

W02758-20



0051450

CERTIFICATE OF ANALYSIS

Bechtel Hanford, Inc.
3350 George Washington Way
Richland, WA 99352

May 21, 1999

Attention: Joan Kessner



SAF Number	:	B99-001
Date First Sample Received	:	April 29, 1999
Number of Samples	:	Ten
Sample Type	:	Water
SDG Number	:	W02758
Data Deliverable	:	3-Day Priority/15 Day Summary



I. Introduction

Between April 29, and May 13, 1999, ten water samples were received by the Quanterra Environmental Services Richland Laboratory (QESRL) for chemical analysis. Upon receipt, the samples were assigned the following laboratory ID number to correspond with the Bechtel Hanford, Inc. (BHI) specific ID:

<u>QESRL ID#</u>	<u>BHI ID#</u>	<u>MATRIX</u>	<u>DATE OF RECEIPT</u>
9CV7JC01	B0TBC4	Water	4/29/99
9CVP6J10	B0TBC5	Water	5/12/99
9CVP6M10	B0TBC6	Water	5/12/99
9CVP6N10	B0TBC7	Water	5/12/99
9CVP6P10	B0TBC8	Water	5/12/99
9CVP6Q10	B0TBC9	Water	5/12/99
9CVP6T10	B0TBD3	Water	5/12/99
9CVP6R10	B0TBD1	Water	5/12/99
9CVQQA10	B0TBD0	Water	5/13/99
9CVQQC10	B0TBD2	Water	5/13/99

II. Analytical Results/Methodology

Bechtel Hanford, Inc.
May 21, 1999
Page 2

The analytical results for this report are presented by laboratory sample ID. Each set of data includes sample identification information; analytical results and the appropriate associated statistical errors.

The requested analysis was: **Hexavalent Chromium**
 Hexavalent Chromium by EPA7196

III. Quality Control

The analytical results for the analysis performed under SDG W02758 include a minimum of one Laboratory Control Sample (LCS), one matrix spike (MS), one matrix spike duplicate (MSD), and one method (reagent) blank. Any exceptions have been noted in the "Comments" section.

Quality control sample results are reported in the same units as sample results.

IV. Comments

Hexavalent Chromium
Hexavalent Chromium by EPA7196

The LCS, MS, LCSD, batch blank, and sample results are within the requirements of the contract.

I certify that this Certificate of Analysis is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Reviewed and approved:



Doug Swenson
Project Manager

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02758 / 7801
LAB SAMPLE ID: 9CV7JC10 MATRIX: SOIL
CLIENT ID: B0TBC4 DATE RECEIVED: 4/29/99 11:51:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	2.26E+00		N/A	N/A	4.00E-02	mg/kg	N/A	EPA7196

Number of Results:

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02758 / 7801
LAB SAMPLE ID: 9CVP6J10 MATRIX: SOIL
CLIENT ID: B0TBC5 DATE RECEIVED: 5/12/99 2:27:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	3.81E+00		N/A	N/A	4.00E-02	mg/kg	N/A	EPA7196

Number of Results:

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02758 / 7801
LAB SAMPLE ID: 9CVP6M10 MATRIX: SOIL
CLIENT ID: B0TBC6 DATE RECEIVED: 5/12/99 2:27:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	7.39E-01		N/A	N/A	4.00E-02	mg/kg	N/A	EPA7196

Number of Results:

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02758 / 7801
LAB SAMPLE ID: 9CVP6N10 MATRIX: SOIL
CLIENT ID: B0TBC7 DATE RECEIVED: 5/12/99 2:27:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	5.58E+00		N/A	N/A	4.00E-02	mg/kg	N/A	EPA7196

Number of Results:

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02758 / 7801
LAB SAMPLE ID: 9CVP6P10 MATRIX: SOIL
CLIENT ID: B0TBC8 DATE RECEIVED: 5/12/99 2:27:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	4.64E+00		N/A	N/A	4.00E-02	mg/kg	N/A	EPA7196

Number of Results:

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02758 / 7801
LAB SAMPLE ID: 9CVP6Q10 MATRIX: SOIL
CLIENT ID: B0TBC9 DATE RECEIVED: 5/12/99 2:27:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	5.59E+00		N/A	N/A	4.00E-02	mg/kg	N/A	EPA7196

Number of Results:

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02758 / 7801
LAB SAMPLE ID: 9CVP6R10 MATRIX: SOIL
CLIENT ID: B0TB01 DATE RECEIVED: 5/12/99 2:25:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	7.47E+00		N/A	N/A	4.00E-02	mg/kg	N/A	EPA7196

Number of Results:

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02758 / 7801
LAB SAMPLE ID: 9CVP6T10 MATRIX: SOIL
CLIENT ID: B0TB03 DATE RECEIVED: 5/12/99 2:25:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	1.00E-01		N/A	N/A	4.00E-02	mg/kg	N/A	EPA7196

Number of Results:

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02758 / 7801
LAB SAMPLE ID: 9CVQQA10 MATRIX: SOIL
CLIENT ID: B0TBD0 DATE RECEIVED: 5/13/99 2:20:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	2.80E+00		N/A	N/A	4.00E-02	mg/kg	N/A	EPA7196

Number of Results:

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02758 / 7801
LAB SAMPLE ID: 9CVQQC10 MATRIX: SOIL
CLIENT ID: B0TBD2 DATE RECEIVED: 5/13/99 2:20:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	1.93E+01		N/A	N/A	4.00E-02	mg/kg	N/A	EPA7196

Number of Results:

BLANK RESULTS

LAB NAME: QUANTERRA, Richland SDG /RPT GRP: W02758 / 7801
LAB SAMPLE ID: CV8VL11B MATRIX: SOIL

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	1.00E-03	U	N/A	N/A	2.00E-03	mg/L	N/A	EPA7196

Number of Results:

BLANK RESULTS

LAB NAME: QUANTERRA, Richland SDG /RPT GRP: W02758 / 7801
LAB SAMPLE ID: CVRFF11B MATRIX: SOIL

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	0.00E+00	U	N/A	N/A	2.00E-03	mg/L	N/A	EPA7196

Number of Results:

BLANK RESULTS

LAB NAME: QUANTERRA, Richland SDG /RPT GRP: W02758 / 7801
LAB SAMPLE ID: CVV0R11B MATRIX: SOIL

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	0.00E+00	U	N/A	N/A	2.00E-03	mg/L	N/A	EPA7196

Number of Results:

LABORATORY CONTROL SAMPLE

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02758 / 7801
LAB SAMPLE ID: CV8VL12S MATRIX: SOIL

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/ IDL	REPORT UNIT	YIELD	EXPECTED	RECOVERY
HEXCHROME	4.64E-01		N/A	N/A	2.00E-03	mg/L	N/A	5.00E-01	92.80%

Number of Results:

LABORATORY CONTROL SAMPLE

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02758 / 7801
LAB SAMPLE ID: CV8VL13S MATRIX: SOIL

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/ IDL	REPORT UNIT	YIELD	EXPECTED	RECOVERY
HEXCHROME	4.83E-01		N/A	N/A	2.00E-03	mg/L	N/A	5.00E-01	96.60%

Number of Results:

LABORATORY CONTROL SAMPLE

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02758 / 7801
LAB SAMPLE ID: CVRFF12S MATRIX: SOIL

ANALYTE	RESULT	COUNTING Q ERROR (2 s)	TOTAL ERROR (2 s)	MDA/ IDL	REPORT UNIT	YIELD	EXPECTED	RECOVERY
HEXCHROME	4.54E-01	N/A	N/A	2.00E-03	mg/L	N/A	5.00E-01	90.80%

Number of Results:

LABORATORY CONTROL SAMPLE

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02758 / 7801
LAB SAMPLE ID: CVRFF13S MATRIX: SOIL

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/ IDL	REPORT UNIT	YIELD	EXPECTED	RECOVERY
HEXCHROME	4.60E-01		N/A	N/A	2.00E-03	mg/L	N/A	5.00E-01	92.00%

