

0001500

Date: 22 January 1999  
 To: Bechtel Hanford Inc. (technical representative)  
 From: TechLaw, Inc.  
 Project: 100-BC Areas - Full Protocol - Waste Site 116-B-14  
 Subject: Inorganics - Data Package No. W02606-QES (SDG No. W02606)

**INTRODUCTION**

This memo presents the results of data validation on Data Package No. W02606-QES prepared by Quanterra Environmental Services (QES). 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
BOTOF2	11/11/98	Soil	C	ICP metals; Mercury (7471); Chrome VI (7196)
BOTOF3	11/11/98	Soil	C	ICP metals; Mercury (7471); Chrome VI (7196)
BOTOF4	11/11/98	Soil	C	ICP metals; Mercury (7471) ; Chrome VI (7196)
BOTOF5	11/11/98	Soil	C	ICP metals; Mercury (7471) ; Chrome VI (7196)

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



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## DATA QUALITY OBJECTIVES

- **Holding Times**

Analytical holding time for ICP metals, mercury and chrome VI were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Solid samples must be analyzed within six (6) months for ICP metals, 28 days for mercury and 30 days for chromium VI.

All holding times were acceptable.

- **Blanks**

### Preparation Blanks

At least one preparation blank, 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.

- **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.

Due a matrix spike percent recovery of -1626.3 and a matrix spike duplicate percent recovery of 282.6, all aluminum results were qualified as estimates and flagged "J".

Due a matrix spike percent recovery of 54.4, and a matrix spike duplicate percent recovery of 51.5, all antimony results were qualified as estimates and flagged "J".

Due a matrix spike percent recovery of 69, all calcium results were qualified as estimates and flagged "J".

Due a matrix spike percent recovery of -3275 and a matrix spike duplicate percent recovery of 718, all iron results were qualified as estimates and flagged "J".

Due a matrix spike percent recovery of 44.9, all magnesium results were qualified as estimates and flagged "J".

Due a matrix spike percent recovery of 21.9, all manganese results were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

- **Precision**

- Laboratory Duplicate Samples

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

Due to an RPD of 200%, all aluminum results were qualified as estimates and flagged "J".

Due to an RPD of 37.8%, all detected calcium results were qualified as estimates and flagged "J".

Due to an RPD of 200%, all detected iron results were qualified as estimates and flagged "J".

Due to an RPD of 116%, all detected manganese results were qualified as estimates and flagged "J".

Due to an RPD of 79.5%, all detected magnesium results were qualified as estimates and flagged "J".

All other laboratory duplicate recovery results were acceptable.

#### Field Duplicate Samples

One pair of field duplicate samples (samples BOTOF3/BOTOF4) were submitted to QES for analysis. The duplicate sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. The RPD for antimony was outside QC limits. Under the BHI statement of work, no qualification is required. All other field duplicate results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the 100 Area Remedial Action Sampling and Analysis Plan target detection limits (TDLs) or the CRDL if no TDL was specified, to ensure that laboratory detection levels meet the required criteria. All reported laboratory detection levels met the analyte specific TDL or CRDL.

- **Completeness**

Data package No. W02606-QES (SDG No. W02606) was submitted for validation and verified for completeness. The completion percentage was 100%.

#### **MAJOR DEFICIENCIES**

None found.

## MINOR DEFICIENCIES

Due to a matrix spike percent recovery of -1626 and a matrix spike duplicate percent recovery of 282, all aluminum results were qualified as estimates and flagged "J". Due to a matrix spike percent recovery of 54 and a matrix spike duplicate percent recovery of 51, all antimony results were qualified as estimates and flagged "J". Due a matrix spike percent recovery of 69, all calcium results were qualified as estimates and flagged "J". Due to a matrix spike percent recovery of -3275 and a matrix spike duplicate percent recovery of 718, all iron results were qualified as estimates and flagged "J". Due to a matrix spike percent recovery of 45, all magnesium results were qualified as estimates and flagged "J". Due a matrix spike percent recovery of 22, all manganese results were qualified as estimates and flagged "J". Due to an RPD of 200%, all detected aluminum results were qualified as estimates and flagged "J". Due to an RPD of 38%, all detected calcium results were qualified as estimates and flagged "J". Due to an RPD of 200%, all detected iron results were qualified as estimates and flagged "J". Due to an RPD of 116%, all detected manganese results were qualified as estimates and flagged "J". Due to an RPD of 79.5%, all detected magnesium 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.

## REFERENCES

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

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

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

**Appendix 1**

**Glossary of Data Reporting Qualifiers**

000006

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

- U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- J - Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.
- BJ - Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.
- R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.
- UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.
- NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).
- N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

**Appendix 2**

**Summary of Data Qualification**

000008

DATA QUALIFICATION SUMMARY

SDG: W02606	REVIEWER: TLI	DATE: 1/22/99	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Antimony	J	All	MS/MSD
Aluminum	J	All	MS/MSD
Calcium	J	All	MS
Iron	J	All	MS/MSD
Magnesium	J	All	MS
Manganese	J	All	MS
Aluminum, calcium, iron, manganese, magnesium	J	All	RPD

000003

**Appendix 3**

**Qualified Data Summary and Annotated Laboratory Reports**

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**Appendix 4**

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

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Quanterra Incorporated  
13715 Rider Trail North  
Earth City, Missouri 63045

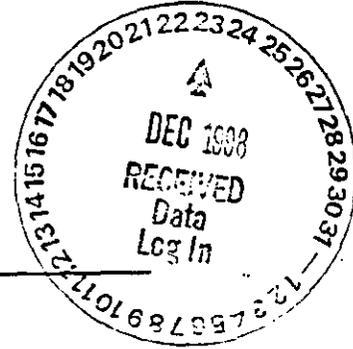
314 298-8566 Telephone  
314 298-8757 Fax

**CASE NARRATIVE**

Bechtel Hanford Incorporated  
3350 George Washington Way  
Richland, Washington 99352

December 21, 1998

Attention: Joan Kessner




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Project Number	:	550.186
SDG	:	W02606
Number of Samples	:	Four (4)
Sample Matrix	:	Soil
Data Deliverable	:	Summary
Date SDG Closed	:	November 16, 1998

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**II. Introduction**

On November 16, 1998 a total of four "soil" samples were received by Quanterra, Richland and transferred to Quanterra, St. Louis for chemical analysis. There were no comments or nonconformances associated with the shipping or receiving of the samples. Upon receipt, the samples were given the following laboratory ID numbers to correspond with the specific client ID's:

<u>St. Louis ID</u>	<u>BHI ID</u>	<u>SAF ID</u>	<u>Matrix</u>	<u>Date of Receipt</u>
19422-001	B0T0F2	B99-002	SOIL	16-NOV-98
19422-002	B0T0F3	B99-002	SOIL	16-NOV-98
19422-003	B0T0F4	B99-002	SOIL	16-NOV-98
19422-004	B0T0F5	B99-002	SOIL	16-NOV-98

**III. Analytical Results/ Methodology**

The analytical results for this report are presented by analytical test. Each set of data includes sample identification information, analytical results and the appropriate detection limits.

