRIORITY**

8/13/99 *R*

Lab id <u>TMNC</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>1.06</u>
Report date <u>07/23/99</u>

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SAMPLE DELIVERY GROUP H0377

N904039-02

BOV1W8

DATA SHEET

SDG <u>7111</u>	Client/Case no <u>Hanford</u>	<u>SDG-H0377</u>
Contact <u>L.A. Johnson</u>	Case no <u>TRB-SRB-207925</u>	
Lab sample id <u>N904039-02</u>	Client sample id <u>BOV1W8</u>	
Dept sample id <u>7111-002</u>	Location/Matrix <u>100 B/C 116-B-12 deep zn SOLID</u>	
Received <u>04/07/99</u>	Collected <u>04/01/99 09:20</u>	
† solids <u>95.0</u>	Custody/SAF No <u>B99-002-79</u>	<u>B99-002</u>

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Uranium 233/234	U-233/234	0.485	0.16	0.086	1.0	<i>KJ</i>	U
Uranium 235	15117-96-1	0.014	0.027	0.10	1.0	U J	U
Uranium 238	U-238	0.688	0.19	0.086	1.0	<i>KJ</i>	U
Plutonium 238	13981-16-3	0	0.018	0.037	1.0	U	PU
Plutonium 239/240	PU-239/240	0.018	0.018	0.033	1.0	U	PU
Nickel 63	13981-37-8	1.41	1.8	3.0	30	U	NI_L
Americium 241	14596-10-2	0.011	0.046	0.11	1.0	U	AM
Total Strontium	SR-RAD	0.106	0.10	0.13	1.0	U	SR
Potassium 40	13966-00-2	10.7	0.38	0.18			GAM
Cobalt 60	10198-40-0	U		0.018	0.050	U	GAM
Cesium 137	10045-97-3	U		0.019	0.10	U	GAM
Europium 152	14683-23-9	U		0.042	0.10	U	GAM
Europium 154	15585-10-1	U		0.059	0.10	U	GAM
Europium 155	14391-16-3	U		0.045	0.10	U	GAM
Radium 226	13982-63-3	0.383	0.033	0.033	0.10		GAM
Radium 228	15262-20-1	0.596	0.083	0.084	0.20		GAM
Thorium 228	14274-82-9	0.516	0.022	0.020			GAM
Thorium 232	TH-232	0.596	0.083	0.084			GAM
Americium 241	14596-10-2	U		0.066		U	GAM
Uranium 238	U-238	U		2.2		U	GAM
Uranium 235	15117-96-1	U		0.072		U	GAM

100 BC Areas-Full Protocol

**PRIORITY**

8/15/99 *K*

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Lab id <u>TNANC</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>1.06</u>
Report date <u>07/23/99</u>

TMA / RICHMOND  
 SAMPLE DELIVERY GROUP H0377

N904039-03

BOV1W9

DATA SHEET

SDG <u>7111</u>	Client/Case no <u>Hanford</u>	SDG- <u>H0377</u>
Contact <u>L.A. Johnson</u>	Case no <u>TRB-SBB-207925</u>	
Lab sample id <u>N904039-03</u>	Client sample id <u>BOV1W9</u>	
Dept sample id <u>7111-003</u>	Location/Matrix <u>100 B/C 116-B-12 deep zn SOLID</u>	
Received <u>04/07/99</u>	Collected <u>04/01/99 09:20</u>	
t solids <u>94.2</u>	Custody/SAF No <u>B99-002-79</u>	<u>B99-002</u>

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Uranium 233/234	U-233/234	0.494	0.14	0.063	1.0	<del>U</del> J	U
Uranium 235	15117-96-1	0.050	0.040	0.076	1.0	U J	U
Uranium 238	U-238	0.412	0.12	0.063	1.0	<del>U</del> J	U
Plutonium 238	13981-16-3	0.012	0.023	0.048	1.0	U	PU
Plutonium 239/240	PU-239/240	-0.004	0.023	0.048	1.0	U	PU
Nickel 63	13981-37-8	1.04	1.6	2.6	30	U	NI_L
Americium 241	14596-10-2	-0.008	0.016	0.060	1.0	U	AM
Total Strontium	SR-RAD	0.058	0.098	0.13	1.0	U	SR
Potassium 40	13966-00-2	11.6	0.46	0.19			GAM
Cobalt 60	10198-40-0	U		0.024	0.050	U	GAM
Cesium 137	10045-97-3	U		0.021	0.10	U	GAM
Europium 152	14683-23-9	U		0.048	0.10	U	GAM
Europium 154	15585-10-1	U		0.079	0.10	U	GAM
Europium 155	14391-16-3	U		0.042	0.10	U	GAM
Radium 226	13982-63-3	0.422	0.041	0.038	0.10		GAM
Radium 228	15262-20-1	0.618	0.11	0.11	0.20		GAM
Thorium 228	14274-82-9	0.584	0.024	0.022			GAM
Thorium 232	TH-232	0.618	0.11	0.11			GAM
Americium 241	14596-10-2	U		0.027		U	GAM
Uranium 238	U-238	U		2.8		U	GAM
Uranium 235	15117-96-1	U		0.066		U	GAM

100 BC Areas-Full Protocol

**PRIORITY** *pc*  
 8/13/99

Lab id <u>TMANC</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>1.06</u>
Report date <u>07/23/99</u>

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TMA / RICHMOND  
SAMPLE DELIVERY GROUP H0377