Number of Results:

LABORATORY CONTROL SAMPLE

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02758 / 7801
LAB SAMPLE ID: CVV0R12S MATRIX: SOIL

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/ IDL	REPORT UNIT	YIELD	EXPECTED	RECOVERY
HEXCHROME	4.36E-01		N/A	N/A	2.00E-03	mg/L	N/A	5.00E-01	87.20%

Number of Results:

LABORATORY CONTROL SAMPLE

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02758 / 7801
LAB SAMPLE ID: CVV0R13S MATRIX: SOIL

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/ IDL	REPORT UNIT	YIELD	EXPECTED	RECOVERY
HEXCHROME	4.33E-01		N/A	N/A	2.00E-03	mg/L	N/A	5.00E-01	86.60%

Number of Results:



Richland Laboratory
Data Review Check List
METALS

<u>Work Order Number(s):</u> CV73C101 (QC Batch 9/20/17)				
<u>Lab Sample Numbers or SDG:</u> W02758				
<u>Method/Test/Parameter:</u> CR+6 in SOIL				
Review Item	Yes (✓)	No (✓)	N/A (✓)	2 nd Level Review (✓)
A. Initial Calibration				
1. Performed at required frequency with required number of levels?	✓			
2. Correlation coefficient within QC limits?	✓			
3. Initial calibration verification (ICV) analyzed immediately after calibration and results within QC limits?	✓			
4. Initial calibration blank (ICB) analyzed immediately after ICV and concentrations of all parameters \leq reporting limit?	✓			
B. Continuing Calibration				
1. CCV analyzed at required frequency and all parameters within QC limits?	✓			
2. CCB analyzed at required frequency and all results \leq reporting limit?	✓			
C. Sample Analysis				
1. Were any samples with concentrations above the linear range for any parameter diluted and reanalyzed?			✓	
2. Were all sample holding times met?	✓			
D. QC Samples				
1. All results for the preparation blank below limits?	✓			
2. MS or MS/MSD recoveries within QC limits and %RPD (for MSD) acceptable?			✓	
3. LCS percent recovery within QC limits and %RPD (for LCSD) acceptable?	✓			
4. Analytical spikes within QC limits where applicable?			✓	
5. ICP only: One serial dilution performed per SDG?			✓	
6. ICP only: CRDL standard (CRI or CRA) analyzed at required frequency?			✓	
7. ICP only: Interference check samples (ICSA, ICSAB) and HICAL analyzed at the required frequencies and within QC limits?			✓	

Review Item	Yes (✓)	No (✓)	N/A (✓)	2 nd Level Review (✓)
E. Other				
1. Are all nonconformances included and noted?			✓	
2. Is the correct date and time of analysis shown?	✓			
3. Did the analyst sign and date the front page of the analytical run?	✓			
4. Correct methodology used?	✓			
5. Transcriptions checked?	✓			
6. Calculations checked at <i>minimum frequency</i> ?	✓			
7. Units checked?	✓			

Comments on any "No" response:

Analyst: Roxie Ross

Date: 5/3/99

Second-Level Review: _____

Date: _____



Richland Laboratory
Data Review Check List
METALS

QC Bath 9/3 3/35

<u>Work Order Number(s):</u> CVPL6J101, CVPL6M101, CVPL6N101, CVPL6P101, CVPL6Q101, CVPL6R101, CVPL6T101				
<u>Lab Sample Numbers or SDG:</u> WO2758				
<u>Method/Test/Parameter:</u> CR46 in SOIL AT				
Review Item	Yes (✓)	No (✓)	N/A (✓)	2 nd Level Review (✓)
A. Initial Calibration				
1. Performed at required frequency with required number of levels?	✓			
2. Correlation coefficient within QC limits?	✓			
3. Initial calibration verification (ICV) analyzed immediately after calibration and results within QC limits?	✓			
4. Initial calibration blank(ICB) analyzed immediately after ICV and concentrations of all parameters ≤ reporting limit?	✓			
B. Continuing Calibration				
1. CCV analyzed at required frequency and all parameters within QC limits?	✓			
2. CCB analyzed at required frequency and all results ≤ reporting limit?	✓			
C. Sample Analysis				
1. Were any samples with concentrations above the linear range for any parameter diluted and reanalyzed?		✓		
2. Were all sample holding times met?	✓			
D. QC Samples				
1. All results for the preparation blank below limits?	✓			
2. MS or MS/MSD recoveries within QC limits and %RPD (for MSD) acceptable?			✓	
3. LCS percent recovery within QC limits and %RPD (for LCSD) acceptable?	✓			
4. Analytical spikes within QC limits where applicable?			✓	
5. ICP only: One serial dilution performed per SDG?			✓	
6. ICP only: CRDL standard (CRI or CRA) analyzed at required frequency?			✓	
7. ICP only: Interference check samples (ICSA, ICSAB) and HICAL analyzed at the required frequencies and within QC limits?			✓	



Richland Laboratory
Data Review Check List
METALS

<u>Work Order Number(s):</u> CVOQA101 & CVOQAC101 QC Batch 9134209				
<u>Lab Sample Numbers or SDG:</u> WO2758				
<u>Method/Test/Parameter:</u> CR+6 SOIL				
Review Item	Yes (✓)	No (✓)	N/A (✓)	2 nd Level Review (✓)
A. Initial Calibration				
1. Performed at required frequency with required number of levels?	✓			
2. Correlation coefficient within QC limits?	✓			
3. Initial calibration verification (ICV) analyzed immediately after calibration and results within QC limits?	✓			
4. Initial calibration blank(ICB) analyzed immediately after ICV and concentrations of all parameters ≤ reporting limit?	✓			
B. Continuing Calibration				
1. CCV analyzed at required frequency and all parameters within QC limits?	✓			
2. CCB analyzed at required frequency and all results ≤ reporting limit?	✓			
C. Sample Analysis				
1. Were any samples with concentrations above the linear range for any parameter diluted and reanalyzed?			✓	
2. Were all sample holding times met?	✓			
D. QC Samples				
1. All results for the preparation blank below limits?	✓			
2. MS or MS/MSD recoveries within QC limits and %RPD (for MSD) acceptable?			✓	
3. LCS percent recovery within QC limits and %RPD (for LCSD) acceptable?	✓			
4. Analytical spikes within QC limits where applicable?			✓	
5. ICP only: One serial dilution performed per SDG?			✓	
6. ICP only: CRDL standard (CRI or CRA) analyzed at required frequency?			✓	
7. ICP only: Interference check samples (ICSA, ICSAB) and HICAL analyzed at the required frequencies and within QC limits?			✓	

**CHAIN OF
CUSTODY FORMS**

Collector Fahlberg/Kerkow	Company Contact R Coffman	Telephone No. 373-6425	Project Coordinator TRENT, SJ	Price Code	Data Turnaround
Project Designation 100 BC Areas - Quick Turn	Sampling Location 100BC H6-B-7 116-C-2	SAF No. B99-001	3 business days		
Ice Chest No. # 99-001	Field Logbook No. EL 1327-2	Method of Shipment Hand Delivered			
Shipped To Quanterra Incorporated	Offsite Property No. N/A	Bill of Lading/Air Bill No. N/A			
		COA R16C2A 2600			

POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	Cool 4C																
	Type of Container	aG																
	No. of Container(s)	1																
Special Handling and/or Storage	Volume	60mL																
SDC WD2758	JAD290171	Chromium Hex - 7196																

Sample No.	Matrix *	Sample Date	Sample Time																
B0TBC4 CV7JC	Soil	4-27-99	1300	X															tieta BOV 104