Bechtel Hanford Incorporated  
December 21, 1998  
Project Number: 550.186  
SDG: W02606  
Page 2

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### III. Analytical Results/ Methodology (continued)

Analyses requested:            ICP Metals by EPA method 6010A.  
   Mercury by EPA method 7471

Deviation from Request:      No Deviation from requested methods.

### IV. Definitions

The following codes are used to denote laboratory quality control samples and can be found in the data summary section of this report:

QCBLK- Quality Control Blank, Method Blank  
QCLCS- Quality Control Laboratory Control Sample, Blank Spike  
MS-     Matrix Spike.  
MSD-   Matrix Spike Duplicate.

### V. Comments

Inorganics:                    A Laboratory Control Sample, Method Blank, Matrix Spike and Matrix Spike Duplicate were analyzed with each preparation batch per the protocol for this analysis.

The recoveries of the Mercury matrix spike (126.1%) and the matrix spike duplicate (126.1%) were greater than 125% therefore all associated data was flagged with a "N".

The recoveries of the matrix spike and/or the matrix spike duplicate for the following list of elements were not within the 75%-125% range therefore all associated data was flagged with a "N".

Bechtel Hanford Incorporated  
December 21, 1998  
Project Number: 550.186  
SDG: W02606  
Page 3

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Inorganics (Cont.):

	<u>% REC</u> <u>MS</u>	<u>% REC</u> <u>MSD</u>
Antimony	54.4	51.5
Calcium	69.0	101.2*
Magnesium	44.9	104.1*
Manganese	21.9	82.5*
Mercury	126.1	126.1

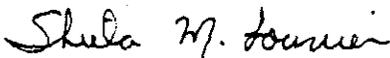
- Data met criteria, for reference only.

The recoveries of the matrix spike and/or the matrix spike duplicate for Aluminum and Iron were also outside the range but the data did not require flagging because the concentrations of these elements were 4 X greater than the spiking levels.

The recoveries of the Mercury matrix spike (126.1%) and the matrix spike duplicate (126.1%) were greater than 125% therefore all associated data was flagged with a "N".

I certify that this Summary 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:

  
Shiela M. Louvier  
St. Louis Project Manager

Collector COFFMAN/FAHLBERG Coffman/Fahlberg 6ALE 2/8/98	Company Contact R Coffman	Telephone No. 373-6425	Project Coordinator TRENT, SJ	Data Turnaround  <b>15 Days</b>
Project Designation 100 BC Areas - Full Protocol	Sampling Location 116-B-14	SAF No. B99-002		

Ice Chest No. Delta 1	Field Logbook No. EL 1327-1	Method of Shipment
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Shipped To Quanterra Incorporated	Offsite Property No.	Bill of Lading/Air Bill No.
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POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	Cool 4C	None								
	Type of Container	aG	aG	aG	aG	aG	aG	P	aG	aG	Marinelli
	No. of Container(s)	0	0	0	0	0	0	1	1	1	1

Special Handling and/or Storage	Volume	Chromium Hex - 7196	ICP Metals - 6010A (Add-on) (Lead)	ICP Metals - 6010A (SW-846) (Chromium, Lead)	Mercury - 7471 - (CV)	Nickel-63	Strontium-89,90 -- Total Sr	Activity Scan	Americium-241; Isotopic Plutonium; Isotopic Uranium	ICP Metals - 6010A (TAL)	See item (!) in Special Instructions
	60mL	60mL	60mL	60mL	60mL	60mL	60mL	20mL	60mL	60mL	500mL
SAMPLE ANALYSIS 811240 SDG W02606		811241				811241		811241		811241	811241

Sample No.	Matrix *	Sample Date	Sample Time	Chromium Hex - 7196	ICP Metals - 6010A (Add-on) (Lead)	ICP Metals - 6010A (SW-846) (Chromium, Lead)	Mercury - 7471 - (CV)	Nickel-63	Strontium-89,90 -- Total Sr	Activity Scan	Americium-241; Isotopic Plutonium; Isotopic Uranium	ICP Metals - 6010A (TAL)	See item (!) in Special Instructions
OTOF2 01	Soil	11-11-98	1240	X	X	X	X	X	X	X	X	X	Box 013X
OTOF3 02	Soil	11-11-98	1310	X	X	X	X	X	X	X	X	X	Box 014X
OTOF4 03	Soil	11-11-98	1310	X	X	X	X	X	X	X	X	X	Box 014X
OTOF5 04	SOIL	11-11-98	1250	X	X	X	X	X	X	X	X	X	Box 01X 100%

CHAIN OF POSSESSION		Sign/Print Names		SPECIAL INSTRUCTIONS								Matrix *	
Inquired By R Coffman	Date/Time 11/34	Received By R Coffman	Date/Time 11/34	** The ERC contractor acknowledges the 24-hour holding time is not likely achievable for Hex Chrom by EPA 7196.  ** Use a separate Chain of Custody for each waste site.  (1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Uranium-238)								S - Soil SE - Sediment SO - Solid SL - Sludge W - Water O - Oil A - Air DS - Drum Solids DL - Drum Liquids T - Tissue WI - Wipe L - Liquid V - Vegetation X - Other	
Inquired By R Coffman	Date/Time 11/16/98	Received By JL Cooper	Date/Time 11-16-98										
Inquired By JL Cooper	Date/Time 11-18-98	Received By JL Cooper	Date/Time 0820										

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

**Appendix 5**

**Data Validation Supporting Documentation**

**000021**

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	<b>C</b>	D	E
PROJECT: 114-15-14			DATA PACKAGE: W02604		
VALIDATOR: TLI		LAB: QES		DATE: 1/11/98	
CASE:			SDG: W02604		
ANALYSES PERFORMED					
<input type="checkbox"/> CLP/ICP	<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/ICP	<input type="checkbox"/> SW-846/GFAA	<input checked="" type="checkbox"/> SW-846/Hg	<input type="checkbox"/> SW-846 Cyanide	<input checked="" type="checkbox"/> CR II	<input type="checkbox"/>
SAMPLES/MATRIX					
BOTOF2 BOTOF3 BOTOF4 BOTOFS					
(dup of F3)					