N904039-04

BOVIX0

DATA SHEET

SDG <u>7111</u>	Client/Case no <u>Hanford</u>	<u>SDG-H0377</u>
Contact <u>L.A. Johnson</u>	Case no <u>TRH-SBB-207925</u>	
Lab sample id <u>N904039-04</u>	Client sample id <u>BOVIX0</u>	
Dept sample id <u>7111-004</u>	Location/Matrix <u>100 B/C 115-B-12 deep zn SOLID</u>	
Received <u>04/07/99</u>	Collected <u>04/01/99 09:45</u>	
% solids <u>93.6</u>	Custody/SAF No <u>B99-002-79</u>	<u>B99-002</u>

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Uranium 233/234	U-233/234	0.616	0.19	0.10	1.0	<del>U</del> J	U
Uranium 235	15117-96-1	0.016	0.032	0.12	1.0	U J	U
Uranium 238	U-238	0.630	0.19	0.10	1.0	<del>U</del> J	U
Plutonium 238	13981-16-3	0.003	0.011	0.020	1.0	U	PU
Plutonium 239/240	PU-239/240	-0.003	0.005	0.020	1.0	U	PU
Nickel 63	13981-37-8	2.12	1.6	2.6	30	U	NI_L
Americium 241	14596-10-2	0.006	0.038	0.079	1.0	U	AM
Total Strontium	SR-RAD	0.070	0.11	0.14	1.0	U	SR
Potassium 40	13966-00-2	11.5	0.48	0.22			GAM
Cobalt 60	10198-40-0	U		0.022	0.050	U	GAM
Cesium 137	10045-97-3	U		0.021	0.10	U	GAM
Europium 152	14683-23-9	U		0.052	0.10	U	GAM
Europium 154	15585-10-1	U		0.076	0.10	U	GAM
Europium 155	14391-16-3	U		0.057	0.10	U	GAM
Radium 226	13982-63-3	0.411	0.038	0.038	0.10		GAM
Radium 228	15262-20-1	0.648	0.099	0.10	0.20		GAM
Thorium 228	14274-82-9	0.616	0.027	0.025			GAM
Thorium 232	TH-232	0.648	0.099	0.10			GAM
Americium 241	14596-10-2	U		0.084		U	GAM
Uranium 238	U-238	U		2.8		U	GAM
Uranium 235	15117-96-1	U		0.090		U	GAM

100 BC Areas-Full Protocol

**PRIORITY** *pu*  
8/13/99

Lab id <u>TMANC</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
Report date <u>07/23/99</u>

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**Appendix 4**

**Laboratory Narrative and Chain-of-Custody Documentation**

**000015**

Thermo Nutech  
W.O. No. N9-04-039-7111

Bechtel Hanford Inc.  
SDG H0377

## **Case Narrative**

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### **1.0 GENERAL**

Bechtel Hanford Inc. Sample Delivery Group H0377 is comprised of four solid (soil) samples designated under SAF No. B99-002 with a Project Designation of: 100 BC Area-Full Protocol.

The samples were received as stated on the Chain-of-Custody documents. Any discrepancies are noted on the TNU Sample Receipt Checklist. Gamma Scan results were transmitted via fax on April 26, 1999; Isotopic Uranium and Nickel-63 were reported by fax on April 27, 1999; Total Strontium by fax on April 28, 1999; Isotopic Plutonium by fax on April 27 and May 4, 1999 and Americium by fax on April 28 and May 4, 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. Recounts were taken on BOV1W7 as well as the duplicate.

#### **2.6 Americium-241 Analyses**

No problems were encountered during the processing of the samples.

**PRIORITY**

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CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

B99-002-79

Page 1 of 1

Collector: Fahlberg/Coffman	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 116-B-12 deep zone	SAF No. B99-002			
Ice Chest No. <b>SML-463</b>	Field Logbook No. EL 1327-2	Method of Shipment Fed Ex			
Shipped To TMA/REGRA R.F. 4.1.99	Offsite Property No. <b>A990097</b>	Bill of Lading/Air Bill No. <b>423579524364</b>			

COA

POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	None	None	Cool 4C	None	None							
	Type of Container	aG	aG	aG	aG	aG							
	No. of Container(s)	1	1	1	1	1							
	Special Handling and/or Storage	Volume	60mL	60mL	125mL	250mL	1000mL						
000017	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									
	✓ B0V1W7	Soil	4.1.99	0845	X	X			X				tie to BotVY9
	✓ B0V1W8	Soil	4.1.99	0920	X	X			X				Botwo
	✓ B0V1W9	Soil	4.1.99	0920	X	X			X				Botwo
✓ B0V1X0	Soil	4.1.99	0945	X	X			X				Botwo	

CHAIN OF POSSESSION		Sign/Print Names		SPECIAL INSTRUCTIONS				Matrix *	
Relinquished By R. COFFMAN R. Coffman	Date/Time 4-1-99 1600	Received By Ref. IC	Date/Time 4-1-99 1600	(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)  R.T. Coffman unavailable to relinquish samples.				Soil Water Vapor Other Solid Other Liquid	
Relinquished By Ref. IC	Date/Time 4/6/99 1110	Received By R. Nielson / R. Nielson	Date/Time 4/6/99 1110						
Relinquished By R. Nielson / R. Nielson	Date/Time 4/6/99 1300	Received By Fed Ex	Date/Time 4-6-99						
Relinquished By Fed Ex	Date/Time 4-7-99 10:30	Received By R. Nielson / R. Nielson	Date/Time 4-7-99						
LABORATORY SECTION	Received By	Title		Date/Time					
FINAL SAMPLE DISPOSITION	Disposal Method		Disposed By				Date/Time		

