

Date: 25 September 1998
 To: Bechtel Hanford Inc. (technical representative)
 From: TechLaw, Inc.
 Project: 105-C Phase II - Verification Sampling - Concrete
 Subject: PCB - Data Package No. W02414-QES (SDG No. W02414)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. W02414-QES prepared by Quanterra Environmental Services (QES). A list of the 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
BONVN7	6/4/98	Concrete	C	PCBs (8080)
BONVX8	6/4/98	Concrete	C	PCBs (8080)
BONVX9	6/4/98	Concrete	C	PCBs (8080)

Data validation was conducted in accordance with the BHI validation statement of work. 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 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 extracted within 14 days of the date of sample collection and analyzed within 40 days from the date of extraction.

If holding times are exceeded by less than two times the limit, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If holding times are exceeded by greater than two times the

limit, all associated detected sample results are qualified as estimates and flagged "J" and all nondetects are rejected and flagged "UR".

Holding times were met for all samples.

- **Blanks**

Method blank analyses are performed to determine the extent of laboratory contamination introduced through sampling, sample preparation or analysis. At least one method blank analysis must be conducted for every 20 samples. Method blanks should not contain target compounds at a concentration greater than CRQL. If target compounds are present, sample results less than five times the blank concentration are qualified as undetected and flagged "U". If the sample result is less than five times the blank concentration and less than CRQL, the result is qualified as undetected and elevated to the CRQL.

All method blank target compound 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 analyses are performed in duplicate using six compounds and must be within the established laboratory quality control limits. If spike recoveries are outside control limits, detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Nondetected sample results with spike recoveries outside control limits are qualified as estimates and flagged "UJ". Sample results greater than five times the spike concentration require no qualification.

Due to MS/MSD percent recoveries above QC limits, the arochlor-1254 results in samples BONVX8 and BONVX9 were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

Surrogate Recovery

The analysis of surrogate compounds provides a measure of performance for individual samples. Matrix-specific surrogate compound recovery control windows have been established by the laboratory. When a surrogate compound recovery is outside the control window, all positively identified target compounds

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associated with the unacceptable surrogate recoveries are qualified as estimates and flagged "J". Nondetected compounds with surrogate recoveries less than the lower control limit are qualified as having an estimated detection limit and flagged "UJ". Nondetected compounds with surrogate recoveries above the upper control limit require no qualification.

Due to the lack of a DCB surrogate recovery, all sample results were qualified as estimates and flagged "J".

- **Precision**

Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike/matrix spike duplicate results provide matrix-specific information on the precision of the method for specific target compound classes. Precision is expressed as the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. For soil samples, results must be within RPD limits of $\pm 35\%$. If RPD values are out of specification and the sample concentration is less than five times the spike concentration, all associated detected sample results are qualified as estimates and flagged "J". If RPD values are out of specification and the sample concentration is greater than five times the spike concentration, no qualification is required.

All precision results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against CRQLs to ensure that laboratory detection levels meet the required criteria. The laboratory detection limits were exceeded for arochlor-1260 in samples BONVX8 and BONVX9, but under WHC guidelines no qualification is required. All other reported laboratory analytical detection limits were at or below the CRQL.

- **Completeness**

Data Package No. W02414-QES (SDG No. W02414) was submitted for validation and verified for completeness. The completion percentage was 100%.

MAJOR DEFICIENCIES

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None found.

MINOR DEFICIENCIES

Due to MS/MSD percent recoveries above QC limits, the arochlor-1254 results in samples BONVX8 and BONVX9 were qualified as estimates and flagged "J". Due to the lack of a DCB surrogate recovery, all sample 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.

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Appendix 1

Glossary of Data Reporting Qualifiers

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Qualifiers which may be applied by data validators in compliance with the procedures herein 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. 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.
- NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).
- N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

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Appendix 2

Summary of Data Qualification

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DATA QUALIFICATION SUMMARY

SDG: W02414	REVIEWER: TLI	DATE: 9/25/98	PAGE <u>1</u> OF <u>1</u>
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Arochlor-1254	J	BONVX8, BONVX9	MS percent recovery
All	J	All	No surrogate recovery

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Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

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1D
PCB ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BONVX8

Lab Name: QUANTERRA, MO Contract: 550.260

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W02414

Matrix: (soil/water) SOIL Lab Sample ID: 18072-001

Sample wt/vol: 6.2 (g/ml) G Lab File ID: _____

Level: (low/med) LOW Date Sampled: 06-04-98

% Moisture: not dec. _____ dec. _____ Date Extracted: 06-16-98

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 06-22-98

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1.0

CAS NO. Compound CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG Q

12674-11-2-----	Aroclor-1016	32	U
11104-28-2-----	Aroclor-1221	32	U
11141-16-5-----	Aroclor-1232	32	U
53469-21-9-----	Aroclor-1242	32	U
12672-29-6-----	Aroclor-1248	32	U
11097-69-1-----	Aroclor-1254	3800	U
11096-82-5-----	Aroclor-1260	160	U

J
↓

- U: Concentration of analyte is less than the value given.
- *: Analyzed for AR1260 and AR1254 at a 5X dilution on GCA 07-01-98.