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS	Matrix *
Relinquished By R. Fahlberg	Date/Time 4-27-99 1400	Received By Prof. # 1-C	Date/Time 4-27-99 1400
Relinquished By Prof. # 1-C	Date/Time 4-27-99 0930	Received By Dang Bawars	Date/Time 4-27-99/0930
Relinquished By Dang Bawars	Date/Time 4-27-99/1151	Received By Dudellberg	Date/Time 4-27-99 1151
Relinquished By	Date/Time	Received By L100Cpx	Date/Time

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

Figure 1

SAMPLE CHECK-IN LIST

Date/Time Received: 4/29 1155 SG#: W02758
Work Order Number: J9D290171 SAF #: B99-001
Shipping Container ID: 99-001 Chain of Custody #: B99-001-49

- 1. Custody Seals on shipping container intact? Yes [] No []
- 2. Custody Seals dated and signed? Yes [] No []
- 3. Chain-of-Custody record present? Yes [] No []
- 4. Cooler temperature 30
- 5. Vermiculite/packing materials is Wet [] Dry []
- 6. Number of samples in shipping container: 1
- 7. Sample holding times exceeded? Yes [] No []

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

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

10. Where any anomalies identified in sample receipt? Yes [] No []
11. Description of anomalies (include sample numbers): _____

Sample Custodian/Laboratory: Heidelberg Date: 4-29-99
Telephoned To: _____ On _____ By _____

ERC Radiological Counting Facility Analysis Report

RCF Number RCF5824

Sample Date & Time 4/27/99 1300

Project ID: 116-C-2A

SAF Number: B99-001

Date Analyzed 4/27/99

Sample ID: BOV104

BOT Bcy

Gamma Energy Analysis

Nuclide	Activity (pCi/g)		Error (pCi/g)	MDC (pCi/g)
K-40	1.0E+01	+/-	1.3E+00	9.1E-01
Co-60	4.9E+01	+/-	1.4E+00	1.3E-01
Cs-137	1.3E+02	+/-	3.8E+00	2.3E-01
Eu-152	3.8E+01	+/-	1.8E+00	3.8E-01
Eu-154	3.6E+00	+/-	7.2E-01	3.8E-01
Eu-155	< 3.6E-01			3.6E-01
Th-232d #	< 1.2E+00			1.2E+00
U-235	< 7.1E-01			7.1E-01
Np-237	< 3.3E-01			3.3E-01
U-238	< 2.7E+01	+/-	-8.8E-03	2.7E+01
U-238d #	< 2.9E-01			2.9E-01
Am-241	4.2E+00	+/-	5.4E-01	2.8E-01

Total GEA (pCi/g)	2.4E+02	+/-	9.6E+00
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	Activity (pCi/g)		Error (pCi/g)
Gross Alpha**	2.0E+00	+/-	1.0E+00
Gross Beta	1.8E+02	+/-	1.9E+01

Alpha MDC (pCi/g)	1.5E+00
Beta MDC (pCi/g)	9.9E+01

Definitions:

All errors reported at 2 standard deviations.

N/R = no result or analysis not requested, <MDC = Less than detection limit.

All GEA results reported as "<" list the Minimum Detectable Concentration (MDC) value for that radionuclide.

Rounding error may result in the reported total GEA activity differing from the sum of the > MDC GEA values in the second significant digit.

For soils and natural samples, the following applies:

The analysis of U-238 is based on the activity of Pa-234m.

The analysis of Np-237 is based on the activity of Pa-233.

U-238dau is the activity of Pb-214 and Bi-214, short lived daughter products of U-238. Equilibrium between parent and daughter products probably does not exist in disturbed materials.

Th-232dau is the activity of Ac-228, Pb-212, and Tl-208, short lived daughter products of Th-232. Equilibrium between parent and daughter products may not exist in disturbed materials.

Other samples, not containing natural materials, may have inapplicable results for the Th, U, transuranics and daughter products. The results must then be balanced for the gross alpha analysis.

**The gross alpha results are not corrected for mass absorption

No peaks for this radionuclide were visible above background in the spectrum. The result was reported as less than MDC.

Analyst

D. M. Brchm

D. M. Brchm

4/28/99

Report To

Randy Coffman

Dave St John

Fax

373-9779

372-9487

0032

U-21547

Bechtel Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			B99-001-50	Page 1 of 2
Collector Fahlberg/Coffman		Company Contact R Coffman		Telephone No. 373-6425	Project Coordinator TRENT, SJ	Price Code
Project Designation 100 BC Areas - Quick Turn		Sampling Location 100BC 116-C-2		SAF No. B99-001		Data Turnaround 3 day
Ice Chest No. ERC 99-008		Field Logbook No. EL 1327-1		Method of Shipment Hand Delivered		
Shipped To Quanterra Incorporated		Offsite Property No. N/A		Bill of Lading/Air Bill No. N/A		

POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	Cool 4C																		
	Type of Container	aG																		
	No. of Container(s)	1																		
	Special Handling and/or Storage	Volume	60mL																	

SDG
W02758

SAMPLE ANALYSIS
J9E120237

Chromium Hex - 7196

Sample No.	Matrix *	Sample Date	Sample Time																		
B0TBC5	CVPL6J	Soil	5.10.99	0945	X																lets Bor D60
B0TBC6	CVPL6M	Soil	5.10.99	0955	X																Bor D61
B0TBC7	CVPL6N	Soil	5.10.99	1013	X																Bor D62
B0TBC8	CVPL6P	Soil	5.10.99	0947	X																Bor D63
B0TBC9	CVPL6Q	Soil	5.10.99	1003	X																Bor D64

CHAIN OF POSSESSION		Sign/Print Names		SPECIAL INSTRUCTIONS										Matrix *
Relinquished By	Date/Time	Received By	Date/Time											Soil Water Vapor Other Solid Other Liquid
R. Fahlberg	5-10-99 1700	R. Coffman	5-10-99 1700											
R. Fahlberg	5-12-99 1330	R. Coffman	5-12-99 1330											
R. Coffman	5-12-99 1427	R. Coffman	5-12-99 1427											
LABORATORY SECTION		Received By		Title										Date/Time
FINAL SAMPLE DISPOSITION		Disposal Method		Disposed By										Date/Time

0033

Bechtel Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			B99-001-51	Page 1 of 2
Collector Fahlberg/Coffman		Company Contact R Coffman		Telephone No. 373-6425	Project Coordinator TRENT, SJ	Price Code
Project Designation 100 BC Areas - Quick Turn		Sampling Location 100BC 116-c-2		SAF No. B99-001	Data Turnaround 3 days	
Ice Chest No. ERC99-008		Field Logbook No. EL 1327-1		Method of Shipment Hand Delivered		
Shipped To Quanterra Incorporated		Offsite Property No. N/A		Bill of Lading/Air Bill No. N/A		
COA						

POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	Cool 4C																		
	Type of Container	aG																		
	No. of Container(s)	1																		
Special Handling and/or Storage	Volume	60mL																		
SAMPLE ANALYSIS				Chromium																
				Hex - 7196																

Sample No.	Matrix *	Sample Date	Sample Time																		
B0TBD0	Soil	5.10.99	1035	X	RJN	5/12/99															
B0TBD1 CVP6R	Soil	5.10.99	1042	X																	
B0TBD2	Soil	5.10.99	1050	X	RJN	5/12/99															
B0TBD3 CVP6T	Soil	5.10.99	1103	X																	
B0TBD4 RK 5-10-99	Soil																				

CHAIN OF POSSESSION		Sign/Print Names			SPECIAL INSTRUCTIONS						Matrix *		
Relinquished By	Date/Time	Received By	Date/Time										
R. Fahlberg	1700	R. Fahlberg	1700										
R. Fahlberg	5-10-99	R. Fahlberg	5-10-99										
R. Fahlberg	5/12/99	R. Nielson	5/12/99										
R. Nielson	5/12/99	R. Nielson	5/12/99										
R. Nielson	5/12/99	R. Nielson	5/12/99										
LABORATORY SECTION	Received By	Title								Date/Time			
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By						Date/Time					