---

**Appendix 5**  
**Data Validation Supporting Documentation**

**000018**

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	<b>C</b>	D	E
PROJECT:	116-B-12		DATA PACKAGE: <del>W0377</del> H0377		
VALIDATOR:	TL	LAB:	QES TVU	DATE: 6/30/99	
CASE:			SDG: H0377		
ANALYSES PERFORMED					
<input type="checkbox"/> Gross Alpha/Beta	<input checked="" type="checkbox"/> Strontium-90	<input type="checkbox"/> Technetium-99	<input checked="" type="checkbox"/> Alpha Spectroscopy	<input checked="" type="checkbox"/> Gamma Spectroscopy	
<input type="checkbox"/> Total Uranium	<input type="checkbox"/> Radium-22	<input type="checkbox"/> Tritium	<input checked="" type="checkbox"/> U-235		
SAMPLES/MATRIX	BOV1W7	BOV1W8	BOV1W9	BOV1X0	
Soil					

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: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

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: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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: N1-43 uses real yield  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

*A-22*

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: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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: U-238 Aspec (2070)

10. Holding Times

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

Comments: BOU107 ISO Uranium 6 days after SDG J  
duplex 5 days after SDS 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: SR-26 U238 W1W8 W9X0  
AM 241 W8  
(Aspec) U235 X0

A-47

TMA / RICHMOND  
SAMPLE DELIVERY GROUP H0377

N904039-06

Method Blank

METHOD BLANK

SDG 7111 Client/Case no Hanford SDG-H0377  
 Contact L.A. Johnson Case no TRB-SBB-207925  
 Lab sample id N904039-06 Client sample id Method Blank  
 Dept sample id 7111-006 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	0.058	0.047	0.090	1.0	U	U
Uranium 235	15117-96-1	0	0.028	0.10	1.0	U	U
Uranium 238	U-238	0	0.023	0.090	1.0	U	U
Plutonium 238	13981-16-3	0.003	0.008	0.014	1.0	U	PU
Plutonium 239/240	PU-239/240	0	0.005	0.014	1.0	U	PU
Nickel 63	13981-37-8	2.30	2.9	4.8	30	U	NI_L
Americium 241	14596-10-2	0.006	0.012	0.024	1.0	U	AM
Total Strontium	SR-RAD	-0.013	0.11	0.20	1.0	U	SR
Potassium 40	13966-00-2	U		0.10		U	GAM
Cobalt 60	10198-40-0	U		0.010	0.050	U	GAM
Cesium 137	10045-97-3	U		0.010	0.10	U	GAM
Europium 152	14683-23-9	U		0.020	0.10	U	GAM
Europium 154	15588-10-1	U		0.030	0.10	U	GAM
Europium 155	14391-16-3	U		0.020	0.10	U	GAM
Americium 241	14596-10-2	U		0.008		U	GAM
Uranium 238	U-238	U		1.0		U	GAM
Uranium 235	15117-96-1	U		0.030		U	GAM

100 BC Areas-Full Protocol

QC-BLANK 30496

**PRIORITY**

000023

Lab id TMANC  
 Protocol Hanford  
 Version Ver 1.0  
 Form IVD-DS  
 Version 1.06  
 Report date 07/23/99

TMA/RICHMOND  
 SAMPLE DELIVERY GROUP H0377

N904039-05

Lab Control Sample

LAB CONTROL SAMPLE

SDG <u>7111</u>	Client/Case no <u>Hanford</u>	<u>SDG-H0377</u>
Contact <u>L.A. Johnson</u>	Case no <u>TRB-SDB-207925</u>	
Lab sample id <u>N904039-05</u>	Client sample id <u>Lab Control Sample</u>	
Dept sample id <u>7111-005</u>	Material/Matrix <u>SOLID</u>	
	RAF No <u>B99-002</u>	

ANALYTE	RESULT pCi/g	2σ ERR (COUNT)	MRA pCi/g	RDL pCi/g	QUALI- FIELD TEST	ADDED pCi/g	2σ ERR pCi/g	REC %	3σ LIMITS (TOTAL)	PROTOCOL LIMITS
Uranium 233/234	4.80	0.57	0.30	1.0	U	5.32	0.21	90	82-118	80-120
Uranium 235	4.80	0.55	0.070	1.0	U	4.35	0.17	103	79-121	80-120
Uranium 238	5.70	0.65	0.30	1.0	U	5.49	0.22	104	80-120	80-120
Plutonium 238	4.61	0.28	0.011	1.0	PU	5.03	0.20	92	88-112	80-120
Plutonium 239/240	4.88	0.29	0.009	1.0	PU	5.29	0.21	92	88-112	80-120
Nickel 63	196	4.4	2.5	30	NI_L	202	0.1	97	84-116	
Americium 241	5.44	0.48	0.023	1.0	AM	5.75	0.23	98	84-116	80-120
Total Strontium	13.0	0.43	0.20	1.0	SR	12.6	0.50	103	83-117	
Cobalt 60	0.300	0.016	0.007	0.050	GAM	0.304	0.012	99	76-124	80-120
Cesium 137	0.380	0.014	0.008	0.10	GAM	0.381	0.015	100	76-124	80-120

100 EC Areas-Full Protocol

QC-LCS 30495

**PRIORITY**

000024

Lab id <u>TMAC</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-LCS</u>
Version <u>1.06</u>
Report date <u>07/23/99</u>

000025

Lab ID 2048C  
 Protocol Hanford  
 Version Ver 3.0  
 Form DTP-DTP  
 Version 3.05  
 Report date 07/23/99

