

Date: 3 April 2000
 To: Bechtel Hanford, Inc. (technical representative)
 From: TechLaw, Inc.
 Project: 105-F/DR Phase III Below-grade Areas Sampling and Analysis - Water
 Subject: Radiochemistry - Data Package No. W03091-QES (SDG No. W03091)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package Nos. W03091-QES which were prepared by Quanterra Environmental Services. 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
BOXKL4	2/22/00	Water	C	See note 1

1- Gamma spectroscopy; alpha spectroscopy (isotopic plutonium and americium-241); total strontium; nickel-63; carbon-14; technetium-99.

Data validation was conducted in accordance with the BHI validation statement of work and the "Sample and Analysis Plan for 105F and 105DR Phase III Below Grade Structures and Underlying Soils" (DOE/RL-99-35). Appendices 1 through 5 provide the following information as indicated below:

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

DATA QUALITY OBJECTIVES

- Holding Times

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

All holding times were acceptable.

RECEIVED
 JUN 26 2000

EDMC

- **Blanks**

Laboratory Blanks

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

All laboratory blank results were acceptable.

Field Blanks

One equipment blank (BOXKL4) was submitted for analysis. All equipment blank results were acceptable although the CRDL was exceeded for nickel-63.

- **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 is 70-130% (80-120% for gamma spectroscopy). 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 the lack of a matrix spike analysis, all carbon-14 results 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

000002

30 percent, the results are acceptable. If either activities are less than five times the CRDL, a control limit of less than or equal to two times the CRDL is used for soil samples and less than or equal to the CRDL for water samples. If either the original or replicate value is below the CRDL, the applicable control limits are less than or equal to the CRDL for water samples and less than or equal to two times the CRDL for soil samples. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

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

All other duplicate results were acceptable although an equipment blank was used for duplicate analysis.

- **Detection Levels**

Reported analytical detection levels are compared against the contract required detection limits (CRDLs) to ensure that laboratory detection levels meet the required criteria. The CRDL was exceeded for nickel-63 and strontium. Under the BHI statement of work, no qualification is required. All other reported laboratory MDAs were at or below the analyte-specific CRDL.

- **Completeness**

Data Package No. W03091-QES (SDG No. W03091) was submitted for validation and verified for completeness. The completion rate was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Due to the lack of a matrix spike analysis, all carbon-14 results were qualified as estimates and flagged "J". Due to the lack of a duplicate analysis, all strontium results were qualified as estimates and flagged "J". Data flagged "J" is an estimate, but under the BHI validation SOW, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

The CRDL was exceeded for nickel-63 and strontium. Under the BHI statement of work, no qualification is required.

REFERENCES

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

DOE/RL-99-35, *Sample and Analysis Plan for 105F and 105DR Phase III Below Grade Structures and Underlying Soils*.

Appendix 1

Glossary of Data Reporting Qualifiers

000005

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.

000006

Appendix 2

Summary of Data Qualification

000007

DATA QUALIFICATION SUMMARY

SDG: W03091	REVIEWER: TLI	DATE: 4/3/00	PAGE <u>1</u> OF <u>1</u>
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Carbon-14	UJ	All	No matrix spike analysis
Strontium	UJ	All	No duplicate analysis

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

000009

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland **SDG: /RPT GRP:** W03091 / 10071
LAB SAMPLE ID: 9D8WWQ10 **MATRIX:** WATER
CLIENT ID: B0XKL4 **DATE RECEIVED:** 2/23/2000 1:30:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
PU-238	0.00E+00	U	0.0E+00	1.9E-01	2.10E-01	pCi/L	81.13%	RICHRC5010
PU239/40	-6.19E-03	U	1.2E-02	1.2E-02	3.12E-01	pCi/L	81.13%	RICHRC5010
AM-241	-2.61E-02	U	2.6E-02	2.6E-02	4.35E-01	pCi/L	103.75%	RICHRC5072
BA-133	1.66E+00	U	5.2E+00	5.2E+00	9.86E+00	pCi/L		RICHRC5017
CO-60	1.98E+00	U	4.4E+00	4.4E+00	9.96E+00	pCi/L		RICHRC5017
CS-137	9.79E-01	U	4.9E+00	4.9E+00	9.42E+00	pCi/L		RICHRC5017
EU-152	7.23E+00	U	1.1E+01	1.1E+01	2.26E+01	pCi/L		RICHRC5017
EU-154	-1.76E+01	U	1.4E+01	1.4E+01	1.93E+01	pCi/L		RICHRC5017
EU-155	2.26E+00	U	9.5E+00	9.5E+00	1.76E+01	pCi/L		RICHRC5017
STRONTIUM	-9.71E-01	U	2.8E+00	2.8E+00	7.03E+00	pCi/L	95.60%	RICHRC5006
C-14	-1.62E+00	U	1.2E-01	1.1E+01	1.59E+01	pCi/L	100.00%	RICHRC5022
NI-63	4.07E+01	U	2.5E+00	6.7E+01	1.10E+02	pCi/L	92.19%	RICHRC5069
TC-99	-1.31E+01	U	7.0E-01	1.1E+01	1.28E+01	pCi/L	100.00%	RICHRC5078