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: CRUI Al, Barium, Calcium, chromium, iron, lead, zinc - pos  
 negative Cobalt, Magnesium, sodium, vanadium  
 all greater than 10X blank absolute value → all OK - detect greater than 5X blank

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: CRUI ms RPD Potassium ADD

Element	CRUI	ms	RPD	Notes
Al	-1626.3	282.4	200	J all no undetects 272
Ant	544	51.5		J
Calcium	69.0	101.2	37.8	J
Iron	-3275.1	718.8	200	UR/J no undetect
Mang	21.9		75.5	UR/J no undetect
Hg	126.1	126.1		OK
Magnesium	44.9		75.5	

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: CR VI See #5 Al, calc, iron, Mg, Mn  
Antimony → 3.6/c.l I all detect  
(Field Dup)

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: \_\_\_\_\_



Date: 22 January 1999  
 To: Bechtel Hanford, Inc. (technical representative)  
 From: TechLaw, Inc.  
 Project: 100-BC Areas - Full Protocol - Waste Site 116-B-14  
 Subject: Radiochemistry - Data Package No. W02606-QES (SDG No. W02606)

**INTRODUCTION**

This memo presents the results of data validation on Summary Data Package No. W02606-QES which was prepared by Quanterra Environmental Services (QES). 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
BOTOF2	11/11/98	Soil	C	See note 1
BOTOF3	11/11/98	Soil	C	See note 1
BOTOF4	11/11/98	Soil	C	See note 1
BOTOF5	11/11/98	Soil	C	See note 1

1 - Gamma spectroscopy; alpha spectroscopy; nickel-63; strontium-90.

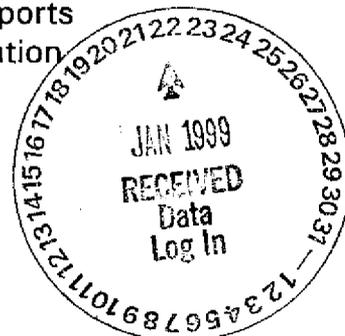
Data validation was conducted in accordance with the BHI validation statement of work (BHI 1997) and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL 1998). Appendices 1 through 5 provide the following information as indicated below:

- 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.



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.

- **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 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.

Due to an LCS recovery of 212%, uranium-235 results in samples BOTOF2, BOTOF3, and BOTOF4 were qualified as estimates and flagged "J".

All other 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 or equal to 30 percent, the results are acceptable. If either activities are less than five times the CRDL, a control limit (acceptable RPD) of less than or equal

to two times the CRDL is used. If either the original or replicate value is below the CRDL, the applicable control limits (acceptable RPD) are less than or equal to two times the CRDL for soil samples. If the RPD is outside the applicable control limit (acceptable RPD), associated results are qualified as estimated detects or estimated non-detects.

All duplicate results were acceptable.

#### Field Duplicate Samples

One pair of field duplicate samples (samples BOTOF3/BOTOF4) were submitted to QES for analysis. The duplicate sample results were compared using the validation guidelines for comparing the RPD between a sample and its duplicate. All field duplicate results were acceptable.

- **Detection Levels**

Reported analytical detection levels are compared against the 100 Area Remedial Action Sampling and Analysis Plan target detection limits (TDLs) or the contract specified MDA if no TDL was specified, to ensure that laboratory detection levels meet the required criteria. The europium-154 result in sample BOTOF4 and the uranium-238 (GEA) results in samples BOTOF4 and BOTOF5 were above the TDL/MDA. All other reported laboratory MDAs were at or below the analyte-specific TDL or contract specified MDA.

- **Completeness**

Data Package No. W02606-QES was submitted for validation and verified for completeness. The completion rate was 100%.

#### **MAJOR DEFICIENCIES**

None found.

#### **MINOR DEFICIENCIES**

Due to an LCS recovery of 212%, uranium-235 results in samples BOTOF2, BOTOF3, and BOTOF4 were qualified as estimates and flagged "J". The europium-154 result in sample BOTOF4 and the uranium-238 (GEA) results in samples BOTOF4 and BOTOF5 were above the TDL/MDA. Data flagged "J" is an estimate, but under the BHI validation SOW, the data may be usable for decision-making

000003

purposes. All other validated results are considered accurate within the standard error associated with the methods.

## **REFERENCES**

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

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

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

**Appendix 1**

**Glossary of Data Reporting Qualifiers**

Qualifiers which may be applied by data validators in compliance with 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**

000007

DATA QUALIFICATION SUMMARY

SDG: W02606	REVIEWER: TLI	DATE: 1/22/99	PAGE <u>1</u> OF <u>1</u>
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Uranium-235	J	B0T0F2, B0T0F3, B0T0F4	LCS percent recovery

000008

**Appendix 3**

**Qualified Data Summary and Annotated Laboratory Reports**

000003



### SAMPLE RESULTS

**LAB NAME:** QUANTERRA, Richland      **SDG: /RPT GRP:** W02606 / 6572  
**LAB SAMPLE ID:** 81124101      **MATRIX:** SOIL  
**CLIENT ID:** B0T0F2      **DATE RECEIVED:** 11/16/98 11:34:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	8.30E-02		N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196
AM-241	-4.07E-04	U	8.1E-04	8.2E-04	3.70E-02	pCi/g	82.80%	RICHRC5080
U-234	9.92E-01	J	1.5E-01	2.2E-01	3.05E-02	pCi/g	76.40%	RICHRC5030
U-235	2.16E-02	J I	2.2E-02	2.2E-02	1.46E-02	pCi/g	76.40%	RICHRC5030
U-238	9.10E-01	J	1.4E-01	2.0E-01	3.47E-02	pCi/g	76.40%	RICHRC5030
PU-238	-5.00E-04	U	1.0E-03	1.0E-03	2.51E-02	pCi/g	67.90%	RICHRC5010
PU239/40	5.74E-03	U	1.3E-02	1.3E-02	2.51E-02	pCi/g	67.90%	RICHRC5010
AM-241	3.94E-02	U	3.8E-02	3.8E-02	5.72E-02	pCi/g	N/A	RICHRC5017
CO-60	5.19E-03	U	1.2E-02	1.2E-02	2.18E-02	pCi/g	N/A	RICHRC5017
CS-137	1.08E+00		1.2E-01	1.2E-01	2.16E-02	pCi/g	N/A	RICHRC5017
EU-152	2.03E-01	J	5.2E-02	5.2E-02	6.64E-02	pCi/g	N/A	RICHRC5017
EU-154	1.49E-03	U	4.0E-02	4.0E-02	6.75E-02	pCi/g	N/A	RICHRC5017
EU-155	3.94E-02	U	3.1E-02	3.1E-02	5.28E-02	pCi/g	N/A	RICHRC5017
K-40	1.67E+01		1.8E+00	1.8E+00	1.84E-01	pCi/g	N/A	RICHRC5017
RA-226	5.35E-01		7.5E-02	7.5E-02	3.56E-02	pCi/g	N/A	RICHRC5017
RA-228	6.60E-01		1.2E-01	1.2E-01	6.87E-02	pCi/g	N/A	RICHRC5017
U-238	9.67E-01		5.0E-01	5.0E-01	4.90E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	9.14E-01	J	1.0E-01	3.0E-01	1.24E-01	pCi/g	63.80%	RICHRC5006
NI-63	3.31E+00	U	3.2E+00	9.6E+00	7.77E+00	pCi/g	100.00%	RICHRC5069