**PRIORITY**

DUPLICATE 30497

0 BC Areas- Full Protocol

DATE	DUPLICATE 20 HR	MDL	QUAL	TEST	ORIGINAL 20 HR	MDL	QUAL	TEST	DATE
	pct/s (COUNT)	pct/s	ATRS		pct/s (COUNT)	pct/s	ATRS		
07/23/99	0.493	0.020	1.0	J	0.489	0.14	0.075	J	07/23/99
07/23/99	0.040	0.017	1.0	J	0.024	0.024	0.091	U	07/23/99
07/23/99	0.481	0.054	1.0	J	0.479	0.14	0.075	J	07/23/99
07/23/99	-0.003	0.037	1.0	U	-0.006	0.017	0.037	U	07/23/99
07/23/99	0	0.025	1.0	U	0.019	0.017	0.027	U	07/23/99
07/23/99	1.15	1.8	3.0	U	2.20	1.8	2.9	U	07/23/99
07/23/99	0	0.042	1.0	U	0.007	0.028	0.054	U	07/23/99
07/23/99	0.027	0.11	1.0	U	0.044	0.11	0.15	U	07/23/99
07/23/99	12.0	0.40	0.20	U	12.1	0.39	0.19	U	07/23/99
07/23/99	0	0.020	0.050	U	0	0	0.018	U	07/23/99
07/23/99	0	0.020	0.10	U	0.019	0.012	0.015	J	07/23/99
07/23/99	0	0.040	0.10	U	0	0	0.045	U	07/23/99
07/23/99	0.025	0.023	0.10	U	0	0	0.047	U	07/23/99
07/23/99	0.460	0.036	0.10	U	0.472	0.037	0.036	U	07/23/99
07/23/99	0.660	0.096	0.090	U	0.657	0.085	0.085	U	07/23/99
07/23/99	0.650	0.023	0.020	U	0.609	0.023	0.022	U	07/23/99
07/23/99	0.660	0.096	0.090	U	0.657	0.086	0.086	U	07/23/99
07/23/99	0	0.020	0.020	U	0	0	0.070	U	07/23/99
07/23/99	0	2.0	2.0	U	0	2.2	2.2	U	07/23/99
07/23/99	0	0.10	0.10	U	0	0.076	0.076	U	07/23/99

Client/Case no Hanford 505-K0377  
 Case no TRS-SM-20725  
 Client sample id BOYNT  
 Location/Matrix 100 B/C 115-B-13 deep in SOILD  
 Collected 04/01/99 08:45  
 Custody/SAR No 899-002-79  
 899-002

Lab sample id H904039-07  
 Depc sample id 7111-001  
 Received 04/07/99  
 4 solids 96.1  
 ORIGINAL

Lab sample id H904039-07  
 Depc sample id 7111-007  
 Received 04/07/99  
 4 solids 96.1  
 DUPLICATE

Contract M.A. Johnson  
 SDO 7111

TMA/RICHMOND  
 SAMPLE DELIVERY GROUP 00377  
 DUPLICATE

H904039-07

BOYNT

Date: 16 August 1999  
To: Bechtel Hanford Inc. (technical representative)  
From: TechLaw, Inc.  
Project: 100-BC Areas - Full Protocol - Waste Site 116-B-12  
Subject: Inorganics - Data Package No. H0377-RLN (SDG No. H0377)

## **INTRODUCTION**

This memo presents the results of data validation on Data Package No. H0377-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
B0V1W7	4/1/99	Soil	C	See note 1
B0V1W8	4/1/99	Soil	C	See note 1
B0V1W9	4/1/99	Soil	C	See note 1
B0V1X0	4/1/99	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.

000001

- **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 reporting limit for chromium VI exceeded the target detection limit (TDL).

- **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.

000002

- **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".

Due to the lack of a duplicate analysis, all chromium VI results were qualified as estimates and flagged "J".

All other laboratory duplicate results were acceptable.

#### Field Duplicates

One sample duplicate pair (BOV1W8/BOV1W9) 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 sample BOV1W9 and BOV1X0. 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. H0377-QES (SDG No. H0377) was submitted for validation and verified for completeness. The completion percentage was 100%.

000003

## **MAJOR DEFICIENCIES**

None found.

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## **MINOR DEFICIENCIES**

Due to the lack of a duplicate analysis, all chromium VI 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 following had reported detection limits above their TDL: Chromium VI in samples BOV1W9 and BOV1X0. 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.

000004

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**Appendix 1**

**Glossary of Data Reporting Qualifiers**

000005

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

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- 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).

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**Appendix 2**

**Summary of Data Qualification**

000007

DATA QUALIFICATION SUMMARY

SDG: H0377	REVIEWER: TLI	DATE: 8/16/99	PAGE <u>1</u> OF <u>1</u>
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Chromium VI	J	All	No duplicate analysis

000008

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**Appendix 3**

**Qualified Data Summary and Annotated Laboratory Reports**

**000009**



Recre LabMet - Lionville

INORGANICS DATA SUMMARY REPORT 04/22/99

CLIENT: TNG-HANFORD B99-002  
 WORK ORDER: 10985-001-001-9999-00

RECRA LOT #: 9904L629

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING	DILUTION
					LIMIT	FACTOR
-001	B0V1W7	Chromium, Total	9.1	MG/KG	0.12	2.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Lead, Total	5.7	MG/KG	0.37	2.0
-002	B0V1W8	Chromium, Total	8.2	MG/KG	0.13	2.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Lead, Total	5.1	MG/KG	0.38	2.0
-003	B0V1W9	Chromium, Total	10.1	MG/KG	0.1	2.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Lead, Total	5.2	MG/KG	0.29	2.0
-004	B0V1X0	Chromium, Total	10.8	MG/KG	0.11	2.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Lead, Total	5.6	MG/KG	0.34	2.0