Number of Results: 13

js
4/3/00

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

000012

Quanterra
2800 George Washington Way
Richland, Washington 99352-1613

509 375-3131 Telephone
509 375-5590 Fax

CERTIFICATE OF ANALYSIS

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



March 19, 2000

Attention: Joan Kessner

SAF Number	:	B00-014
Date SDG Closed	:	February 23, 2000
Number of Samples	:	One (1)
Sample Type	:	Water
SDG Number	:	W03091
Data Deliverable	:	21-Day / Summary

I. Introduction

On February 23, 2000, one water sample was received at the Quanterra Richland Laboratory (QRL) for radiochemical analysis. Upon receipt, the sample was assigned the following laboratory ID number to correspond with the Bechtel Hanford, Inc. (BHI) specific ID:

<u>QRL ID#</u>	<u>BHI ID#</u>	<u>MATRIX</u>	<u>DATE OF RECEIPT</u>
9D8WWQ10	B0XKL4	WATER	2/23/00

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.

The requested analyses were:

Gamma Spectroscopy
Gamma Scan by method RICH-RC-5017
Gas Proportional Counting
Total Strontium by method RICH-RC-5006
Alpha Spectroscopy
Plutonium-238, -239/40 by method RICH-RC-5010
Americium-241 by method RICH-RC-5080
Liquid Scintillation Counting
Technetium-99 by method RICH-RC-5078

000013

~~000013~~

Bechtel Hanford, Inc.
March 19, 2000
Page 2

Nickel-63 by method RICH-RC-5069
Carbon-14 by method RICH-RC-5022

III. Quality Control

The analytical results for each analysis performed under SDG W03091 include a minimum of one Laboratory Control Sample (LCS), one method (reagent) blank, and one duplicate sample analysis. Any exceptions have been noted in the "Comments" section.

QC and sample results are reported in the same units.

IV. Comments

Gamma Spectroscopy

Gamma Scan by method RICH-RC-5017:

The achieved MDAs are based on the best available counting geometry and detector efficiency for the matrix analyzed. The data are accepted for reporting with the MDAs achieved. Except as noted, the LCS, batch blank, sample and sample duplicate (B0XKL4) results are within contractual requirements.

Gas Proportional Counting

Total Strontium by method RICH-RC-5006:

The achieved MDA does not meet the CRDL for sample B0XKL4 due to insufficient sample volume. The data are accepted for reporting with the MDAs achieved. There was insufficient sample volume received for a duplicate sample analysis. Except as noted, the LCS, batch blank and sample results are within contractual requirements.

Alpha Spectroscopy

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

The LCS, batch blank, sample and sample duplicate (B0XKL4) results are within contractual requirements.

Americium-241 by method RICH-RC-5080:

The LCS, batch blank, sample and sample duplicate (B0XKL4) results are within contractual requirements.

Liquid Scintillation Counting

Technetium-99 by method RICH-RC-5078:

The LCS, batch blank, sample, sample duplicate (B0XKL4) and sample matrix spike (B0XKL4) results are within contractual requirements.

000014

~~0003~~

Bechtel Hanford, Inc.

March 19, 2000

Page 3

Nickel-63 by method RICH-RC-5069:

The achieved MDA does not meet the CRDL for sample B0XKL4 due to insufficient sample volume. The data are accepted for reporting with the MDAs achieved. The duplicate sample analysis results do not agree within RPD limits. Since there is insufficient sample volume remaining for reanalysis, the data are accepted for reporting with client approval [J.Kessner 3/17/00]. Except as noted, the LCS, batch blank, sample and sample matrix spike (B0XKL4) results are within contractual requirements.