0037

ERC Radiological Counting Facility Analysis Report

RCF Number RCF5947Sample Date & Time 5/10/99 1103Project ID: 116-C-2ASAF Number: B99-001Date Analyzed 5/11/99Sample ID: B0VD68

Gamma Energy Analysis

Nuclide	Activity (pCi/g)	Error (pCi/g)	MDC (pCi/g)
K-40	9.1E+00	+/- 3.1E+00	1.3E+00
Co-60	1.7E+02	+/- 5.0E+00	2.4E-01
Cs-137	4.9E+01	+/- 1.5E+00	2.7E-01
Eu-152	3.5E+00	+/- 8.9E-01	5.1E-01
Eu-154	1.2E+00	+/- 3.6E-01	4.3E-01
Eu-155	< 3.3E-01		3.3E-01
Th-232d	< 2.6E+00		2.6E+00
U-235	< 8.2E-01		8.2E-01
Np-237	< 2.9E-01		2.9E-01
U-238	< 4.4E+01		4.4E+01
U-238d #	< 3.5E-01		3.5E-01
Am-241	3.1E+00	+/- 5.1E-01	2.8E-01

BOTBD3
BOVDL4

Total GEA (pCi/g)	2.4E+02	+/-	1.1E+01
-------------------	---------	-----	---------

	Activity (pCi/g)	Error (pCi/g)
Gross Alpha**	< 1.4E-01	
Gross Beta	2.7E+01	+/- 1.8E+00

Alpha MDC (pCi/g)	1.4E-01
Beta MDC (pCi/g)	1.5E+01

Definitions:

All errors reported at 2 standard deviations.

N/R = no result or analysis not requested. <MDC = Less than detection limit.

All GEA results reported as "<" list the Minimum Detectable Concentration (MDC) value for that radionuclide.

Rounding error may result in the reported total GEA activity differing from the sum of the > MDC GEA values in the second significant digit.

For soils and natural samples, the following applies:

The analysis of U-238 is based on the activity of Pa-234m.

The analysis of Np-237 is based on the activity of Pu-233.

U-238dau is the activity of Pb-214 and Bi-214, short lived daughter products of U-238. Equilibrium between parent and daughter products probably does not exist in disturbed materials.

Th-232dau is the activity of Ac-228, Pb-212, and Tl-208, short lived daughter products of Th-232. Equilibrium between parent and daughter products may not exist in disturbed materials.

Other samples, not containing natural materials, may have inapplicable results for the Th, U, transuranics and daughter products. The results must then be balanced for the gross alpha analysis.

**The gross alpha results are not corrected for mass absorption

No peaks for this radionuclide were visible above background in the spectrum. The result was reported as less than MDC.

Analyst

Katherine Robertson-DeMers

K. A. Robertson-DeMers

5/12/99

Report To

Randy Coffman

Dave St. John

Fax

373-9779

372-9487

Report Printed: Wednesday, May 12, 1999

0035

ERC Radiological Counting Facility Analysis Report

RCF Number RCF5945

Sample Date & Time 5/10/99 1042

Project ID: 116-C-2A

SAF Number: B99-001

Date Analyzed 5/11/99

Sample ID: B0VD66

Gamma Energy Analysis

Nuclide	Activity (pCi/g)	Error (pCi/g)	MDC (pCi/g)
K-40	1.2E+01	+/- 1.7E+00	1.4E+00
Co-60	4.9E+00	+/- 3.4E-01	1.0E-01
Cs-137	4.0E+01	+/- 1.3E+00	2.2E-01
Eu-152	1.4E+02	+/- 4.6E+00	5.1E-01
Eu-154	8.9E+00	+/- 8.4E-01	6.6E-01
Eu-155 #	< 5.2E-01		5.2E-01
Th-232d	< 9.0E-01		9.0E-01
U-235	< 1.0E+00		1.0E+00
Np-237	< 1.9E-01		1.9E-01
U-238	< 2.7E+01		2.7E+01
U-238d	< 3.6E-01		3.6E-01
Am-241 #	< 2.9E-01		2.9E-01

*BOTBOL
B0V845*

Total GEA (pCi/g) 2.1E+02 +/- 8.8E+00

	Activity (pCi/g)	Error (pCi/g)
Gross Alpha**	< 1.1E-01	
Gross Beta	8.0E+01	+/- 3.1E+00

Alpha MDC (pCi/g)	1.1E-01
Beta MDC (pCi/g)	4.3E+01

Definitions:

All errors reported at 2 standard deviations.
 N/R = no result or analysis not requested. <MDC = Less than detection limit.
 All GEA results reported as "<" list the Minimum Detectable Concentration (MDC) value for that radionuclide.
 Rounding error may result in the reported total GEA activity differing from the sum of the > MDC GEA values in the second significant digit.

For soils and natural samples, the following applies:

The analysis of U-238 is based on the activity of Pa-234m.
 The analysis of Np-237 is based on the activity of Pa-233.
 U-238dau is the activity of Pb-214 and Bi-214, short lived daughter products of U-238. Equilibrium between parent and daughter products probably does not exist in disturbed materials.
 Th-232dau is the activity of Ac-228, Pb-212, and Tl-208, short lived daughter products of Th-232. Equilibrium between parent and daughter products may not exist in disturbed materials.
 Other samples, not containing natural materials, may have inapplicable results for the Th, U, transuranics and daughter products. The results must then be balanced for the gross alpha analysis.
 **The gross alpha results are not corrected for mass absorption
 # No peaks for this radionuclide were visible above background in the spectrum. The result was reported as less than MDC.

Analyst *Katherine O. Robertson-DeMers* 5/12/99
 K. A. Robertson-DeMers

Report To: Randy Coffman, Dave St. John
 Fax: 373-9779, 372-9487

ERC Radiological Counting Facility Analysis Report

RCF Number RCF5943Sample Date & Time 5/10/99 1003Project ID: 116-C-2ASAF Number: B99-001Date Analyzed 5/11/99Sample ID: B0VD64

Gamma Energy Analysis

Nuclide	Activity (pCi/g)	Error (pCi/g)	MDC (pCi/g)
K-40	9.4E+00	+/- 1.7E+00	1.5E+00
Co-60	9.3E+00	+/- 5.0E-01	1.2E-01
Cs-137	1.7E+02	+/- 4.8E+00	2.9E-01
Eu-152	1.8E+02	+/- 5.7E+00	4.7E-01
Eu-154	1.9E+01	+/- 1.0E+00	4.2E-01
Eu-155 #	< 6.5E-01		6.5E-01
Th-232d #	< 5.4E-01		5.4E-01
U-235	< 1.2E+00		1.2E+00
Np-237 #	< 4.3E-01		4.3E-01
U-238	< 3.0E+01		3.0E+01
U-238d #	< 3.8E-01		3.8E-01
Am-241	2.1E+00	+/- 3.7E-01	3.5E-01

BOT BC9

Total GEA (pCi/g)	3.9E+02	+/-	1.4E+01
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	Activity (pCi/g)	Error (pCi/g)
Gross Alpha**	< 5.1E-01	
Gross Beta	1.7E+02	+/- 4.9E+00

Alpha MDC (pCi/g)	5.1E-01
Beta MDC (pCi/g)	8.9E+01

Definitions:

All errors reported at 2 standard deviations.

N/R - no result or analysis not requested. <MDC = Less than detection limit.

All GEA results reported as "<" list the Minimum Detectable Concentration (MDC) value for that radionuclide.

Rounding error may result in the reported total GEA activity differing from the sum of the > MDC GEA values in the second significant digit.

For soils and natural samples, the following applies:

The analysis of U-238 is based on the activity of Pa-234m.

The analysis of Np-237 is based on the activity of Pa-233.

U-238dau is the activity of Pb-214 and Bi-214, short lived daughter products of U-238. Equilibrium between parent and daughter products probably does not exist in disturbed materials.