*pu*  
7/2/99

000011

005

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 04/13/99

CLIENT: TNU-HANFORD B99-002  
 WORK ORDER: 10985-001-001-9999-00

RECRA LOT #: 9904L629

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	BOV1W7	% Solids Chromium VI	96.3 0.86 J	% MG/KG	0.01 0.42	1.0 1.0
-002	BOV1W8	% Solids Chromium VI	94.4 0.85 J	% MG/KG	0.01 0.42	1.0 1.0
-003	BOV1W9	% Solids Chromium VI	95.5 0.42 uJ	% MG/KG	0.01 0.42	1.0 1.0
-004	BOV1X0	% Solids Chromium VI	91.5 0.44 uJ	% MG/KG	0.01 0.44	1.0 1.0

*[Handwritten signature]*  
 7/2/99

000012

*[Handwritten signature]*

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**Appendix 4**

**Laboratory Narrative and Chain-of-Custody Documentation**

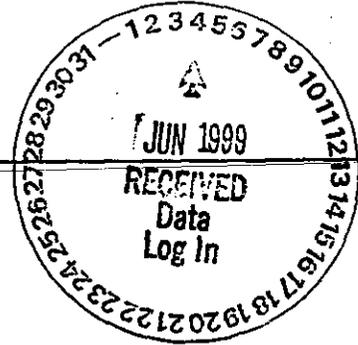
**000013**



**RECRA  
LabNet**

a division of Recra Environmental, Inc.

Virtual Laboratories Everywhere



**Recra LabNet Philadelphia  
Analytical Report**

**Client : TNU-HANFORD B99-002  
RFW# : 9904L629  
SDG/SAF# : H0377/B99-002**

**W.O.# : 10985-001-001-0001-00  
Date Received: 04-07-99**

**METALS CASE NARRATIVE**

1. This narrative covers the analyses of 4 soil samples.
2. The samples were prepared and analyzed in accordance with methods checked on the attached glossary. Two fold dilutions were performed on the the ICP metals due to the sample matrix.
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 90-110% control limits.
6. All Initial and Continuing Calibration Blanks (ICB/CCBs) were within control limits (less than the PQL).
7. All preparation/method blanks (MB) 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. All duplicate analyses were within the 20% Relative Percent Difference (RPD) control limits. Refer to the Inorganics Precision Report.

000014

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.

DAK

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  
mlh/m04-629

4-29-99  
Date



000015

*002*



a division of Recra Environmental, Inc.

Virtual Laboratories Everywhere

JUL 21 1999 12:40PM

**Recra LabNet Philadelphia  
Analytical Report**

**Client : TNU-HANFORD B99-002**  
**RFW# : 9904L629**  
**SDG# : H0377**  
**SAF# : B99-002**

**W.O. # : 10985-001-001-9999-00**  
**Date Received: 04-07-99**

**INORGANIC CASE NARRATIVE**

This narrative was revised to clarify replicate analysis information.

1. This narrative covers the analyses of 4 soil samples.
2. The samples were 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 analysis for Percent Solids was within the 20% Relative Percent Difference (RPD) control limit, however replicate analysis was not performed for Chromium VI.
9. Results for solid samples are reported on a dry weight basis.

  
 \_\_\_\_\_  
 J. Michael Taylor  
 Vice President  
 Philadelphia Analytical Laboratory

July 21-99  
 Date

pc004-629v

The results presented in this report relate only to the analytical testing and conditions of the samples as 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 10 pages.

Collector: Fahlberg/Coffman  
 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 116-B-12 deep zone  
 SAF No. B99-002  
 Ice Chest No. 844  
 Field Logbook No. EL 1327-2  
 Method of Shipment: Fed Ex  
 Shipped To: FMA/RECRA R.F. 4.1.99  
 Offsite Property No. A990098  
 Bill of Lading/Air Bill No. 423579524375  
 COA: 7904L629

POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	None	None	Cool 4C	None	None						
	Type of Container	aG	aG	aG	aG	aG						
Special Handling and/or Storage	No. of Container(s)	1	1	1	1	1						
	Volume	60mL	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									
BOV1W7	Soil	4.1.99	0845			X	X					tie to BOTV Y9
BOV1W8	Soil	4.1.99	0920			X	X					BOTW 00
BOV1W9	Soil	4.1.99	0920			X	X					BOTW 00
BOV1X0	Soil	4.1.99	0945			X	X					BOTW 01

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS	Matrix *
Relinquished By: R. Coffman / R. Coffman Date/Time: 4-1-99 1600	Received By: REF. IC Date/Time: 4-1-99 1600	(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) R.T. Coffman unavailable to relinquish samples 9904L629 4.20c	Soil Water Vapor Other Solid Other Liquid
Relinquished By: REF. IC Date/Time: 4/6/99 1100	Received By: R. Nelson / R. Nelson Date/Time: 4/6/99 1110		
Relinquished By: R. Nelson / R. Nelson Date/Time: 4/6/99 1300	Received By: Fed Ex Date/Time:		
Relinquished By: Fed Ex Date/Time:	Received By: J. G. ... Date/Time: 4/7/99 0930		

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

000017

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**Appendix 5**  
**Data Validation Supporting Documentation**

**000018**

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	<b>C</b>	D	E
PROJECT:	116-B-12		DATA PACKAGE: H0377		
VALIDATOR:	TL	LAB: Recra	DATE: 6/30/99		
CASE:			SDG:	H0377	
ANALYSES PERFORMED					
<input type="checkbox"/> CLP/CP	<input type="checkbox"/> CLP/GFAA	<input type="checkbox"/> CLP/Hg	<input type="checkbox"/> CLP/Cyanide	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> SW-846/CP	<input type="checkbox"/> SW-846/GFAA	<input checked="" type="checkbox"/> SW-846/Hg	<input type="checkbox"/> SW-846 Cyanide	<input checked="" type="checkbox"/> CRVT	<input type="checkbox"/>
SAMPLES/MATRIX	BOVIW7	BOVIW8	BOVIW9	BOVIW6	
sail					