Carbon-14 by method RICH-RC-5022:

The LCS, batch blank, sample and sample duplicate (B0XKL4) results are within contractual requirements.

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:



Jackie Waddell
Project Manager

000015

~~0004~~

Bechtel Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				B00-014-07	Page 1 of 1
Collector Falberg/Winterrose	Company Contact J Adler	Telephone No. 373-4316	Project Coordinator TRENT, SJ		Price Code 7L	Data Turnaround 21 Days	
Project Designation 105-F/DR Phase III Below-grade Areas Sampling and Analy	Sampling Location 105F	SAF No. B00-014		Air Quality <input type="checkbox"/>			
Ice Chest No. ERC96 059	Field Logbook No. EL 1424	COA R105F22870	Method of Shipment Quanterra				
Shipped To Quanterra Incorporated	Offsite Property No. NA	Bill of Lading/Air Bill No. AA					

POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	None	HNO3 to pH <2	HCl to pH <2	HNO3 to pH <2								
	Type of Container	P	P	P	P								
	No. of Container(s)	1	1	1	1								
	Special Handling and/or Storage	Volume	20mL	500mL	1000mL	1000mL							

SDG
W03091
SAMPLE ANALYSIS
JOB230239
Due 3-15

Activity Scan: ICP Metals - 6010A (Supertrace) [Lead]; Mercury 7470 - (CV)
Technetium-99
See item (1) in Special Instructions.

Sample No.	Matrix *	Sample Date	Sample Time										
BOXKL4 DBWWQ	Water	2-22-00	1320	X	X	X	X						
000016													

CHAIN OF POSSESSION		Sign/Print Names		SPECIAL INSTRUCTIONS				Matrix *
Relinquished By R. Free	Date/Time 1510	Received By R.A. Thoren	Date/Time 2-22-00/1510	(1) Gamma Spectroscopy (Water) (Cobalt-60); Gamma Spec - Add-on (Barium-133); Isotopic Plutonium; Strontium-89,90 - Total Sr; Americium-241; Carbon-14; Nickel-63 Sample originated from a non-radiologically controlled source				S=Soil SE=Sediment SO=Solid S=Sludge W=Water O=Oil A=Air DS=Drum Solids DL=Drum Liquids T=Tissue WI=Wipe L=Liquid V=Vegetation X=Other
Relinquished By R. Thoren	Date/Time 2-22-00/1330	Received By K. Schusterberg	Date/Time 2-23-00					
Relinquished By	Date/Time	Received By	Date/Time					
Relinquished By	Date/Time	Received By	Date/Time					
Relinquished By	Date/Time	Received By	Date/Time					

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

Appendix 5

Data Validation Supporting Documentation

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT:	IOSDR water		DATA PACKAGE: HQ W03091		
VALIDATOR:	TLC	LAB:	QES	DATE: 3/28/02	
CASE:			SDG: W03091		
ANALYSES PERFORMED					
<input type="checkbox"/> Gross Alpha/Beta	<input checked="" type="checkbox"/> Strontium-90	<input checked="" 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	<input checked="" type="checkbox"/> U-238	
SAMPLES/MATRIX	BOXKLY				
	water				