FORM I PEST

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9/23/98

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PCB ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BONVX9

Lab Name: QUANTERRA, MO Contract: 550.260

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W02414

Matrix: (soil/water) SOIL Lab Sample ID: 18072-002

Sample wt/vol: 30.1 (g/ml) G Lab File ID: _____

Level: (low/med) LOW Date Sampled: 06-04-98

% Moisture: not dec. _____ dec. _____ Date Extracted: 06-16-98

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 06-22-98

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1.0

CAS NO. Compound CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG Q

12674-11-2-----	Aroclor-1016	33	U
11104-28-2-----	Aroclor-1221	33	U
11141-16-5-----	Aroclor-1232	33	U
53469-21-9-----	Aroclor-1242	33	U
12672-29-6-----	Aroclor-1248	33	U
11097-69-1-----	Aroclor-1254	2600	U
11096-82-5-----	Aroclor-1260	160	U

J

↓

U: Concentration of analyte is less than the value given.

*: Analyzed for AR1254 at a 5X dilution on GCA 07-02-98.

FORM I PEST

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9/23/98

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1D
PCB ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BONVN7

Lab Name: QUANTERRA, MO Contract: 550.260
 Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W02414
 Matrix: (soil/water) SOIL Lab Sample ID: 18072-003
 Sample wt/vol: 30.3 (g/ml) G Lab File ID: _____
 Level: (low/med) LOW Date Sampled: 06-04-98
 % Moisture: not dec. _____ dec. _____ Date Extracted: 06-16-98
 Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 06-22-98
 GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1.0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NO.	Compound	Q
12674-11-2	Aroclor-1016	U
11104-28-2	Aroclor-1221	U
11141-16-5	Aroclor-1232	U
53469-21-9	Aroclor-1242	U
12672-29-6	Aroclor-1248	U
11097-69-1	Aroclor-1254	u
11096-82-5	Aroclor-1260	U

J
↓

U: Concentration of analyte is less than the value given.

FORM I PEST

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Rm 9/23/98

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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

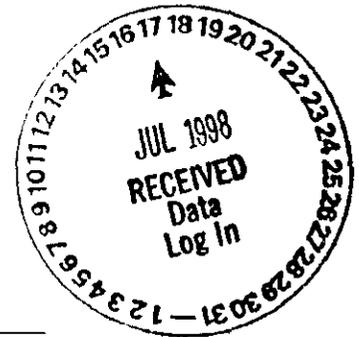
314 298-8566 Telephone
314 298-8757 Fax

CASE NARRATIVE

Bechtel Hanford Incorporated
3350 George Washington Way
Richland, Washington 99352

July 16, 1998

Attention: Joan Kessner



Project Number	:	550.260
SDG	:	W02414
Number of Samples	:	Two (2)
Sample Matrix	:	Other Solid
Data Deliverable	:	Summary
Date SDG Closed	:	June 05, 1998

II. Introduction

On June 05, 1998, two (2) "other solid" samples, were received by Quanterra, Richland and transferred to Quanterra, St. Louis for chemical analysis. There are no comments or nonconformances associated with the shipping and receiving of these samples. Upon receipt, the samples were given the following laboratory ID numbers to correspond with the specific client ID:

<u>St. Louis ID</u>	<u>BHI ID</u>	<u>Richland ID</u>	<u>Matrix</u>	<u>Date of Receipt</u>
18072-001	B0NVX8	80611401	Other Solid	05-JUNE-98
18072-002	B0NVX9	80611402	Other Solid	05-JUNE-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.

Analyses requested: ICP Metals by EPA method 6010A.
HG by EPA method 7471/7470.
PCBs by EPA 8080.

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Bechtel Hanford Incorporated
July 16, 1998
Project Number: 550.260
SDG: W02414
Page 2

III. Analytical Results/ Methodology (continued)

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.
DUP- Laboratory Duplicate.
MSD- Matrix Spike Duplicate.

V. Comments

General: All analyses were cancelled for B0NVN7.

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.

Percent solids was not determined for the samples in SDG W02414. Due to software configuration, the CLP forms list solid sample result units as "dry weight" and % solids as "100". The results on the forms are actually mg/Kg as is and are not corrected for percent solids. The figure of 100 was used as percent solids for calculation purposes only and does not represent measured solids content of the samples.