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: CRVI above TDL  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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: IR on CRVI spike  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

A-281

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: IR for CR VI - No dup on CR VI - J  
all other ok

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 one %DL in W9 + X0

800

000022

SAMPLE	SITE ID	ANALYTE	RESULT	REPLICATE NO	FACTOR (REP)	DILUTION
001NEP	BOVLM7	Chromium, Total	9.1	9.8	7.4	2.0
		Mercury, Total	0.02u	0.02u	NC	1.0
		Lead, Total	5.7	5.9	3.4	2.0

RECMA LOT #: 9904L629

CLIENT: TNU-HAMFORD 899-002  
WORK ORDER: 10985-001-001-9999-00

INORGANICS PRECISION REPORT 04/22/99

ROGER LABNOE - LISIALLIS

00

000023

SAMPLE	SITE ID	ANALYTE	SAMPLE	RESULT	AMOUNT	RECOVER	FACTON (SPM)	DILUTION
001	NOV1M7	Chromium, Total	25.1	9.1	17.0	94.1	2.0	2.0
		Mercury, Total	0.18	0.028	0.17	107.5	1.0	1.0
		Lead, Total	46.8	5.7	42.6	95.8	2.0	2.0

RECRA LOT #: 99041629

CLIENT: TWO-HANFORD 899-002  
WORK ORDER: 10985-001-001-9999-00

INORGANICS ACCURACY REPORT 04/22/99

RECRA LABOR - FLORENCE

Recre LabNet - Licoville

INORGANICS METHOD BLANK DATA SUMMARY PAGE 04/22/99

CLIENT: TNU-HANFORD 899-002  
 WORK ORDER: 10985-001-001-9999-00

RECRA LOT #: 9904L629

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK1	99L0222-MB1	Chromium, Total	0.18	MG/KG	0.06	1.0
		Lead, Total	0.18 u	MG/KG	0.18	1.0
BLANK1	99C0106-MB1	Mercury, Total	0.04	MG/KG	0.02	1.0

000024

~~006~~

CLIENT: TNU-HANFORD B99-002  
WORK ORDER: 10985-001-001-9999-00

RECRA LOT #: 9904L629

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR (REP)
-004REP	BOVLX0	% Solids	91.5	91.3	0.23	1.0

Recre LabNet - Lionville

INORGANICS ACCURACY REPORT 04/13/99

CLIENT: TNU-MANFORD B99-002  
 WORK ORDER: 10985-001-001-9999-00

RECRA LOT #: 9904L629

SAMPLE	SITE ID	ANALYTE	SPIKED	INITIAL	SPIKED	%RECOV	DILUTION
			SAMPLE	RESULT	AMOUNT		FACTOR (SPK)
-004	BOV1X0	Soluble Chromium VI	4.4	<del>0.2</del> <sup>0.214</sup> 0.214	4.4	108.0	1.0
		Insoluble Chromium VI	1180	<del>0.3</del> <sup>0.44</sup> 0.44	1300	90.3	20.0
BLANK10	99LVI033-MB1	Soluble Chromium VI	3.9	0.40u	4.0	97.3	1.0
		Insoluble Chromium VI	1040	0.40u	1160	89.1	20.0

Recra LabNet - Lionville

INORGANICS METHOD BLANK DATA SUMMARY PAGE 04/13/99

CLIENT: TNU-HANFORD B99-002  
WORK ORDER: 10985-001-001-9999-00

RECRA LOT #: 9904L629

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK10	99LVI033-MB1	Chromium VI	0.40	u MG/KG	0.40	1.0

000027

~~005~~

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 1<sup>st</sup> 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.

<b>Review Comment Record (RCR)</b>	1. Date 8/19/99	2. Review No. BHI/QA99013
	3. Project 116-B-12	4. Page Page 1 of 1

5. Document Number(s)/Title(s)  H0377-TNU (SDG No. H0377)	6. Program/Project/ Building Number  100-BC Areas – Full Protocol - 116-B-12	7. Reviewer  Claude Stacey	8. Organization/Group  BHI/QA	9. Location/Phone  H0-16/372-9208
---	--	----------------------------------	-------------------------------------	---

17. Comment Submittal Approval: \_\_\_\_\_ 10. Agreement with indicated comment disposition(s) \_\_\_\_\_ 11. CLOSED

_____ Organization Manager (Optional)	_____ Date	_____ Reviewer/Point of Contact	_____ Date	_____ Reviewer/Point of Contact
_____ Author/Originator		_____ 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 1, under holding Times last sentence has, "... for chrome VI;" this should be "... for chromium VI;"			
2	Radiochemistry: OK No comments			
3				
4				

**Duncan, Jeanette M**

---

**From:** Routt, Tina/RLO [troutt@CH2M.com]  
**Sent:** Wednesday, August 18, 1999 10:21 AM  
**To:** Duncan, Jeanette/RLO-HAN  
**Subject:** Validation Review - H0399, H0387, H0377

Jeanette -

H0387 (B-3) - No comments  
H0399 (B-9) - No comments  
H0377 (B-12) - Analytical Detection Levels (p. 3). Validator stated that Chromium VI had reported detection limits above TDL in samples B0V1W9 and B0V1X0. This is true, but it is also true for samples B0V1W7 and B0V1W8.

I have already given you my comments on H0393 (B-6B) and H0401 (B-4), and Dave Corbett is reviewing B-2. So, that is all of my comments on validation reports I have received to date.