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: sea blank - MDA very high

EB - sea MDAs very high NI-63 am in EB

- 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: C14 - No MS J

6. Laboratory Control Samples N/A

LCS analyzed? Yes No N/A

LCS recoveries acceptable? Yes No N/A

LCS traceable? Yes No N/A

Transcription/Calculation Errors? Yes No N/A

Comments: _____

7. Chemical Recovery N/A

Chemical carrier added? Yes No N/A

Chemical recovery acceptable? Yes No N/A

Chemical carrier traceable? Yes No N/A

Chemical carrier expired? Yes No N/A

Transcription/Calculation errors? Yes No N/A

Comments: _____

8. Duplicates N/A

Duplicates Analyzed? Yes No N/A

RPD Values Acceptable? Yes No N/A

Transcription/Calculation Errors? Yes No N/A

Comments: - all undetectable
- no SR dup T cell

9. Field QC Samples N/A

Field duplicate sample(s) analyzed? Yes No N/A

Field duplicate RPD values acceptable? Yes No N/A

Field split sample(s) analyzed? Yes No N/A

Field split RPD values acceptable? Yes No N/A

Performance audit sample(s) analyzed? Yes No N/A

Performance audit sample results acceptable? Yes No N/A

Comments: _____

10. Holding Times

Are sample holding times acceptable? Yes No N/A

Comments: Yes _____

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

Results reported for all required sample analyses? Yes No N/A

Results supported in raw data? Yes No N/A

Results Acceptable? Yes No N/A

Transcription/Calculation errors? Yes No N/A

MDA's meet required detection limits? Yes No N/A

Transcription/calculation errors? Yes No N/A

Comments: MDAs were above ~~for~~ for

~~CO60 25137 152/154/155 SR~~

NI-43 JSR

Date: 3 April 2000
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 105-F/DR Phase III Below-grade Areas Sampling and Analysis - Water
Subject: Inorganics - Data Package No. W03091-QES (SDG No. W03091)

INTRODUCTION

This memo presents the results of data validation on Data Package No. W03091-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
BOXKL4	2/22/00	Water	C	See note 1

1 - ICP metals by 6010B 'supertrace' (lead and chromium); mercury by 7471A.

Data validation was conducted in accordance with the BHI validation statement of work and "Sample and Analysis Plan for 105F and 105DR Phase III Below Grade Structures and Underlying Soils" (DOE/RL-99-35). Appendices 1 through 5 provide the following information as indicated below:

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

DATA QUALITY OBJECTIVES

- **Holding Times**

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

All holding times were acceptable.

000001

- **Blanks**

Preparation Blanks

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

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

All preparation blank results were acceptable.

Field Blanks

One equipment blank (BOXKL4) was submitted for analysis. All equipment 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.

All matrix spike results were acceptable.

000002

- **Precision**

Laboratory Duplicate Samples

Laboratory duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Results must be within RPD limits of plus or minus 30%. 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 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".

All laboratory duplicate results were acceptable although an equipment blank was used for the duplicate analysis.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the CRDLs to ensure that laboratory detection levels meet the required criteria. All reported laboratory detection levels met the analyte specific CRDL.

- **Completeness**

Data package No. W03091-QES (SDG No. W03091) was submitted for validation and verified for completeness. The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

REFERENCES

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

DOE/RL-99-35, *Sample and Analysis Plan for 105F and 105DR Phase III Below Grade Structures and Underlying Soils*.

Appendix 1

Glossary of Data Reporting Qualifiers

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

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

000006

Appendix 2

Summary of Data Qualification

000007

DATA QUALIFICATION SUMMARY

SDG: W03091	REVIEWER: TLI	DATE: 4/3/00	PAGE <u>1</u> OF <u>1</u>
COMMENTS: No qualifiers assigned.			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON

000008

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

000009

BCHTEL HANFORD, INC.

Client Sample ID: B0XK1A

TOTAL Metals

Lot-Sample #...: F0B240139-001

Matrix.....: WATER

Date Sampled...: 02/22/00

Date Received...: 02/23/00

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING LIMIT</u>	<u>UNITS</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>WORK ORDER #</u>
Prep Batch #...: 0056177						
Lead	ND U	3.0	ug/L	SW846 6010B	02/25-02/29/00	D8XH6101
		Dilution Factor: 1		MDL.....: 0.90		
Chromium	ND U	10.0	ug/L	SW846 6010B	02/25-02/29/00	D8XH6107
		Dilution Factor: 1		MDL.....: 2.0		
Prep Batch #...: 0066217						
Mercury	ND U	0.20	ug/L	SW846 7470A	03/06-03/07/00	D8XH6104
		Dilution Factor: 1		MDL.....: 0.035		

Handwritten signature
4/3/00

000011

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

000012

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

March 22, 2000

Attention: Joan Kessner

Quote Number	:	33833
SAF	:	B00-014
SDG	:	W03091
Number of Samples	:	one (1)
Sample Matrix	:	Water
Data Deliverable	:	Summary
Date SDG Closed	:	February 23, 2000



II. Introduction

On February 23, 2000, one (1) "water" sample was received by Quanterra, Richland and transferred to Quanterra, St. Louis for chemical analysis. The samples were received at the St. Louis lab on 2/24/00 at a temperature of 3 degrees C. See the attached Sample Summary for a listing of Client Ids and their associated Lab numbers.