Number of Results: 19

*RPK*  
11/19/99

Result = IDL When Not Detected

(Q)ualifiers: U = Analyte result < MDA/IDL  
J = No U qualifier and result < RDL

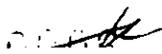
### SAMPLE RESULTS

**LAB NAME:** QUANTERRA, Richland      **SDG: /RPT GRP:** W02606 / 6572  
**LAB SAMPLE ID:** 81124102      **MATRIX:** SOIL  
**CLIENT ID:** BOT0F3      **DATE RECEIVED:** 11/16/98 11:34:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	4.20E-02		N/A	N/A	3.00E-02	mg/kg	N/A	EPA7100
AM-241	1.49E-02	U	2.1E-02	2.2E-02	2.76E-02	pCi/g	99.10%	RICHRC5080
U-234	7.49E-01	J	1.9E-01	2.5E-01	7.42E-02	pCi/g	34.40%	RICHRC5030
U-235	5.81E-02	AK J	5.4E-02	5.5E-02	5.48E-02	pCi/g	34.40%	RICHRC5030
U-238	7.91E-01	J	1.9E-01	2.6E-01	4.82E-02	pCi/g	34.40%	RICHRC5030
PU-238	-1.09E-03	U	1.5E-03	1.6E-03	3.11E-02	pCi/g	60.30%	RICHRC5010
PU239/40	1.01E-01		5.3E-02	5.6E-02	3.11E-02	pCi/g	60.30%	RICHRC5010
AM-241	-7.84E-02	U	7.0E-02	7.0E-02	1.13E-01	pCi/g	N/A	RICHRC5017
CO-60	2.72E-02	U	1.6E-02	1.6E-02	2.87E-02	pCi/g	N/A	RICHRC5017
CS-137	5.78E+00		5.8E-01	5.8E-01	2.92E-02	pCi/g	N/A	RICHRC5017
EU-152	1.31E+00		1.7E-01	1.7E-01	8.92E-02	pCi/g	N/A	RICHRC5017
EU-154	7.86E-02	U	4.8E-02	4.8E-02	8.66E-02	pCi/g	N/A	RICHRC5017
EU-155	2.59E-02	U	5.4E-02	5.4E-02	8.92E-02	pCi/g	N/A	RICHRC5017
K-40	1.54E+01		1.6E+00	1.6E+00	1.66E-01	pCi/g	N/A	RICHRC5017
RA-226	6.54E-01		9.3E-02	9.3E-02	5.18E-02	pCi/g	N/A	RICHRC5017
RA-228	7.66E-01		1.2E-01	1.2E-01	8.44E-02	pCi/g	N/A	RICHRC5017
U-238	1.05E+00	U	5.8E-01	5.8E-01	9.88E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	1.28E+00		1.3E-01	3.9E-01	1.35E-01	pCi/g	46.80%	RICHRC5006
NI-63	2.29E+00	U	3.1E+00	9.3E+00	7.62E+00	pCi/g	100.00%	RICHRC5069

Number of Results: 19

  
 11/19/99



### SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland      SDG: /RPT GRP: W02606 / 6572  
 LAB SAMPLE ID: 81124103      MATRIX: SOIL  
 CLIENT ID: B0T0F4      DATE RECEIVED: 11/16/98 11:34:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	8.50E-02		N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196 <del>7</del>
AM-241	-6.38E-04	U	9.0E-04	9.1E-04	3.21E-02	pCi/g	98.00%	RICHRC5080
U-234	9.15E-01	J	1.4E-01	2.0E-01	2.42E-02	pCi/g	78.90%	RICHRC5030
U-235	6.31E-02	<del>U</del> J	3.7E-02	3.8E-02	2.13E-02	pCi/g	78.90%	RICHRC5030
U-238	1.03E+00		1.5E-01	2.2E-01	1.43E-02	pCi/g	78.90%	RICHRC5030
PU-238	-2.69E-03	U	2.7E-03	2.7E-03	4.49E-02	pCi/g	51.20%	RICHRC5010
PU239/40	1.68E-02	U	2.4E-02	2.4E-02	2.27E-02	pCi/g	51.20%	RICHRC5010
AM-241	3.28E-02	U	7.5E-02	7.5E-02	1.29E-01	pCi/g	N/A	RICHRC5017
CO-60	2.21E-02	U	1.6E-02	1.6E-02	2.88E-02	pCi/g	N/A	RICHRC5017
CS-137	5.88E+00		5.9E-01	5.9E-01	2.59E-02	pCi/g	N/A	RICHRC5017
EU-152	1.34E+00		1.7E-01	1.7E-01	8.05E-02	pCi/g	N/A	RICHRC5017
EU-154	1.17E-01	<del>U</del>	5.1E-02	5.1E-02	9.19E-02	pCi/g	N/A	RICHRC5017
EU-155	3.80E-02	U	4.8E-02	4.8E-02	7.90E-02	pCi/g	N/A	RICHRC5017
K-40	1.66E+01		1.8E+00	1.8E+00	1.88E-01	pCi/g	N/A	RICHRC5017
RA-226	6.26E-01		9.0E-02	9.0E-02	5.02E-02	pCi/g	N/A	RICHRC5017
RA-228	7.35E-01		1.5E-01	1.5E-01	9.42E-02	pCi/g	N/A	RICHRC5017
U-238	9.67E-01	U	6.6E-01	6.6E-01	1.05E+00	pCi/g	N/A	RICHRC5017
STRONTIUM	1.51E+00		1.3E-01	5.0E-01	1.09E-01	pCi/g	58.70%	RICHRC5006
NI-63	4.74E+00	U	3.2E+00	9.7E+00	7.76E+00	pCi/g	100.00%	RICHRC5069

Number of Results: 19

*ms*  
11/19/99

Result = IDL When Not Detected  
 (Q)ualifiers: U = Analyte result < MDA/IDL  
 J = No U qualifier and result < RDL