Th-232dau is the activity of Ac-228, Pb-212, and Tl-208, short lived daughter products of Th-232. Equilibrium between parent and daughter products may not exist in disturbed materials.

Other samples, not containing natural materials, may have inapplicable results for the Th, U, transuranics and daughter products. The results must then be balanced for the gross alpha analysis.

**The gross alpha results are not corrected for mass absorption

No peaks for this radionuclide were visible above background in the spectrum. The result was reported as less than MDC.

Analyst

Katherine Robertson
R. Mcers
 K. A. Robertson-DcMers

5/12/99

Report To

Randy Coffman

Dave St. John

Fax

373-9779

372-9487

Report Printed: Wednesday, May 12, 1999

0037

ERC Radiological Counting Facility Analysis Report

RCF Number RCF5942

Sample Date & Time 5/10/99 0947

Project ID: 116-C-2A

SAF Number: B99-001

Date Analyzed 5/11/99

Sample ID: B0VD63

Gamma Energy Analysis

Nuclide	Activity (pCi/g)	Error (pCi/g)	MDC (pCi/g)
K-40	8.7E+00	+/- 2.2E+00	2.0E+00
Co-60	4.2E+01	+/- 1.4E+00	1.6E-01
Cs-137	5.5E+02	+/- 1.5E+01	4.3E-01
Eu-152	1.7E+02	+/- 5.8E+00	6.5E-01
Eu-154	2.0E+01	+/- 1.1E+00	4.9E-01
Eu-155 #	< 7.5E-01		7.5E-01
Th-232d #	< 1.8E+00		1.8E+00
U-235	< 9.3E-01		9.3E-01
Np-237	< 6.4E-01		6.4E-01
U-238	< 3.9E+01		3.9E+01
U-238d	< 5.2E-01		5.2E-01
Am-241	7.7E+00	+/- 9.9E-01	5.4E-01

BOTBC8

Total GEA (pCi/g) 8.0E+02 +/- 2.7E+01

	Activity (pCi/g)	Error (pCi/g)	Alpha MDC (pCi/g)
Gross Alpha**	< 1.7E+00		1.7E+00
Gross Beta	4.8E+02 +/-	9.7E+00	Beta MDC (pCi/g) 2.5E+02

Definitions:

All errors reported at 2 standard deviations.
 N/R = no result or analysis not requested. <MDC = Less than detection limit.
 All GEA results reported as "<" list the Minimum Detectable Concentration (MDC) value for that radionuclide.
 Rounding error may result in the reported total GEA activity differing from the sum of the > MDC GEA values in the second significant digit.

For soils and natural samples, the following applies:

The analysis of U-238 is based on the activity of Pa-234m.
 The analysis of Np-237 is based on the activity of Pa-233.
 U-238_{dau} is the activity of Pb-214 and Bi-214, short lived daughter products of U-238. Equilibrium between parent and daughter products probably does not exist in disturbed materials.
 Th-232_{dau} is the activity of Ac-228, Pb-212, and Tl-208, short lived daughter products of Th-232. Equilibrium between parent and daughter products may not exist in disturbed materials.
 Other samples, not containing natural materials, may have inapplicable results for the Th, U, transuranics and daughter products. The results must then be balanced for the gross alpha analysis.
 **The gross alpha results are not corrected for mass absorption
 # No peaks for this radionuclide were visible above background in the spectrum. The result was reported as less than MDC.

Kathryn A. Robertson -
R. Demers 5/12/99
 K. A. Robertson-DeMers

Report To
 Randy Coffman
 Dave St. John

Fax
 373-9779
 372-9487

Report Printed: Wednesday, May 12, 1999

ERC Radiological Counting Facility Analysis Report

RCF Number RCF5941Sample Date & Time 5/10/99 1013Project ID: 116-C-2ASAF Number: B99-001Date Analyzed 5/11/99Sample ID: B0VD62

Gamma Energy Analysis

Nuclide	Activity (pCi/g)	Error (pCi/g)	MDC (pCi/g)
K-40	1.0E+01	+/- 1.7E+00	1.4E+00
Co-60	3.5E+01	+/- 1.2E+00	1.5E-01
Cs-137	1.4E+00	+/- 2.1E-01	1.9E-01
Eu-152	1.3E+02	+/- 4.5E+00	5.6E-01
Eu-154	1.2E+01	+/- 7.7E-01	4.0E-01
Eu-155	< 5.4E-01		5.4E-01
Th-232d	< 1.5E+00		1.5E+00
U-235	< 8.5E-01		8.5E-01
Np-237	< 3.5E-01		3.5E-01
U-238	< 3.2E+01		3.2E+01
U-238d #	< 3.2E-01		3.2E-01
Am-241 #	< 2.8E-01		2.8E-01

B0TBCT

Total GEA (pCi/g)	1.9E+02	+/-	8.3E+00
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	Activity (pCi/g)	Error (pCi/g)
Gross Alpha**	< 2.9E-01	
Gross Beta	2.6E+02	+/- 6.6E+00

Alpha MDC (pCi/g)

2.9E-01

Beta MDC (pCi/g)

1.4E+02

Definitions:

All errors reported at 2 standard deviations.

N/R = no result or analysis not requested. <MDC = Less than detection limit.

All GEA results reported as "<" list the Minimum Detectable Concentration (MDC) value for that radionuclide.

Rounding error may result in the reported total GEA activity differing from the sum of the > MDC GEA values in the second significant digit.

For soils and natural samples, the following applies:

The analysis of U-238 is based on the activity of Pa-234m.

The analysis of Np-237 is based on the activity of Pa-233.

U-238_{da} is the activity of Pb-214 and Bi-214, short lived daughter products of U-238. Equilibrium between parent and daughter products probably does not exist in disturbed materials.Th-232_{da} is the activity of Ac-228, Pb-212, and Tl-208, short lived daughter products of Th-232. Equilibrium between parent and daughter products may not exist in disturbed materials.

Other samples, not containing natural materials, may have inapplicable results for the Th, U, transuranics and daughter products. The results must then be balanced for the gross alpha analysis.

**The gross alpha results are not corrected for mass absorption

No peaks for this radionuclide were visible above background in the spectrum. The result was reported as less than MDC.

Analyst

Kathryn A. Robertson

DeMers
K. A. Robertson-DeMers

5/12/99

Report To
Randy Coffman
Dave St. JohnFax
373-9779
372-9487

Report Printed: Wednesday, May 12, 1999

0039

ERC Radiological Counting Facility Analysis Report

RCF Number RCF5940Sample Date & Time 5/10/99 0955Project ID: 116-C-2ASAF Number: B99-001Date Analyzed 5/11/99Sample ID: B0VD61

Gamma Energy Analysis

Nuclide	Activity (pCi/g)	Error (pCi/g)	MDC (pCi/g)
K-40	9.2E+00	+/- 1.4E+00	1.1E+00
Co-60	1.9E+01	+/- 6.8E-01	1.1E-01
Cs-137	2.3E+00	+/- 3.6E-01	1.8E-01
Eu-152	1.1E+02	+/- 4.1E+00	5.4E-01
Eu-154	1.1E+01	+/- 6.7E-01	3.0E-01
Eu-155	< 4.6E-01		4.6E-01
Th-232d	1.9E+00	+/- 6.0E-01	2.3E-01
U-235	< 7.0E-01		7.0E-01
Np-237	< 3.2E-01		3.2E-01
U-238	< 2.5E+01	+/- -7.9E-03	2.5E+01
U-238d #	< 2.5E-01		2.5E-01
Am-241 #	< 2.4E-01		2.4E-01

BOTBC6

Total GEA (pCi/g)	1.5E+02	+/-	7.8E+00
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	Activity (pCi/g)	Error (pCi/g)
Gross Alpha**	< -5.0E-02	
Gross Beta	1.7E+02	+/- 4.9E+00

Alpha MDC (pCi/g)	-5.0E-02
Beta MDC (pCi/g)	9.0E+01

Definitions:

All errors reported at 2 standard deviations.