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.

Analyses requested: ICP Metals - (SuperTrace Lead, Chromium)
Mercury - 7470 - (CV)

Deviation from Request: None

000013

10

Bechtel Hanford Incorporated
March 22, 2000
Quote Number: 33833
SDG: W03091
Page 2

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

General:

The term "Detection Limit" used in the analytical data reports refers to either the lab's standard reporting limits or contractually required reporting limits, whichever is applicable.

Please refer to the attached cross-reference table for the standard preparation methods used at Quanterra, St. Louis.

The EDD for this SDG will be sent at a later date. The switch to our new LIMs system required a re-programming of the EDD software. That is currently in process.

Chromium was added to the requested list of compounds by the client after the samples had been received.

Metals:

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 Mercury analytical run extended beyond the twenty four hour hold time (from digestion to analysis) recommended by the SW846 method. All QC met criteria. The data was not affected by this procedure.

There were no comments or non-conformances associated with the ICP data.

000014

Bechtel Hanford Incorporated
March 22, 2000
Quote Number: 33833
SDG: W03091
Page 3

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:

A handwritten signature in cursive script, appearing to read "Marti Ward".

Marti Ward
St. Louis Project Manager

000015

Bechtel Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				B00-014-07	Page 1 of 1
Collector Falberg/Winterrose	Company Contact J Adler	Telephone No. 373-4316	Project Coordinator TRENT, SJ		Price Code 7L	Data Turnaround 21 Days	
Project Designation 105-F/DR Phase III Below-grade Areas Sampling and Analy	Sampling Location 105F	SAF No. B00-014	Air Quality <input type="checkbox"/>				
Ice Chest No. E2096 059	Field Logbook No. EL 1424	COA R105F22870	Method of Shipment Quanterra				
Shipped To Quanterra Incorporated	Offsite Property No. NA	Bill of Lading/Air Bill No. NA					

POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	None	HNO3 to pH < 2	HCl to pH < 2	HNO3 to pH < 2						
	Type of Container	P	P	P	P						
	No. of Container(s)	1	1	1	1						
	Special Handling and/or Storage	Volume	20mL	500mL	1000mL	1000mL					

SDG
W03091

SAMPLE ANALYSIS Due 3-15
JOB230239

Activity Scan ICP Metals - 6010A (Supertrace) (Lead); Mercury 7470 - (CV) Technetium-99 ✓ See item (1) in Special Instructions.

Sample No.	Matrix *	Sample Date	Sample Time								
BOX #4 08WWQ	Water	2-22-00	1320	X	X	X	X				

CHAIN OF POSSESSION				SPECIAL INSTRUCTIONS				Matrix * S=Soil SE=Sediment SO=Solid S=Sludge W=Water O=Oil A=Air DS=Drum Solids DL=Drum Liquids T=Tissue WI=Wipe L=Liquid V=Vegetation X=Other
Relinquished By R. Free	Date/Time 1510	Received By R.A. Thoren	Date/Time 2-22-00/1510	(1) Gamma Spectroscopy (Water) (Cobalt-60); Gamma Spec - Add-on (Barium-133); Isotopic Plutonium; Strontium-89,90 - Total Sr; Americium-241; Carbon-14; Nickel-63 Sample originated from a non-radiologically controlled source				
Relinquished By R. Thoren	Date/Time 2-23-00/1330	Received By R. Thoren	Date/Time 2-22-00/1330					
Relinquished By	Date/Time	Received By	Date/Time					
Relinquished By	Date/Time	Received By	Date/Time					
Relinquished By	Date/Time	Received By	Date/Time					

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

Appendix 5

Data Validation Supporting Documentation

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: _____

5. ACCURACY

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

Comments: _____

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

6. PRECISION

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

Comments: _____

7. FURNACE AA QUALITY CONTROL

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

Comments: _____

8. REPORTED RESULTS AND DETECTION LIMITS

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

Comments: _____

FAX

TECHLAW, INC.

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

To: Jeannette Duncan

From: Bruce Christian

Pages: 1

Date: 28 March 2000

Information Request

W03091 - Rad

I need the dates for preparation and analysis for NI-63, TC-99 and C-14.