000023

~~0004~~

### SAMPLE RESULTS

**LAB NAME:** QUANTERRA, Richland      **SDG: /RPT GRP:** W02606 / 6572  
**LAB SAMPLE ID:** 81124104      **MATRIX:** SOIL  
**CLIENT ID:** BOT0F5      **DATE RECEIVED:** 11/18/98 11:34:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	2.52E-01		N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196
AM-241	0.00E+00	U	0.0E+00	2.8E-02	2.53E-02	pCi/g	81.50%	RICHRC5080
U-234	7.37E-01	J	1.4E-01	1.9E-01	3.66E-02	pCi/g	71.10%	RICHRC5030
U-235	2.28E-02	U	2.6E-02	2.6E-02	3.85E-02	pCi/g	71.10%	RICHRC5030
U-238	7.90E-01	J	1.4E-01	2.0E-01	2.98E-02	pCi/g	71.10%	RICHRC5030
PU-238	8.02E-03	U	1.5E-02	1.5E-02	3.13E-02	pCi/g	78.50%	RICHRC5010
PU239/40	5.80E-02		3.5E-02	3.8E-02	1.43E-02	pCi/g	78.50%	RICHRC5010
AM-241	-5.72E-03	U	3.8E-02	3.8E-02	6.43E-02	pCi/g	N/A	RICHRC5017
CO-60	1.23E-02	U	1.2E-02	1.2E-02	2.18E-02	pCi/g	N/A	RICHRC5017
CS-137	2.06E+00		2.1E-01	2.1E-01	2.24E-02	pCi/g	N/A	RICHRC5017
EU-152	4.09E-01		8.1E-02	8.1E-02	5.99E-02	pCi/g	N/A	RICHRC5017
EU-154	1.44E-02	U	4.0E-02	4.0E-02	7.04E-02	pCi/g	N/A	RICHRC5017
EU-155	4.17E-02	U	3.4E-02	3.4E-02	5.61E-02	pCi/g	N/A	RICHRC5017
K-40	1.50E+01		1.6E+00	1.6E+00	1.81E-01	pCi/g	N/A	RICHRC5017
RA-226	5.44E-01		7.5E-02	7.5E-02	3.90E-02	pCi/g	N/A	RICHRC5017
RA-228	6.64E-01		1.2E-01	1.2E-01	7.38E-02	pCi/g	N/A	RICHRC5017
U-238	1.73E-01	U	4.2E-01	4.2E-01	5.54E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	1.04E+00		1.1E-01	3.4E-01	1.28E-01	pCi/g	80.80%	RICHRC5006
NI-63	-3.07E-02	U	3.0E+00	8.8E+00	7.70E+00	pCi/g	100.00%	RICHRC5069

Number of Results: 19

*DL*  
1/19/99

**Appendix 4**

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

## CERTIFICATE OF ANALYSIS

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

December 2, 1998

Attention: Joan Kessner



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SAF Number	:	B98-002
Number of Samples	:	Four
SDG Closed	:	11/16/98
Sample Type	:	Soil
SDG Number	:	W02606
Data Deliverable	:	15 Day Priority / Full Protocol Summary

---

### I. Introduction

On November 16, 1998, the Quanterra, Inc., Richland Laboratory (QRL) for a 15-day priority radiochemical analysis, received four soil samples. Upon receipt, the samples were assigned the following laboratory ID numbers to correspond with the Bechtel Hanford (BHI) specific IDs:

<u>QTESRL ID#</u>	<u>BHI ID#</u>	<u>MATRIX</u>	<u>DATE OF RECEIPT</u>
81124101	B0T0F2	SOIL	11/16/98
81124102	B0T0F3	SOIL	11/16/98
81124103	B0T0F4	SOIL	11/16/98
81124104	B0T0F5	SOIL	11/16/98

### II. Analytical Results/Methodology

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.

Bechtel Hanford Inc.  
December 2, 1998  
Page 2

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The requested analyses were:

**Alpha Spectroscopy**

Americium-241 by method RICH-RC-5080

Plutonium-238, -239/40 by method RICH-RC-5010

Uranium-234, -235, -238 by method RICH-RC-5030

**Gamma Spectroscopy**

Gamma Scan by method RICH-RC-5017

**Gas Proportional Counting**

Total Strontium by method RICH-RC-5006

**Liquid Scintillation Counting**

Nickel-63 by method RICH-RC-5069

**Chemical Analyses**

Chromium Hex by EPA method 7196

III. Quality Control

The analytical results for each analysis performed under SDG W02606 include a minimum of one Laboratory Control Sample (LCS), one method (reagent) blank, and one duplicate. Any exceptions have been noted in the "Comments" section.

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

IV. Comments

**Alpha Spectroscopy**

Americium-241 by method RICH-RC-5080

The LCS, batch blank, sample duplicate (BOT0F2) and sample results met the requirements of the contract.

Plutonium-238, -239/40 by method RICH-RC-5010

The LCS, batch blank, sample duplicate (BOT0F2) and sample results met the requirements of the contract.

Uranium-234, -235, -238 by method RICH-RC-5030

The LCS, batch blank, sample duplicate (BOT0F5) and sample results met the requirements of the contract.

Bechtel Hanford Inc.  
December 2, 1998  
Page 3

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### **Gamma Spectroscopy**

#### Gamma Scan by method RICH-RC-5017

The LCS, batch blank, sample duplicate (BOTOF2) and sample results met the requirements of the contract.

### **Gas Proportional Counting**

#### Total Strontium by method RICH-RC-5006

The LCS, batch blank, sample duplicate (BOTOF2) and sample results met the requirements of the contract.

### **Liquid Scintillation Counting**

#### Nickel-63 by method RICH-RC-5069

The LCS, batch blank, sample duplicate (BOTOF3) and sample results met the requirements of the contract.

### **Chemical Analyses**

#### Chromium Hex by EPA method 7196

The original batch analyzed for Cr+6 was analyzed without a post-digestive spike, therefore: the batch was reanalyzed. The blank from the reanalysis of these samples had a negative value that could not be used, therefore; the batch was reanalyzed a second time. The LCS, MS (BOTOF2), batch blank, sample duplicate (BOTOF2) and sample results from the second reanalysis met 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. The Laboratory Manager or a designee, as verified by the following signature has authorized release of the data contained in this hard copy data package.