N/R = no result or analysis not requested. <MDC = Less than detection limit.

All GEA results reported as "<" list the Minimum Detectable Concentration (MDC) value for that radionuclide.

Rounding error may result in the reported total GEA activity differing from the sum of the > MDC GEA values in the second significant digit.

For soils and natural samples, the following applies:

The analysis of U-238 is based on the activity of Pa-234m.

The analysis of Np-237 is based on the activity of Pa-233.

U-238dau is the activity of Pb-214 and Bi-214, short lived daughter products of U-238. Equilibrium between parent and daughter products probably does not exist in disturbed materials.

Th-232dau is the activity of Ac-228, Pb-212, and Tl-208, short lived daughter products of Th-232. Equilibrium between parent and daughter products may not exist in disturbed materials.

Other samples, not containing natural materials, may have inapplicable results for the Th, U, transuranics and daughter products. The results must then be balanced for the gross alpha analysis.

**The gross alpha results are not corrected for mass absorption

No peaks for this radionuclide were visible above background in the spectrum. The result was reported as less than MDC.

Analyst

Kathryn A. Robertson

DeMers
K. A. Robertson-DeMers

5/12/99

Report To
Randy Coffman
Dave St. John

Fax
373-9779
372-9487

Report Printed: Wednesday, May 12, 1999

0040

ERC Radiological Counting Facility Analysis Report

RCF Number RCF5939Sample Date & Time 5/10/99 0945Project ID: 116-C-2ASAF Number: B99-001Date Analyzed 5/11/99Sample ID: B0VD60

Gamma Energy Analysis

Nuclide	Activity (pCi/g)	Error (pCi/g)	MDC (pCi/g)
K-40	9.3E+00	+/- 1.8E+00	1.7E+00
Co-60	3.5E+01	+/- 1.1E+00	1.6E-01
Cs-137	7.0E+00	+/- 7.2E-01	2.9E-01
Eu-152	2.8E+02	+/- 8.5E+00	6.7E-01
Eu-154	2.6E+01	+/- 2.1E+00	4.9E-01
Eu-155	< 6.9E-01		6.9E-01
Th-232d	< 5.6E-01		5.6E-01
U-235	< 1.1E+00		1.1E+00
Np-237	< 4.8E-01		4.8E-01
U-238	< 3.9E+01		3.9E+01
U-238d #	< 4.0E-01		4.0E-01
Am-241 #	< 3.8E-01		3.8E-01

B0TB05

Total GEA (pCi/g) 3.6E+02 +/- 1.4E+01

	Activity (pCi/g)	Error (pCi/g)
Gross Alpha**	< 2.5E-01	
Gross Beta	2.9E+02 +/-	7.0E+00

Alpha MDC (pCi/g)	2.5E-01
Beta MDC (pCi/g)	1.5E+02

Definitions:

All errors reported at 2 standard deviations.

N/R = no result or analysis not requested. <MDC = less than detection limit.

All GEA results reported as "<" list the Minimum Detectable Concentration (MDC) value for that radionuclide.

Rounding error may result in the reported total GEA activity differing from the sum of the > MDC GEA values in the second significant digit.

For soils and natural samples, the following applies:

The analysis of U-238 is based on the activity of Pa-234m.

The analysis of Np-237 is based on the activity of Pa-233.

U-238dau is the activity of Pb-214 and Bi-214, short lived daughter products of U-238. Equilibrium between parent and daughter products probably does not exist in disturbed materials.

Th-232dau is the activity of Ac-228, Pb-212, and Tl-208, short lived daughter products of Th-232. Equilibrium between parent and daughter products may not exist in disturbed materials.

Other samples, not containing natural materials, may have inapplicable results for the Th, U, transuranics and daughter products. The results must then be balanced for the gross alpha analysis.

**The gross alpha results are not corrected for mass absorption

No peaks for this radionuclide were visible above background in the spectrum. The result was reported as less than MDC.

Analyst

Katherine A. Robertson-DeMers

5/12/99

K. A. Robertson-DeMers

Report Printed: Wednesday, May 12, 1999

Post-It® Fax Note	7671	Date	# of pages ▶
To	Dave St. John	From	K.A. Robertson-DeMers
Co./Dept.		Co.	
Phone #		Phone #	373-9731
Fax #	372-9487	Fax #	

0041

Figure 1

SAMPLE CHECK-IN LIST

Date/Time Received: 5-12-99 SG#: W02758
Work Order Number: J9E120237 SAF #: B99-001
Shipping Container ID: ERC 9908 Chain of Custody #: B99-001-50+51

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

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

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

- 10. Where any anomalies identified in sample receipt? Yes No
- 11. Description of anomalies (include sample numbers): _____

Sample Custodian/Laboratory: [Signature] Date: 5-12-99

Telephoned To: _____ On _____ By _____

U-21271

Bechtel Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			B99-001-51	Page 1 of 2
Collector Fahlberg/Coffman	Company Contact R Coffman	Telephone No. 373-6425	Project Coordinator TRENT, SJ	Price Code	Data Turnaround 3 days	
Project Designation 100 BC Areas - Quick Turn	Sampling Location 100BC 116-C-2	Field Logbook No. EL 1327-1	SAF No. B99-001			
Ice Chest No. ERC 99-008	Offsite Property No. N/A	Method of Shipment Hand Delivered	Bill of Lading/Air Bill No. N/A			
Shipped To Quanterra Incorporated		COA R16B122AWO				

POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	Cool 4C																		
	Type of Container	aG																		
	No. of Container(s)	1																		
	Special Handling and/or Storage	Volume 60mL																		
SXA WO2758		SAMPLE ANALYSIS JAE130244		Chromium Hex - 7196																

Sample No.	Matrix *	Sample Date	Sample Time																		
B0TBD0 CVQQA	Soil	5.10.99	1035	X																	ticta B0VD65
B0TBD1	Soil	5.10.99	1042	X																	B0VD66
B0TBD2 CVQQC	Soil	5.10.99	1050	X																	B0VD67
B0TBD3	Soil	5.10.99	1103	X																	B0VD68
B0TBD4 RK 5-10-99	Soil																				

CHAIN OF POSSESSION	Sign/Print Names		SPECIAL INSTRUCTIONS										Matrix *		
	Relinquished By R. Fahlberg	Date/Time 5.10.99	Received By REF # 1-C	Date/Time 5.10.99	NOTE: COLLECTOR UNAVAILABLE TO SIGN COC.										Soil
	Relinquished By REF # C 51399	Date/Time 1100	Received By SUGALE	Date/Time 51399 1100											Water
	Relinquished By SUGALE	Date/Time 51399 1420	Received By K. Coffman	Date/Time 51399 1420											Vapor
Relinquished By	Date/Time	Received By	Date/Time											Other Solid	
Relinquished By	Date/Time	Received By	Date/Time											Other Liquid	

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

0043

ERC Radiological Counting Facility Analysis Report

RCF Number RCF5944

Sample Date & Time 5/10/99 1035

Project ID: 116-C-2A

SAF Number: B99-001

Date Analyzed 5/11/99

Sample ID: B0VD65

Gamma Energy Analysis

Nuclide	Activity (pCi/g)	Error (pCi/g)	MDC (pCi/g)
K-40	1.2E+01	+/- 2.1E+00	1.8E+00
Co-60	2.1E+02	+/- 5.9E+00	2.8E-01
Cs-137	1.4E+03	+/- 3.9E+01	6.1E-01
Eu-152	1.2E+02	+/- 4.6E+00	9.1E-01
Eu-154	1.2E+01	+/- 9.3E-01	6.6E-01
Eu-155	< 1.1E+00		1.1E+00
Th-232d #	< 2.4E+00		2.4E+00
U-235	< 2.3E+00		2.3E+00
Np-237	< 1.0E+00		1.0E+00
U-238d	< 7.7E-01		7.7E-01
U-238 #	< 5.6E+01		5.6E+01
Am-241	5.8E+01	+/- 3.1E+00	7.8E-01

BOTB DO

Total GEA (pCi/g) 1.8E+03 +/- 5.6E+01

	Activity (pCi/g)	Error (pCi/g)
Gross Alpha**	1.5E+01	+/- 3.2E+00
Gross Beta	1.3E+03	+/- 2.2E+01

Alpha MDC (pCi/g)	1.2E+01
Beta MDC (pCi/g)	7.0E+02

Definitions:

All errors reported at 2 standard deviations.