*emailed
to Jackie
3/28*

*should have
info 3/29*

*Bruce - Please see attached counting sheets.
Rich says this should close 12.*

Jeannette

Liquid Scintillation Counting Sheet

QC BATCH Number: 0060159

Position	WorkOrder No.	Volume Analyzed (g, mL, L, H)	Total Sample Volume (g, mL, L) OR Multiplier	Vial Label or Spike Value	Preparation Information
1	D946V-1-01BN				Analysis: <u>C-14</u> Matrix: <u>WATER</u> Client: <u>RHL</u> Date Cocktail Added: <u>3-1-00</u> Total Count Time <u>40</u> min Volume Counted: <u>5</u> mLs Tray No(s): <u>11</u> Initials: <u>pm</u>
2	D946V-1-03BX	200			
3	D946V-1-02C			CSE006720134 PR.3/1/00 EX.3/1/00	
4	D8WWQ-1-03	100 mL			
5	D8WWQ-1-08X	d			
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					

Counting Information

Tower No: 9
 LSC#: 4
 CR Initials: af

Comments

Counted
 3/1/00
 JW
 3/20/00

Liquid Scintillation Counting Sheet



QC BATCH Number: 0060163

5065

3-15

Position	WorkOrder No.	Volume Analyzed (g/mL L Hr)	Total Sample Volume (g mL L) OR Multiplier	Vial Label or Spike Volume	Preparation Information
1	D8WWQ10CS	125		TCSE0151 PR. 2/18/00 EX. 2/18/01	Analysis: <u>TC99</u> Matrix: <u>Water</u> Client: <u>BHI</u> Date Cocktail Added: <u>3.5.00</u> Total Count Time: <u>60</u> min Volume Counted: <u>5</u> mLs Tray No(s): <u>2</u> Initials: <u>HH</u>
2	D8WWQ10DX	↓			
3	D8WWQ107	↓			
4	D947A101B	↓			
5	D947A102C	↓		TCSE0422 PR. 2/18/00 EX. 2/18/01	
6	D947A103B	5			
7					
8					
9					Counting Information Tower No: <u>6</u> LSC#: <u>3</u> CR Initials: <u>1545 2/6/2</u>
10					
11					
12					
13					Comments Ctd. 3/9/00 JWS/30/00
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					

Liquid Scintillation Counting Sheet

QC BATCH Number: 0060162

5069

3-15-00

Position	WorkOrder No.	Volume Analyzed (g mL) L Hr	Total Sample Volume (g mL L) OR Multiplier	Vial Label or Spike Value	Preparation Information
1	D8WWQ10A X	11.0		NITA0282 PR.2/17/00 EX.12/01	Analysis: <u>Ni 63</u> Matrix: <u>Water</u> Client: <u>BH1</u> Date Cocktail Added: <u>3.9.00</u> Total Count Time <u>100</u> min Volume Counted: <u>5</u> mLs Tray No(s): <u>7</u> Initials: <u>KH</u>
2	D8WWQ 105	12.2		NITA0283 PR.2/17/00 EX.12/01	
3	D8WWQ 109S	12.2		NISA0109 28091 PR.2/17/00 EX.12/01	
4	D9475 101B	400.0		NITA0284 PR.2/17/00 EX.12/01	
5	D9475102C	↓		NISA0108 28013 PR.2/17/00 EX.12/01	
6	D9475103B	5			
7	D9475104C	400		NISA0107 28105 PR.2/17/00 EX.12/01	
8	D9475105C	↓		NISA0106 28048 PR.2/17/00 EX.12/01	
9	D9475106C	↓		NISA0110 28119 PR.2/17/00 EX.12/01	
10					Counting Information Tower No: <u>4</u> LSC#: <u>5</u> CR Initials: <u>[Signature]</u>
11					
12					
13					Comments <u>Ctd. 3/12/00</u> <u>[Signature]</u>
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					