Reviewed and approved:



Andy Kopriva  
Project Manager

000018

0004

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Collector Coffman/Fahlberg <i>DATE 2/10/98</i>	Company Contact R Coffman	Telephone No. 373-6425	Project Coordinator TRENT, SJ	Data Turnaround <b>15 Days</b>
Project Designation 100 BC Areas - Full Protocol	Sampling Location 116-B-14	SAF No. B99-002		

Field Logbook No. EL 1327-1	Method of Shipment
--------------------------------	--------------------

Shipped To Quanterra Incorporated	Offsite Property No.	Bill of Lading/Air Bill No.
--------------------------------------	----------------------	-----------------------------

POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	Cool 4C	None								
	Type of Container	aG	aG	aG	aG	aG	aG	P	aG	aG	Marinelli
	No. of Container(s)	0	0	0	0	0	0	1	1	1	1

Special Handling and/or Storage	Volume	60mL	60mL	60mL	60mL	60mL	60mL	20mL	60mL	60mL	500mL
---------------------------------	--------	------	------	------	------	------	------	------	------	------	-------

SAMPLE ANALYSIS	Chromium Hex - 7196	ICP Metals - 6010A (Add-on) (Lead)	ICP Metals - 6010A (SW-846) (Chromium, Lead)	Mercury - 7471 - (CV)	Nickel-63	Strontium-89,90 - Total Sr	Activity Scan	Americium-241; Isotopic Plutonium; Isotopic Uranium	ICP Metals - 6010A (TAL)	See Item (1) in Special Instructions
										<i>SDG</i>

Sample No.	Matrix *	Sample Date	Sample Time	Chromium	ICP Metals - 6010A (Add-on)	ICP Metals - 6010A (SW-846)	Mercury - 7471 - (CV)	Nickel-63	Strontium-89,90 - Total Sr	Activity Scan	Americium-241; Isotopic Plutonium; Isotopic Uranium	ICP Metals - 6010A (TAL)	See Item (1) in Special Instructions
OTOF2 01	Soil	11-11-98	1240	X	X	X	X	X	X	X	X	X	Box 0M3X
OTOF3 02	Soil	11-11-98	1310	X	X	X	X	X	X	X	X	X	Box 0M4X
OTOF4 03	Soil	11-11-98	1310	X	X	X	X	X	X	X	X	X	Box 0M4X
OTOF5 04	SOIL	11-11-98	1250	X	X	X	X	X	X	X	X	X	Box 0M4X

CHAIN OF POSSESSION		Sign/Print Names	
Inquired By <i>R. Nielsen</i>	Date/Time <i>11/34</i>	Received By <i>R. Nielsen</i>	Date/Time <i>11/16/98</i>
Inquired By	Date/Time	Received By	Date/Time
Inquired By	Date/Time	Received By	Date/Time

**SPECIAL INSTRUCTIONS**

\*\* The ERC contractor acknowledges the 24-hour holding time is not likely achievable for Hex Chrom by EPA 7196.

\*\* Use a separate Chain of Custody for each waste site.

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

**Matrix \***

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

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

**Appendix 5**

**Data Validation Supporting Documentation**

000020

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	<u>C</u>	D	E
PROJECT:	WS 116-B-14		DATA PACKAGE: W02606		
VALIDATOR:	TLI	LAB:	QES	DATE: 1/8/99	
CASE:				SDG: W02606	
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 soil					
BCTOF2, BCTOF3, BCTOF4, BCTOF5					
dup of 3					

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: V-234 0.1 → all over 5x MDA

V-238 0.1 → all over 5x MDA

\_\_\_\_\_

\_\_\_\_\_

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: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Ashe*

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: U-235 (F2, F3 & F4 - J) (21270)

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: \_\_\_\_\_

**LABORATORY CONTROL SAMPLE**

LAB NAME: QUANTERRA, Richland      SDG: /RPT GRP: W02606 / 6572  
 LAB SAMPLE ID: J112411S      MATRIX: SOIL

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/ IDL	REPORT UNIT	YIELD	EXPECTED	RECOVERY
HEXCHROME	9.17E-01		N/A	N/A	2.00E-03	mg/L	N/A	0.00E+00	#Div/01
AM-241	3.69E+00	J	3.5E-01	7.9E-01	2.27E-02	pCi/g	95.40%	4.51E+00	81.90%
U-234	8.06E-01	J	1.3E-01	1.8E-01	2.82E-02	pCi/g	84.30%	8.66E-01	93.05%
U-235	8.40E-02	J	4.1E-02	4.3E-02	2.28E-02	pCi/g	84.30%	3.95E-02	212.51%
U-238	7.52E-01	J	1.2E-01	1.7E-01	2.66E-02	pCi/g	84.30%	9.07E-01	82.84%
PU239/40	3.75E+00		4.2E-01	7.6E-01	5.44E-02	pCi/g	35.30%	3.38E+00	110.84%
STRONTIUM	6.06E+00		2.1E-01	2.2E+00	8.14E-02	pCi/g	90.50%	6.04E+00	100.30%
NI-63	5.41E+02		1.3E+01	7.2E+01	1.24E+01	pCi/g	100.00%	5.62E+02	96.28%

Number of Results:

# Review Comment Record (RCR)

1. Date	2. Review No.
2/08/99	BH/QA99001
3. Project	4. Page
116-B-14	Page 1 of 1

5. Document Number(s)/Title(s)	6. Program/Project/ Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
W02506 - QBS (SDG No. W02506)	100-BC Acres - Fall Protocol - 116-B-14 Waste Site Soil Samples	Claude Stacey	BH/QA	HO.160772-9208

10. Agreement with indicated removal disposition(s) 11. CLOSED

Organization Manager (Optional) \_\_\_\_\_ Date \_\_\_\_\_

Reviewer/Point of Contact \_\_\_\_\_ Date 2/2 Feb. 99

Author/Originator \_\_\_\_\_ Reviewer/Point of Contact 

Item	12. 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	<p>Background: Page 019, the Data Summary table indicates the Es-152 value for sample BH70F2 and Es-154 value for sample BH70F4 are qualified with a "U". Although the lab test sheet for these sample also indicate a "U" qualification, the sample data are above the MDA/IDL. If there is a technical reason for the data to be qualified "U" it should be indicated in the report or the data should not be qualified "U".</p>		<p>Cancelled per - surface of lab system.</p>	
2				
3				