N/R = no result or analysis not requested. <MDC = Less than detection limit.

All GEA results reported as "<" list the Minimum Detectable Concentration (MDC) value for that radionuclide.

Rounding error may result in the reported total GEA activity differing from the sum of the > MDC GEA values in the second significant digit.

For soils and natural samples, the following applies:

The analysis of U-238 is based on the activity of Pa-234m.

The analysis of Np-237 is based on the activity of Pa-233.

U-238dau is the activity of Pb-214 and Bi-214, short lived daughter products of U-238. Equilibrium between parent and daughter products probably does not exist in disturbed materials.

Th-232dau is the activity of Ac-228, Pb-212, and Tl-208, short lived daughter products of Th-232. Equilibrium between parent and daughter products may not exist in disturbed materials.

Other samples, not containing natural materials, may have inapplicable results for the Th, U, transuranics and daughter products. The results must then be balanced for the gross alpha analysis.

**The gross alpha results are not corrected for mass absorption

No peaks for this radionuclide were visible above background in the spectrum. The result was reported as less than MDC.

Analyst

K. A. Robertson-DeMers
 K. A. Robertson-DeMers 5/12/99

Report To
 Randy Coliman
 Dave St. John

Fax
 373-9779
 372-9487

Report Printed: Wednesday, May 12, 1999

0044

ERC Radiological Counting Facility Analysis Report

RCF Number RCF5946

Sample Date & Time 5/10/99 1050

Project ID: 116-C-2A

SAF Number: B99-001

Date Analyzed 5/11/99

Sample ID: B0VD67

Gamma Energy Analysis

Nuclide	Activity (pCi/g)	Error (pCi/g)	MDC (pCi/g)
K-40	1.4E+01	+/- 4.9E+00	4.7E+00
Co-60	1.4E+03	+/- 4.0E+01	1.0E+00
Cs-137	3.9E+02	+/- 1.1E+01	1.3E+00
Eu-152	2.7E+01	+/- 8.9E+00	3.0E+00
Eu-154	7.3E+00	+/- 1.3E+00	2.4E+00
Eu-155 #	< 1.5E+00		1.5E+00
Th-232d	< 1.5E+01		1.5E+01
U-235	< 3.0E+00		3.0E+00
Np-237	< 2.0E+00		2.0E+00
U-238	< 1.8E+02		1.8E+02
U-238d	< 1.8E+00		1.8E+00
Am-241	1.8E+01	+/- 1.3E+00	1.1E+00

BOTBD2
BOV846

Total GEA (pCi/g) 1.9E+03 +/- 6.8E+01

	Activity (pCi/g)	Error (pCi/g)
Gross Alpha**	< 5.0E+00	
Gross Beta	7.0E+02	+/- 1.3E+01

Alpha MDC (pCi/g)	5.0E+00
Beta MDC (pCi/g)	3.7E+02

Definitions:

All errors reported as 2 standard deviations.
 N/R = no result or analysis not requested. <MDC = Less than detection limit.
 All GEA results reported as "<" list the Minimum Detectable Concentration (MDC) value for that radionuclide.
 Rounding error may result in the reported total GEA activity differing from the sum of the > MDC GEA values in the second significant digit.

For soils and natural samples, the following applies:

The analysis of U-238 is based on the activity of Pa-234m.
 The analysis of Np-237 is based on the activity of Pa-233.
 U-238dau is the activity of Pb-214 and Bi-214, short lived daughter products of U-238. Equilibrium between parent and daughter products probably does not exist in disturbed materials.
 Th-232dau is the activity of Ac-228, Pb-212, and Tl-208, short lived daughter products of Th-232. Equilibrium between parent and daughter products may not exist in disturbed materials.
 Other samples, not containing natural materials, may have inapplicable results for the Th, U, transuranics and daughter products. The results must then be balanced for the gross alpha analysis.
 **The gross alpha results are not corrected for mass absorption
 # No peaks for this radionuclide were visible above background in the spectrum. The result was reported as less than MDC.

Analyst K. A. Robertson-DeMers 5/12/99
 K. A. Robertson-DeMers

Report To
 Randy Coffman
 Dave St. John
 Fax
 373-9779
 372-9487

Report Printed: Wednesday, May 12, 1999

POTENTIAL HAZARDS

HEALTH

- Radiation presents minimal risk to transport workers, emergency response personnel, and the public during transportation accidents. Packaging durability is related to potential hazards of material.
- Low-level radioactive material; very low radiation hazard to people.
- Quantity of material presents low radiation hazard if released from package during accident.
- Some radioactive materials cannot be detected by commonly available instruments.
- Packages do not have RADIOACTIVE I, II, or III labels. Some may have EMPTY labels or may have the word "Radioactive" in the package marking.
- If any radioactive contamination occurs, it will be extremely low level.

FIRE OR EXPLOSION

- Some of these materials may burn, but most do not ignite readily.
- Radioactivity does not change flammability or other properties of materials.

PUBLIC SAFETY

- CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.
- Priorities for rescue, life-saving, first aid, and control of fire and other hazards are higher than the priority for measuring radiation levels.
- Radiation Authority must be notified of accident conditions, and is usually responsible for radiological decisions.
- Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions.
- Stay upwind.
- Keep unauthorized personnel away.
- Detain or isolate uninjured persons or equipment suspected to be contaminated; delay decontamination and cleanup until instructions are received from Radiation Authority.

PROTECTIVE CLOTHING

- Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters protective clothing will provide adequate protection.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 100 meters (330 feet).

Fire

- When a large quantity of this material is involved in a major fire, consider an initial evacuation distance of 300 meters (1000 feet) in all directions.

EMERGENCY RESPONSE

FIRE

- Presence of radioactive material will not change effectiveness of fire control techniques.
- Move containers from fire area if you can do it without risk.
- Do not move damaged packages; move undamaged packages out of fire zone.

Small Fires

- Dry chemical, CO₂, water spray or regular foam.

Large Fires

- Water spray, fog (flooding amounts).

SPILL OR LEAK

- Do not touch damaged packages or spilled material.

Liquid Spills

- Cover with sand, earth or other noncombustible absorbent material.
- Cover powder spill with plastic sheet or tarp to minimize spreading.

FIRST AID

- Medical problems take priority over radiological concerns.
- Use first aid treatment according to the nature of the injury.
- Do not delay care and transport of a seriously injured person.
- Apply artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Injured persons who contacted released material may be a minor contamination problem to contacted persons, equipment and facilities.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, 7, UN 2910

THIS PACKAGE CONFORMS TO THE CONDITIONS AND LIMITATIONS SPECIFIED IN 49 CFR 173.421 FOR RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, UN 2910

U.S. DEPARTMENT OF ENERGY, RICHLAND WA.
~~BY RUST FEDERAL SERVICES HANFORD~~
P.O. BOX 1970, 2355 STEVENS DRIVE
RICHLAND, WA 99352

WASTE MANAGEMENT, FEDERAL SERVICES,
NORTHWEST OPERATIONS

116-C-2 BOTBDO & BOTBD2

QUANTERRA

VOLUME TOTAL (60ml + 60ml) 1.7g/ml = 204g

HAVE (Ci)

Co-60 (2.1 x 10^2 pCi/g + 1.4 x 10^3 pCi/g) / 2 = 8.05 x 10^10 Ci/g = 1.64 x 10^-7 Ci

Cs-137 (1.4 x 10^3 pCi/g + 3.9 x 10^2 pCi/g) / 2 = 8.95 x 10^10 Ci/g = 1.82 x 10^-7 Ci

Eu-152 1.2 x 10^2 pCi/g = 1.2 x 10^10 Ci/g = 2.44 x 10^-8 Ci

TOTAL/PKG 3.70 x 10^-7 Ci
TBq/PKG 1.37 x 10^-8 TBq

ALLOWED (Ci) - TYRA
ISOTOPE Az

LTD QTY
Az (10^-3)

Table with 3 columns: Isotope, Tyra (Ci), and LTD Qty (10^-3). Rows include Co-60, Cs-137, and Eu-152.