W03091

Data validation results:			
Validator:	DWS		
Date:	4/4/00		
SDGs:	SAF	COA	Project:
HO-726	B00-005	R11004 2Y20	110-D-4 French drain
W03091	B00-014	R105F2 2F00	105-F/DR phase III below grade areas sampling and analysis
data package	analysis	page	comment
HO726	Rad chem	3	Under detection levels: the seventh line should be changed to reflect that BOXD34 failed to meet the U235(gea) not BOXD32 as stated.
HO726	Rad chem	multiple	The data summary package, and all paperwork from the laboratory state total Sr, whereas the chains and the DOE/RL-96-22 table II-2 list Sr90, the chains further specify Sr89 and also Sr total. If total radiogenic Sr is being requested why does the paperwork not consistently state this? This observation has been made previously, request clarification.
HO726	Rad chem	4	under minor deficiencies: the third line should be changed to reflect that BOXD34 failed to meet the U235(gea) not BOXD32 as stated.
HO726	Cr+6	157	the package submitted to the Chi validator lacked a chain of custody for samples BOXD29 through BOXD35
W03091	Rad Chem	multiple	Similar observation with regards to Sr versus Sr-90. The data summary package states both Sr total and "strontium", the lab paperwork specifies Sr total, whereas the chains and the DOE/RL-99-05 table 2-2 list Sr90, the chains further specify Sr89 and also Sr total. If total radiogenic Sr is being requested why does the paperwork not consistently state this? This observation has been made perviously, request clarification.
W03091	ICP "supertrace"		no errors found

RLW comments

85304 "Detection Levels"
Need to add that CRDL for Total Rad Sr was also exceeded in the sample

RLW 4-6-00

RLW
4-6-00

Review Comment Record (RCR)	1. Date 4/10/00	2. Review No. BHI/QA0023
	3. Project 105-F/DR	4. Page Page 1 of 1

5. Document Number(s)/Title(s) SDG No. W03091	6. Program/Project/ Building Number 105-F/DR Phase III Below-grade Areas Sampling and Analysis - water	7. Reviewer Claude Stacey	8. Organization/Group BHI/QA	9. Location/Phone HO-16/372-9208
--	---	----------------------------------	-------------------------------------	---

17. Comment Submittal Approval: _____	10. Agreement with indicated comment disposition(s) _____	11. CLOSED _____
Organization Manager (Optional) _____	Date _____	Reviewer/Point of Contact _____
	Author/Originator _____	Author/Originator _____

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
1	Radiochemistry: OK - No Comments.			
2	Inorganic: Page 01, Holding Times refers to a 30 day holding time for Cr-VI. This sample was a water sample which has a 24 hr holding time for Cr-VI. There is no reason to mention the holding times for Cr-VI since it was not requested for this sample. This would include the IOM in the reference section that deals with Cr-VI in soils.		<i>Carve for - Need Cr address for holding times.</i>	
3				
4				
5				

<h1>Review Comment Record (RCR)</h1>	1. Date 4/10/00	2. Review No. BHI/QA0023
	3. Project 105-F/DR	4. Page Page 1 of 1

5. Document Number(s)/Title(s) SDG No. W03091	6. Program/Project/ Building Number 105-F/DR Phase III Below-grade Areas Sampling and Analysis - water	7. Reviewer Claude Stacey	8. Organization/Group BHI/QA	9. Location/Phone H0-16/372-9208
--	---	----------------------------------	-------------------------------------	---

17. Comment Submittal Approval: _____	10. Agreement with indicated comment disposition(s) _____	11. CLOSED _____
Organization Manager (Optional)	Date	Reviewer/Point of Contact
		4/17/00 Date
		 Reviewer/Point of Contact
		Author/Originator

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
1	Radiochemistry: OK – No Comments.			
2	Inorganic: Page 01, Holding Times refers to a 30 day holding time for Cr-VI. This sample was a water sample which has a 24 hr holding time for Cr-VI. There is no reason to mention the holding times for Cr-VI since it was not requested for this sample. This would include the IOM in the reference section that deals with Cr-VI in soils.			
3				
4				
5				