### SAMPLE RESULTS

**LAB NAME:** QUANTERRA, Richland      **SDG: /RPT GRP:** W02606 / 6572  
**LAB SAMPLE ID:** 81124101      **MATRIX:** SOIL  
**CLIENT ID:** B0T0F2      **DATE RECEIVED:** 11/16/98 11:34:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	8.30E-02		N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196
AM-241	-4.07E-04	U	8.1E-04	8.2E-04	3.70E-02	pCi/g	82.80%	RICHRC5080
U-234	9.92E-01	J	1.5E-01	2.2E-01	3.05E-02	pCi/g	78.40%	RICHRC5030
U-235	2.16E-02	J	2.2E-02	2.2E-02	1.46E-02	pCi/g	78.40%	RICHRC5030
U-238	9.10E-01	J	1.4E-01	2.0E-01	3.47E-02	pCi/g	78.40%	RICHRC5030
PU-238	-5.00E-04	U	1.0E-03	1.0E-03	2.51E-02	pCi/g	67.90%	RICHRC5010
PU239/40	5.74E-03	U	1.3E-02	1.3E-02	2.51E-02	pCi/g	67.90%	RICHRC5010
AM-241	3.94E-02	U	3.8E-02	3.8E-02	5.72E-02	pCi/g	N/A	RICHRC5017
CO-60	5.19E-03	U	1.2E-02	1.2E-02	2.18E-02	pCi/g	N/A	RICHRC5017
CS-137	1.08E+00		1.2E-01	1.2E-01	2.16E-02	pCi/g	N/A	RICHRC5017
EU-152	2.03E-01		5.2E-02	5.2E-02	6.64E-02	pCi/g	N/A	RICHRC5017
EU-154	1.49E-03	U	4.0E-02	4.0E-02	6.75E-02	pCi/g	N/A	RICHRC5017
EU-155	3.94E-02	U	3.1E-02	3.1E-02	5.28E-02	pCi/g	N/A	RICHRC5017
K-40	1.67E+01		1.8E+00	1.8E+00	1.84E-01	pCi/g	N/A	RICHRC5017
RA-226	5.35E-01		7.5E-02	7.5E-02	3.56E-02	pCi/g	N/A	RICHRC5017
RA-228	6.60E-01		1.2E-01	1.2E-01	6.87E-02	pCi/g	N/A	RICHRC5017
U-238	9.67E-01		5.0E-01	5.0E-01	4.90E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	9.14E-01	J	1.0E-01	3.0E-01	1.24E-01	pCi/g	63.80%	RICHRC5006
NI-63	3.31E+00	U	3.2E+00	9.6E+00	7.77E+00	pCi/g	100.00%	RICHRC5069

Number of Results: 19

*RPK*  
11/19/99

Result = IDL When Not Detected

(Q)ualifiers: U = Analyte result < MDA/IDL  
J = No U qualifier and result < RDL

Quanterra Analytical Services, Inc  
rptChemRadSample: v3.41

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### SAMPLE RESULTS

**LAB NAME:** QUANTERRA, Richland      **SDG: /RPT GRP:** W02606 / 6572  
**LAB SAMPLE ID:** 81124102      **MATRIX:** SOIL  
**CLIENT ID:** B0T0F3      **DATE RECEIVED:** 11/16/98 11:34:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	4.20E-02		N/A	N/A	3.00E-02	mg/kg	N/A	EPA7400
AM-241	1.49E-02	U	2.1E-02	2.2E-02	2.76E-02	pCi/g	99.10%	RICHRC5080
U-234	7.49E-01	J	1.9E-01	2.5E-01	7.42E-02	pCi/g	34.40%	RICHRC5030
U-235	5.81E-02	<del>U</del> J	5.4E-02	5.5E-02	5.48E-02	pCi/g	34.40%	RICHRC5030
U-238	7.91E-01	J	1.9E-01	2.8E-01	4.82E-02	pCi/g	34.40%	RICHRC5030
PU-238	-1.09E-03	U	1.5E-03	1.6E-03	3.11E-02	pCi/g	60.30%	RICHRC5010
PU239/40	1.01E-01		5.3E-02	5.6E-02	3.11E-02	pCi/g	60.30%	RICHRC5010
AM-241	-7.84E-02	U	7.0E-02	7.0E-02	1.13E-01	pCi/g	N/A	RICHRC5017
CO-60	2.72E-02	U	1.6E-02	1.6E-02	2.87E-02	pCi/g	N/A	RICHRC5017
CS-137	5.78E+00		5.8E-01	5.8E-01	2.92E-02	pCi/g	N/A	RICHRC5017
EU-152	1.31E+00		1.7E-01	1.7E-01	8.92E-02	pCi/g	N/A	RICHRC5017
EU-154	7.86E-02	U	4.8E-02	4.8E-02	8.66E-02	pCi/g	N/A	RICHRC5017
EU-155	2.59E-02	U	5.4E-02	5.4E-02	8.92E-02	pCi/g	N/A	RICHRC5017
K-40	1.54E+01		1.6E+00	1.6E+00	1.66E-01	pCi/g	N/A	RICHRC5017
RA-226	6.54E-01		9.3E-02	9.3E-02	5.18E-02	pCi/g	N/A	RICHRC5017
RA-228	7.66E-01		1.2E-01	1.2E-01	8.44E-02	pCi/g	N/A	RICHRC5017
U-238	1.05E+00	U	5.8E-01	5.8E-01	9.88E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	1.28E+00		1.3E-01	3.9E-01	1.35E-01	pCi/g	46.80%	RICHRC5006
NI-63	2.29E+00	U	3.1E+00	9.3E+00	7.62E+00	pCi/g	100.00%	RICHRC5069

Number of Results: 19

*pp*  
11/19/99

Result = IDL When Not Detected

(Q)ualifiers: U = Analyte result < MDA/IDL,  
J = No U qualifier and result < RDL.