The recoveries of the Lead matrix spike (77.3%) and the matrix spike duplicate (74.5) were not within the 80%-120% range, therefore all associated data was not flagged with a "N".

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

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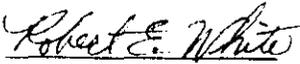
Bechtel Hanford Incorporated
July 16, 1998
Project Number: 550.260
SDG: W02414
Page 3

The MS/MSD recoveries were very high due to the high level of Arochlor 1254 in the sample, which has peaks in common with the spiked Arochlor.

The surrogate recovery for DCB could not be calculated in the samples due to the high levels of PCB and/or interferences. The TCMX recovery was also high in the MSD.

I certify that this data package is in compliance with the terms and conditions of the contract 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:


Robert E. White
Project Manager

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Leung 4/10/98 = 015550

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B98-087-08	Page 1 of 1
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Collector R Fahlberg	Company Contact S Marke	Telephone No. 373-4316	Project Coordinator IRENT, SJ	Data Turnaround 21 Days
Project Designation 105-C Phase II - Verification Sampling - Concrete	Sampling Location 100 C		SAF No. B98-087	
Ice Chest No. ERC-96-085	Field Logbook No. EL 1309-2	Method of Shipment HAND DELIVERED		
Shipped To Quanterra Incorporated	Offsite Property No. N/A	Bill of Lading/Air Bill No. N/A		

Waste Designation: Client determined no waste codes associated with this project. COA

R13K

POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	None	Cool 4C	None	None						
	Type of Container	aG	aG	aG	aG						
	No. of Container(s)	0	1	1	1						
	Volume	60mL	60mL	60mL	60mL						

Special Handling and/or Storage: **00001**

SAMPLE ANALYSIS

806114

Activity Scan	PCBs - 8080	See item (1) in Special Instructions.	ICP Metals - 6010A (Add-on) (Lead); Mercury - 7471 - (CV)
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Sample No.	Matrix *	Sample Date	Sample Time							
BONVW 8 01	Other Solid	6-4-98	0810	X	X	X	X			BONVW4
BONY 9 02	Other Solid	6-4-98	0825	X	X	X	X			BONYW5
BONVN 7 03	Other Solid	6-4-98	0840	X	X	X	X			BONVW6
					100%		100%			

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS	Matrix *
Relinquished By: <i>[Signature]</i> 6/5/98 13:30 Date/Time	Received By: <i>[Signature]</i> 6-5-98 Date/Time	<p>** Quanterra is to analyze samples for PCBs only upon receipt. All additional sample material is to be held for potential analyses at a later date.</p> <p>(1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Isotopic Plutonium; Isotopic Uranium; Americium-241; Strontium-89,90 - Total Sr; Technetium-99; Niobium-94; Carbon-14</p> <p>D.St. John relinquished to Quanterra, custodian because Robert Fahlberg was not available for sample delivery.</p>	<ul style="list-style-type: none"> S - Soil SE - Sediment SO - Solid SL - Sludge W - Water O - Oil A - Air DS - Drum Solids DL - Drum Liquids T - Tissue WT - Wipe L - Liquid V - Vegetation X - Other
Relinquished By: <i>[Signature]</i> 6-5-98 Date/Time	Received By: <i>[Signature]</i> 6-5-98 0900 Date/Time		
Relinquished By: <i>[Signature]</i> Date/Time	Received By: <i>[Signature]</i> Date/Time		
Relinquished By: <i>[Signature]</i> Date/Time	Received By: <i>[Signature]</i> Date/Time		

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

Appendix 5

Data Validation Supporting Documentation

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PESTICIDE/PCB DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT:	105-c ph II		DATA PACKAGE: W02414		
VALIDATOR:	TLI	LAB: (QE)	DATE: 9/13/98		
CASE:			SDG: W02414		
ANALYSES PERFORMED					
<input type="checkbox"/> CLP3/90	<input type="checkbox"/> SW-846 8080	<input type="checkbox"/> SW-846 8081	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SAMPLES/MATRIX	BouVX8		BouVX9		
Solid					

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: _____

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

3.1 INSTRUMENT PERFORMANCE (METHOD 8080 AND 8081)

Are DDT retention times acceptable Yes No **N/A**
 Are calibration standard retention times acceptable? Yes No **N/A**
 Are DDT and endrin breakdowns acceptable? Yes No **N/A**

PESTICIDE/PCB DATA VALIDATION CHECKLIST

Are DBC retention times acceptable? Yes No **N/A**
Is the GC/MS tuning/performance check acceptable? Yes No **N/A**

Comments: _____

3.2 CALIBRATIONS (METHOD 8080 AND 8081)

Are EVAL standard calibration factors and %RSD values acceptable? Yes No **N/A**
Are quantitation column calibration factor %RSD values acceptable? Yes No **N/A**
Were the analytical sequence requirements met? Yes No **N/A**
Are continuing calibration %D values acceptable? Yes No **N/A**