HAVE VS ALLOWED

(1.64 x 10^-7 Ci / 1.08 x 10^-2 Ci) + (1.82 x 10^-7 Ci / 1.35 x 10^-2 Ci) + (2.44 x 10^-8 Ci / 2.43 x 10^-2 Ci) =

1.51 x 10^-5 + 1.34 x 10^-5 + 1.00 x 10^-6 = 2.95 x 10^-5

2.95 x 10^-5 < 1 ∴ LTD QTY

.0000295% < 100%

Figure 1

SAMPLE CHECK-IN LIST

Date/Time Received: 5/13/99 1420 SG#: W02758
Work Order Number: J9E130244 SAF #: B99-001
Shipping Container ID: ERC99-008 Chain of Custody #: B99-001-51

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

8. Samples have: <input checked="" type="checkbox"/> tape <input checked="" type="checkbox"/> custody seals <input type="checkbox"/> hazard labels <input type="checkbox"/> appropriate sample labels

9. Samples are: <input checked="" type="checkbox"/> in good condition <input type="checkbox"/> broken <input type="checkbox"/> leaking <input type="checkbox"/> have air bubbles

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

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

Sample Custodian/Laboratory: K. Kennedy Date: 5/13/99

Telephoned To: _____ On _____ By _____

COC Signature Page

Batch #:	Initials/Date	Procedure #
9120170		
Released By	<u>KEJ 4-30-99</u>	<u>Rickie0009</u>
Received	<u>(R3) 4/30/99</u>	<u>RICHWC5063 R3</u>
Released By	<u>(R3) 5/3/99</u>	<u>n/a</u>
Received		
Released By		<u>n/a</u>
Received		
Released By		<u>n/a</u>
Received		
Released By		<u>n/a</u>
Received		
Released By		<u>n/a</u>
Received		
Released By		<u>n/a</u>
Received		

RQC050

Quanterra Incorporated
WET CHEM BATCHSHEET
Richland

Run Date: 4/30/99
Time: 9:47:04

PRODUCTION FIGURES - WET CHEM

TOTAL NUMBER	SAMPLE NUMBER	QC	RE-RUN MATRIX	RE-RUN OTHER	MISC NUMBER	TOTAL HOURS	EXPANDED DELIVERABLE
--------------	---------------	----	---------------	--------------	-------------	-------------	----------------------

METHOD:	EA Hexavalent Chromium			6A)			
QC BATCH #:	9120170			INITIALS:			DATA ENTRY:
PREP DATE:	4/30/99			PREP			INITIALS
USER:	ROSSR			ANAL			DATE

Work Order	Lab Number	Structured Analysis	Exp. Del.	Analysis Date	Sample ID:
CV7JC-1-01	J-9D290171-001	XX A 88 EA 5K			B0TBC4
CV8VL-1-01	J-9D300000-170-B	XX A 88 EA 5K			INTRA-LAB BLANK
CV8VL-1-02	J-9D300000-170-C	XX A 88 EA 5K			INTRA-LAB CHECK
CV8VL-1-03	J-9D300000-170-L	XX A 88 EA 5K			INTRA-LAB CHECK

Control Limits

(85-115)

(85-115)

0050

COC Signature Page

Batch #:	Initials/Date	Procedure #
Released By	<i>HH 5-17-99</i>	<i>Rieke0009</i>
Received		
Released By		n/a
Received		
Released By		n/a
Received		
Released By		n/a
Received		
Released By		n/a
Received		
Released By		n/a
Received		
Released By		n/a
Received		

RC-131, Rev.0, 8/98

RQC050

Quanterra Incorporated
WET CHEM BATCHSHEET
Richland

Run Date: 5/15/99
Time: 12:33:38

PRODUCTION FIGURES - WET CHEM

TOTAL NUMBER	SAMPLE NUMBER	QC	RE-RUN MATRIX	RE-RUN OTHER	MISC NUMBER	TOTAL HOURS	EXPANDED DELIVERABLE
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METHOD:	EA Hexavalent Chromium				6A)		
QC BATCH #:	9135135				INITIALS:		DATA ENTRY:
PREP DATE:	5/15/99				PREP		INITIALS
USER:	ROSSR				ANAL		DATE

Work Order	Lab Number	Structured Analysis	Exp. Del.	Analysis Date	Sample ID:
CVP6J-1-01	J-9E120237-001	XX A 88 EA 5K			B0TBC5 5.0073g
CVP6M-1-01	J-9E120237-002	XX A 88 EA 5K			B0TBC6 5.0085g
CVP6N-1-01	J-9E120237-003	XX A 88 EA 5K			B0TBC7 5.0159g
CVP6P-1-01	J-9E120237-004	XX A 88 EA 5K			B0TBC8 5.0015g
CVP6Q-1-01	J-9E120237-005	XX A 88 EA 5K			B0TBC9 5.0098g
CVP6R-1-01	J-9E120237-006	XX A 88 EA 5K			B0TBD1 5.0042g
CVP6T-1-01	J-9E120237-007	XX A 88 EA 5K			B0TBD3 5.0066g
CVV0R-1-01	J-9E150000-135-B	XX A 88 EA 5K			INTRA-LAB BLANK
CVV0R-1-02	J-9E150000-135-C	XX A 88 EA 5K			INTRA-LAB CHECK
CVV0R-1-03	J-9E150000-135-L	XX A 88 EA 5K			INTRA-LAB CHECK

Control Limits

(85-115)

(85-115)

0052

COC Signature Page

Batch #:	Initials/Date	Procedure #
9134209		
Released By	ASUAG	RW0009
Received	(B) 5-14-99	RICHTWC5003 R3
Released By	(B) 5-15-99	n/a
Received		
Released By		n/a
Received		
Released By		n/a
Received		
Released By		n/a
Received		
Released By		n/a
Received		
Released By		n/a
Received		

RQC050

Quanterra Incorporated
WET CHEM BATCHSHEET
Richland

Run Date: 5/14/99
Time: 9:52:16

PRODUCTION FIGURES - WET CHEM

TOTAL NUMBER	SAMPLE NUMBER	QC	RE-RUN MATRIX	RE-RUN OTHER	MISC NUMBER	TOTAL HOURS	EXPANDED DELIVERABLE
--------------	---------------	----	---------------	--------------	-------------	-------------	----------------------

METHOD:	EA Hexavalent Chromium				6A)		
QC BATCH #:	9134209				INITIALS:		DATA ENTRY:
PREP DATE:	5/14/99				PREP		INITIALS
USER:	ROSSR				ANAL		DATE

Work Order	Lab Number	Structured Analysis	Exp. Del.	Analysis Date	Sample ID:
CVQQA-1-01	J-9E130244-001	XX A 88 EA 5K			B0TBDO 5.0023g
CVQQC-1-01	J-9E130244-002	XX A 88 EA 5K			B0TBD2 5.0037g
CVRFF-1-01	J-9E140000-209-B	XX A 88 EA 5K			INTRA-LAB BLANK
CVRFF-1-02	J-9E140000-209-C	XX A 88 EA 5K			INTRA-LAB CHECK
CVRFF-1-03	J-9E140000-209-L	XX A 88 EA 5K			INTRA-LAB CHECK

Control Limits

(85-115)

(85-115)

0054