000012

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*DATA*

### SAMPLE RESULTS

**LAB NAME:** QUANTERRA, Richland      **SDG: /RPT GRP:** W02606 / 6572  
**LAB SAMPLE ID:** 81124103      **MATRIX:** SOIL  
**CLIENT ID:** B0T0F4      **DATE RECEIVED:** 11/16/98 11:34:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	8.50E-02		N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196 ✓
AM-241	-6.38E-04	U	9.0E-04	9.1E-04	3.21E-02	pCi/g	98.00%	RICHRC5080
U-234	9.15E-01	J	1.4E-01	2.0E-01	2.42E-02	pCi/g	78.90%	RICHRC5030
U-235	6.31E-02	J	3.7E-02	3.8E-02	2.13E-02	pCi/g	78.90%	RICHRC5030
U-238	1.03E+00		1.5E-01	2.2E-01	1.43E-02	pCi/g	78.90%	RICHRC5030
PU-238	-2.69E-03	U	2.7E-03	2.7E-03	4.49E-02	pCi/g	51.20%	RICHRC5010
PU239/40	1.68E-02	U	2.4E-02	2.4E-02	2.27E-02	pCi/g	51.20%	RICHRC5010
AM-241	3.28E-02	U	7.5E-02	7.5E-02	1.29E-01	pCi/g	N/A	RICHRC5017
CO-60	2.21E-02	U	1.6E-02	1.6E-02	2.88E-02	pCi/g	N/A	RICHRC5017
CS-137	5.88E+00		5.9E-01	5.9E-01	2.59E-02	pCi/g	N/A	RICHRC5017
EU-152	1.34E+00		1.7E-01	1.7E-01	8.05E-02	pCi/g	N/A	RICHRC5017
EU-154	1.17E-01		5.1E-02	5.1E-02	9.19E-02	pCi/g	N/A	RICHRC5017
EU-155	3.80E-02	U	4.8E-02	4.8E-02	7.90E-02	pCi/g	N/A	RICHRC5017
K-40	1.66E+01		1.8E+00	1.8E+00	1.88E-01	pCi/g	N/A	RICHRC5017
RA-226	6.26E-01		9.0E-02	9.0E-02	5.02E-02	pCi/g	N/A	RICHRC5017
RA-228	7.35E-01		1.5E-01	1.5E-01	9.42E-02	pCi/g	N/A	RICHRC5017
U-238	9.67E-01	U	6.6E-01	6.6E-01	1.05E+00	pCi/g	N/A	RICHRC5017
STRONTIUM	1.51E+00		1.3E-01	5.0E-01	1.09E-01	pCi/g	58.70%	RICHRC5006
NI-63	4.74E+00	U	3.2E+00	9.7E+00	7.76E+00	pCi/g	100.00%	RICHRC5069

Number of Results: 19

*Handwritten signature*  
11/19/99

Result = IDL When Not Detected

(Q)ualifiers: U = Analyte result < MDA/IDL  
J = No U qualifier and result < RDL

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Quanterra Analytical Services, Inc  
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### SAMPLE RESULTS

**LAB NAME:** QUANTERRA, Richland      **SDG: /RPT GRP:** W02606 / 6572  
**LAB SAMPLE ID:** 81124104      **MATRIX:** SOIL  
**CLIENT ID:** B0T0F5      **DATE RECEIVED:** 11/16/98 11:34:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
<del>HEXCHROME</del>	<del>2.52E-01</del>		<del>N/A</del>	<del>N/A</del>	<del>3.00E-02</del>	<del>mg/kg</del>	<del>N/A</del>	<del>EPA7196</del>
AM-241	0.00E+00	U	0.0E+00	2.8E-02	2.53E-02	pCi/g	81.50%	RICHRC5080
U-234	7.37E-01	J	1.4E-01	1.9E-01	3.66E-02	pCi/g	71.10%	RICHRC5030
U-235	2.28E-02	U	2.6E-02	2.6E-02	3.85E-02	pCi/g	71.10%	RICHRC5030
U-238	7.90E-01	J	1.4E-01	2.0E-01	2.96E-02	pCi/g	71.10%	RICHRC5030
PU-238	8.02E-03	U	1.5E-02	1.5E-02	3.13E-02	pCi/g	78.50%	RICHRC5010
PU239/40	5.80E-02		3.5E-02	3.6E-02	1.43E-02	pCi/g	78.50%	RICHRC5010
AM-241	-5.72E-03	U	3.8E-02	3.8E-02	6.43E-02	pCi/g	N/A	RICHRC5017
CO-60	1.23E-02	U	1.2E-02	1.2E-02	2.18E-02	pCi/g	N/A	RICHRC5017
CS-137	2.06E+00		2.1E-01	2.1E-01	2.24E-02	pCi/g	N/A	RICHRC5017
EU-152	4.09E-01		8.1E-02	8.1E-02	5.99E-02	pCi/g	N/A	RICHRC5017
EU-154	1.44E-02	U	4.0E-02	4.0E-02	7.04E-02	pCi/g	N/A	RICHRC5017
EU-155	4.17E-02	U	3.4E-02	3.4E-02	5.61E-02	pCi/g	N/A	RICHRC5017
K-40	1.50E+01		1.6E+00	1.6E+00	1.81E-01	pCi/g	N/A	RICHRC5017
RA-226	5.44E-01		7.5E-02	7.5E-02	3.90E-02	pCi/g	N/A	RICHRC5017
RA-228	6.64E-01		1.2E-01	1.2E-01	7.36E-02	pCi/g	N/A	RICHRC5017
U-238	1.73E-01	U	4.2E-01	4.2E-01	5.54E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	1.04E+00		1.1E-01	3.4E-01	1.28E-01	pCi/g	60.80%	RICHRC5006
NI-63	-3.07E-02	U	3.0E+00	8.8E+00	7.70E+00	pCi/g	100.00%	RICHRC5069

Number of Results: 19

*plc*  
1/19/99

Result = IDL When Not Detected

Quanterra Analytical Services, Inc

(Q)ualifiers: U = Analyte result < MDA/IDL  
J = No U qualifier and result < RDL

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rptChemRadSample: v3.41

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## Duncan, Jeanette M

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**From:** Blumenkranz, David B  
**Sent:** Tuesday, February 16, 1999 4:39 PM  
**To:** Duncan, Jeanette M  
**Cc:** Fancher, Jonathan D (Jon); Sturges, Mark H  
**Subject:** Data Validation Packages

My comments as follows:

**Inorganics - Data Package No. W02613-QES:** No comments

**Radiochemistry - Data Package No. W02613-QES:** No comments

**Inorganics - Data Package No. W02606-QES:** No comments

**Radiochemistry - Data Package No. W02606-QES:** No comments

**Inorganics - Data Package No. H0324-RLN:** In "Minor Deficiencies" indicate that the IDL exceeded the TDL for Cr+6 results.

**Radiochemistry - Data Package No. H0324-RLN:** In "Minor Deficiencies" indicate that the MDA exceeded the TDL for U-238 (GEA) results and U-235 (GEA) in sample B0T6P4. Also, if the lab result is "U" for a particular isotope, isn't the MDA then an estimated best conservative guess concentration? If so, then go ahead and put the MDA in the data summary for Am-241, Co-60, Cs-137, U isotopes (GEA) and the Eu isotopes w/ a footnote to indicate the value in the table is the MDA because a result was not reported.

**Semivolatiles - Data Package No. H0324-RLN:** In "Minor Deficiencies" indicate that the reported detection limit exceeded the CRDL for B0P6P2, B0P6P3, B0P6P4, B0P6P5 and B0P6P6. Also, we should get the MS & MSD results for bis(2-ethylhexyl)phthalate so the the validator can finish the validation.

**PCBs - Data Package No. H0324-RLN:** Page numbers 2 & 3 have been transposed. In "Minor Deficiencies" indicate that the IDL exceeded the TDL for Aroclor-1221 results. (Is it spelled Aroclor or Arochlor?)

Thanx,  
Dave