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

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

.....

---

# facsimile transmittal

To: *B. Christian*

Fax: *372-5157*

From: *R. Weiss*

Date:

Re: *Ad 377*

Pages: *3*

CC:

~~Quick Turn / Priority Data~~

~~Final Data Package~~



.....

**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: 4 August 1999

Information Request

H0377 - Inorganics

The matrix spike percent recovery for chromium VI appears to be incorrect.

*Revised sheet (attached) provided  
by lab  
Rick Miller*

Recra LabWet - Lionville

INORGANICS ACCURACY REPORT 04/13/99

CLIENT: TNU-HANFORD 899-002  
WORK ORDER: 10985-001-001-9999-DD

RECRA LOT #: 9904L629

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR (SPK)
-004	BOV1X0	Soluble Chromium VI	4.4	<del>0.7</del> <sup>0.714u</sup> 0.714u	4.4	<del>100.0</del> 101.7	1.0
		Insoluble Chromium VI	1180	<del>0.3</del> <sup>0.44u</sup> 0.44u	1300	90.3	20.0
BLANK10	99LV1022-NB1	Soluble Chromium VI	2.9	0.40u	4.0	97.3	1.0
		Insoluble Chromium VI	1040	0.40u	1160	89.1	20.0

THE FOLLOWING FILE(S) ERASED

FILE	FILE TYPE	OPTION	TEL NO.	PAGE	RESULT
076	MEMORY TX		3755151	06/06	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: 375-5151  
 From: R. Weiss Date: 8-5-99  
 Re: IRS Fax 377 + 436 Pages: 6  
 CC:

Quick Turn / Priority Data  Final Data Package

Brace  
 .. stable ..

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

.....  
facsimile transmittal

To: B. Christian

Fax: 375-5151

From: R. Weiss

Date: 8-5-99

Re: IRS For 377 + 436

Pages: 6

CC:

Quick Turn / Priority Data

Final Data Package

Brace,  
you probably have these already.  
Please call me when you can. I want  
to make sure there are no additional "holes"  
to fill.

Rid

.....

# 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

H0377 - Radiochemistry

- Page 5, (strontium - method summary), indicates that sample preparation was conducted after analysis.  
*Revised sheet attached*
- Page 4, (isotopic uranium - method summary) indicates that sample preparation was conducted after analysis.  
*Revised sheet attached*
- Page 4, (isotopic uranium - method summary) indicates: The duplicate analyzed 5 days after the rest of the data package and sample B0V1W7 run 6 days after the rest of the samples.

TMA/RICHMOND  
SAMPLE DELIVERY GROUP H0377

Test SR Matrix SOLID  
SDG 7111  
Contact L.A. Johnson

METHOD SUMMARY  
TOTAL STRONTIUM IN SOIL  
BETA COUNTING

Client Hanford  
Contract TRB-SBB-207925  
Case no SDG-H0377

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	PLANCHET	Total Strontium
Preparation batch 6880-036					
BOV1W7	N904039-01			7111-001	U
BOV1W8	N904039-02			7111-002	U
BOV1W9	N904039-03			7111-003	U
BOV1X0	N904039-04			7111-004	U
BLK (QC ID=30496)	N904039-06			7111-006	U
LCS (QC ID=30495)	N904039-05			7111-005	ok
Duplicate (N904039-01)	N904039-07			7111-007	- U

Nominal values and limits from method RDLs (pCi/g) 1.0  
100 BC Areas-Full Protocol

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	MAX MDA pCi/g	ALIQ g	PREP FAC	DILU- TION	YIELD %	EPF COUNT %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	PREPARED	ANAL- YZED	DETECTOR
Preparation batch 6880-036 2σ prep error 10.0 % Reference Lab Notebook 6880 pg.36																
BOV1W7	N904039-01			0.15	1.00			91		400			22	04/22/99	04/23	GRB-201
BOV1W8	N904039-02			0.13	1.00			94		400			22	04/22/99	04/23	GRB-202
BOV1W9	N904039-03			0.13	1.00			89		400			22	04/22/99	04/23	GRB-203
BOV1X0	N904039-04			0.14	1.00			92		400			22	04/22/99	04/23	GRB-204
BLK (QC ID=30496)	N904039-06			0.20	1.00			84		400				04/22/99	04/23	GRB-230
LCS (QC ID=30495)	N904039-05			0.20	1.00			82		200				04/22/99	04/23	GRB-219
Duplicate (N904039-01)	N904039-07			0.20	1.00			92		400			22	04/22/99	04/23	GRB-231
	(QC ID=30497)															

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 0.16 ± 0.068  
FOR 7 SAMPLES YIELD 89 ± 9

METHOD SUMMARIES

Page 5

SUMMARY DATA SECTION

Page 19

Lab id TMANC  
Protocol Hanford  
Version Ver 1.0  
Form DVD-CMS  
Version 3.06  
Report date 07/23/99

**TMA/RICHMOND**  
SAMPLE DELIVERY GROUP H0377

Test U Matrix SOLID  
SDG 7111  
Contact L.A. Johnson

**METHOD SUMMARY**  
URANIUM, ISOTOPIC IN SOIL  
ALPHA SPECTROSCOPY

Client Hanford  
Contract TRB-SBB-207925  
Case no SDG-H0377

**RESULTS**

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUP- FIX	PLANCHET	1: Uranium			2: Uranium			3: Uranium			RESULT RATIOS (%)			
					233/234			235			238			1+3	2σ	2+3	2σ
Preparation batch 6880-036																	
BOV1W7	N904039-01			7111-001	0.489 J			U			0.479 J			102	42	5	5
BOV1W8	N904039-02			7111-002	0.485 J			U			0.688 J			70	30	2	4
BOV1W9	N904039-03			7111-003	0.494 J			U			0.412 J			120	49	12	10
BOV1X0	N904039-04			7111-004	0.616 J			U			0.630 J			98	42	3	5
BLK (QC ID=30496)	N904039-06			7111-006	U			U			U						
LCS (QC ID=30495)	N904039-05			7111-005	ok			ok			ok						
Duplicate (N904039-01)	N904039-07			7111-007	ok J			ok J			ok J			102	16	8	4
Nominal values and limits from method				RDLs (pCi/g)	1.0			1.0			1.0			100			4
100 BC Areas-Full Protocol												Averages		99			6