W03091

Data validation results:			
Validator:	DWS		
Date:	4/4/00		
SDGs:	SAF	COA	Project:
HO-726	B00-003	R110B4 2Y20	110-B-4 French drain
W03091	B00-014	R105F2 2F00	105-F/DR phase III below grade areas sampling and analysis
data package	analysis	page	comment
HO726	Rad chem	3	Under detection levels: the seventh line should be changed to reflect that BOXD34 failed to meet the U235(gea) not BOXD32 as stated.
HO726	Rad chem	multiple	The data summary package, and all paperwork from the laboratory state total Sr, whereas the chains and the DOE/RL-96-22 table II-2 list Sr90, the chains further specify Sr89 and also Sr total. If total radiogenic Sr is being requested why does the paperwork not consistently state this? This observation has been made previously, request clarification.
HO726	Rad chem	4	under minor deficiencies: the third line should be changed to reflect that BOXD34 failed to meet the U235(gea) not BOXD32 as stated.
HO726	Cr+6	15?	the package submitted to the Chi validator lacked a chain of custody for samples BOXD29 through BOXD33
W03091	Rad Chem	multiple	Similar observation with regards to Sr verses Sr-90. The data summary package states both Sr total and "strontium", the lab paperwork specifies Sr total, whereas the chains and the DOE/RL-99-35 table 2-2 list Sr90, the chains further specify Sr89 and also Sr total. If total radiogenic Sr is being requested why does the paperwork not consistently state this? This observation has been made perviously, request clarification.
W03091	ICP "supertrace"		no errors found

RLW comments

P33 & 4 "Detection Levels"

Need to add that CRDL for Total Rad Sr was also exceeded in the sample

RLW 4-6-00

RLW
4-6-00

Duncan, Jeanette M

From: Shea, David W
Sent: Tuesday, April 04, 2000 11:30 AM
To: Weiss, Richard L; Duncan, Jeanette M
Subject: Data packages H0-726 and W03091

Jeanette and Rich,

The validation of the above mentioned data packages is complete. The observations are attached as an excel spreadsheet. The paper copies of the data packages have been recycled.

Dave



datav4.xls

Data validation results:			
Validator:	DWS		
Date:	4/4/00		
SDGs:	SAF	COA	Project:
HO-726	B00-005	R116D4 2Y20	116-D-4 French drain
W03091	B00-014	R105F2 2F00	105-F/DR phase III below grade areas sampling and analysis
data package	analysis	page	comment
HO726	Rad chem	3	Under detection levels: the seventh line should be changed to reflect that BOXD34 failed to meet the U235(gea) not BOXD32 as stated.
HO726	Rad chem	multiple	The data summary package, and all paperwork from the laboratory state total Sr, whereas the chains and the DOE/RL-96-22 table II-2 list Sr90, the chains further specify Sr89 and also Sr total. If total radiogenic Sr is being requested why does the paperwork not consistently state this? This observation has been made previously, request clarification.
HO726	Rad chem	4	under minor deficiencies: the third line should be changed to reflect that BOXD34 failed to meet the U235(gea) not BOXD32 as stated.
HO726	Cr+6	15?	the package submitted to the Chi validator lacked a chain of custody for samples BOXD29 through BOXD33
W03091	Rad Chem	multiple	Similar observation with regards to Sr verses Sr-90. The data summary package states both Sr total and "strontium", the lab paperwork specifies Sr total, whereas the chains and the DOE/RL-99-35 table 2-2 list Sr90, the chains further specify Sr89 and also Sr total. If total radiogenic Sr is being requested why does the paperwork not consistently state this? This observation has been made perviously, request clarification.
W03091	ICP "supertrace"		no errors found

FAX

TECHLAW, INC.

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

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 28 March 2000

Information Request

W03091 - Rad

I need the dates for preparation and analysis for NI-63, TC-99 and C-14.

FAX

TECHLAW, INC.

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

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 28 March 2000

Information Request #2

W03091 - Inorganics

The PQL's in the 105DR SAP are for soil analysis. What do I use for water??

*Default to CRDLs for applicable
values*

RZW 3-26-00

Duncan, Jeanette M

From: Adler, Jason G
Sent: Wednesday, March 22, 2000 7:44 AM
To: Kessner, Joan H
Cc: Adler, Jason G; Trent, Stephen J; St John, David A; Duncan, Jeanette M; Weiss, Richard L
Subject: SDG WO3090

Joan,

It looks like the data for WO3091 is coming in OK so validation by 4/26 should not be a problem. What about WO3090? It will have most of the analysis (about 11 sample locations) and will also need to be validated by April 26. If you could keep an eye on this one, it would be appreciated. I don't like having to push the validators with the short turns, but it has been unavoidable on this project. And STL (aka Quanterra) has been slow with the data.

Thanks.

Jason G. Adler
D&D Characterization
(509) 373-4316
Cell - 531-0703
Fax - (509) 373-7719
Page - 85-2591