**METHOD PERFORMANCE**

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUP- FIX	MAX MDA	ALIQ	PREP	DILU-	YIELD	EFF	COUNT	FWHM	DRIFT	DAYS	ANAL-		
				pCi/g	g	PAC	TION	%	%	min	keV	KeV	HELD	PREPARED	YZED	DETECTOR
Preparation batch 6880-036      2σ prep error 5.0 %      Reference Lab Notebook 6880 pg.36																
BOV1W7	N904039-01			0.091	1.00			81		150			26	04/22/99	04/27	SS-055
BOV1W8	N904039-02			0.10	1.00			74		152			21	04/22/99	04/22	SS-002
BOV1W9	N904039-03			0.076	1.00			86		152			21	04/22/99	04/22	SS-003
BOV1X0	N904039-04			0.12	1.00			59		152			21	04/22/99	04/22	SS-005
BLK (QC ID=30496)	N904039-06			0.10	1.00			69		152				04/22/99	04/22	SS-007
LCS (QC ID=30495)	N904039-05			0.30	1.00			96		152				04/22/99	04/22	SS-006
Duplicate (N904039-01)	N904039-07			0.020	1.00			85		998			25	04/22/99	04/26	SS-056
(QC ID=30497)																
Nominal values and limits from method				1.0	1.00			30-105		150	100		180			

PROCEDURES	REFERENCE	UPLATE
EP-060		Soil Preparation, rev 0
EP-070		Soil Dissolution, rev 0
EP-910		Uranium Purification, rev 0
EP-008		Heavy Elements Electroplating, rev 0

AVERAGES ± 2 SD	MDA	<u>0.12</u> ± <u>0.17</u>
FOR 7 SAMPLES	YIELD	<u>79</u> ± <u>25</u>

Lab id TMANC  
Protocol Hanford  
Version Ver 1.0  
Form DVD-CMS  
Version 3.06  
Report date 07/23/99

# **FAX**

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## **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**

**H0377 - Radiochemistry**

- **Page 5, (strontium - method summary), indicates that sample preparation was conducted after analysis.**
- **Page 4, (isotopic uranium - method summary) indicates that sample preparation was conducted after analysis.**
- **Page 4, (isotopic uranium - method summary) indicates: The duplicate analyzed 5 days after the rest of the data package and sample B0V1W7 run 6 days after the rest of the samples.**

**FAX**

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**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

H0377 - Radiochemistry

Page 5, method summaries, indicates: Sample preparation after analysis.

*These IRs superseded by IR dated  
7/23/99*

# **FAX**

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## **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**

**H0377 - Radiochemistry**

**Page 4, method summaries, indicates: Sample preparation after analysis; the duplicate analyzed 5 days after the rest of the data package; and sample B0V1W7 run 6 days after the rest of the samples.**

**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 June 1999

Information Request

H0377 - Inorganics

The method blank for Chrome VI only gives the results for % solids.  
*duplicate*

*No Dup Performed  
For Cr<sup>VI</sup> see Case  
Narrative  
RLW 7-21-99*



a division of Recra Environmental, Inc.

Virtual Laboratories Everywhere

### Recra LabNet Philadelphia Analytical Report

Client : TNU-HANFORD B99-002  
RFW# : 9904L629  
SDG# : H0377  
SAF# : B99-002

W.O. # : 10985-001-001-9999-00  
Date Received: 04-07-99

#### INORGANIC CASE NARRATIVE

This narrative was revised to clarify replicate analysis information.

1. This narrative covers the analyses of 4 soil samples.
2. The samples were 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 analysis for Percent Solids was within the 20% Relative Percent Difference (RPD) control limit, however replicate analysis was not performed for Chromium VI.
9. Results for solid samples are reported on a dry weight basis.

  
 \_\_\_\_\_  
 J. Michael Taylor  
 Vice President  
 Philadelphia Analytical Laboratory

July 21-99  
 Date

pef104-629r

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 10 pages.

**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 June 1999

Information Request

H0377 - Inorganics

The method blank for Chrome VI only gives the results for % solids.  
*duplicate*



**Duncan, Jeanette M**

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**From:** Routt, Tina/RLO [troutt@CH2M.com]  
**Sent:** Wednesday, August 18, 1999 10:21 AM  
**To:** Duncan, Jeanette/RLO-HAN  
**Subject:** Validation Review - H0399, H0387, H0377

Jeanette -

H0387 (B-3) - No comments

H0399 (B-9) - No comments

H0377 (B-12) - Analytical Detection Levels (p. 3). Validator stated that Chromium VI had reported detection limits above TDL in samples B0V1W9 and B0V1X0. This is true, but it is also true for samples B0V1W7 and B0V1W8. -

*boths were detected,*

I have already given you my comments on H0393 (B-6B) and H0401 (B-4), and Dave Corbett is reviewing B-2. So, that is all of my comments on validation reports i have received to date.

*me*

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

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 1<sup>st</sup> 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.

*correct  
5/25/99*

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.