Comments: _____

3.3 INSTRUMENT PERFORMANCE AND INITIAL CALIBRATION (3/90 SOW)

Was the initial calibration sequence performed? Yes No **N/A**
Was the resolution acceptable in the resolution check mix? Yes No **N/A**
Is resolution acceptable in the PEM, INDA and INDB? Yes No **N/A**
Are DDT and Endrin breakdowns acceptable? Yes No **N/A**
Are retention times in PEMs and calibration mixes acceptable? Yes No **N/A**
Are RPD values in the PEMs acceptable? Yes No **N/A**
Are %RSD values acceptable? Yes No **N/A**

Comments: _____

3.4 CALIBRATION VERIFICATION (3/90 SOW)

Were the analytical sequence requirements met? Yes No **N/A**
Is resolution acceptable in the PEMs? Yes No **N/A**
Are initial calibrations acceptable? Yes No **N/A**

PESTICIDE/PCB DATA VALIDATION CHECKLIST

Are retention times acceptable in the PEMs, INDA and INDB mixes?	Yes	No	N/A
Are RPD values in the PEMs acceptable?	Yes	No	N/A
Are the DDT and endrin breakdowns acceptable?	Yes	No	N/A
Was GPC cleanup performed?	Yes	No	N/A
Is the GPC calibration check acceptable?	Yes	No	N/A
Was Florisil cleanup performed?	Yes	No	N/A
Is the Florisil performance check acceptable?	Yes	No	N/A

Comments: _____

4. BLANKS

Were laboratory blanks analyzed?	<input checked="" type="radio"/> Yes	No	N/A
Are laboratory blank results acceptable?	<input checked="" type="radio"/> Yes	No	N/A
Were field/trip blanks analyzed?	Yes	<input checked="" type="radio"/> No	N/A
Are field/trip blank results acceptable?	Yes	No	<input checked="" type="radio"/> N/A

Comments: _____

5. ACCURACY

Were surrogates analyzed?	<input checked="" type="radio"/> Yes	No	N/A
Are surrogate recoveries acceptable?	<input checked="" type="radio"/> Yes	<input checked="" type="radio"/> No	N/A
Were MS/MSD samples analyzed?	<input checked="" type="radio"/> Yes	No	N/A
Are MS/MSD results acceptable?	Yes	<input checked="" type="radio"/> No	N/A
Were LCS samples analyzed?	Yes	No	N/A
Are LCS results acceptable?	Yes	No	N/A

Comments: Arochlor 1254 J call 8+9
MS/MSD way out

No PCB - detection results qual under MS
J/UJ all

PESTICIDE/PCB DATA VALIDATION CHECKLIST

6. PRECISION

Are MS/MSD RPD values acceptable? Yes No N/A
Are laboratory duplicate results 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. SYSTEM PERFORMANCE

Is chromatographic performance acceptable? Yes No N/A
Are positive results resolved acceptably? Yes No N/A

Comments: _____

8. COMPOUND IDENTIFICATION AND QUANTITATION

Is compound identification acceptable? Yes No N/A
Is compound quantitation acceptable? Yes No N/A

Comments: _____

9. REPORTED RESULTS AND QUANTITATION LIMITS

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

Comments: _____

3F
SOIL PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: QUANTERRA, MO Contract: 550.260
 Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W02414
 Matrix Spike - EPA Sample No.: BONVX8 Level: (low/med) LOW

COMPOUND	SPIKE ADDED (ug/kg)	SAMPLE CONCENTRATION (ug/Kg)	MS CONCENTRATION (ug/Kg)	MS % REC #	QC LIMITS REC.
Aroclor-1016	160	0	1100	694 *	30-198
Aroclor-1260	160	0	8000	5045 *	56-138

COMPOUND	SPIKE ADDED (ug/kg)	MSD CONCENTRATION (ug/Kg)	MSD % REC #	% RPD	QC LIMITS RPD REC.
Aroclor 1016	160	430	263 *	90 *	25 30-198
Aroclor 1260	160	0	4630 *	8	28 56-138

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 1 out of 2 outside limits
 Spike Recovery: 4 out of 4 outside limits

COMMENTS: Matrix spike AR1260 and AR1016 had matrix and dilution factor interference.

FORM III PEST-2

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2F
PCB SURROGATE RECOVERY

Lab Name: QUANTERRA, MO

Contract: 550.260

Lab Code: ITMO Case No.: _____

SAS No.: _____ SDG No.: W02414

Level: (low/med) LOW

	EPA SAMPLE NO.	S1 (DCB) #	S2 (TCMX) #
01	PBLK01	146 *	82
02	PSPK01	135	89
03	BONVX8		64
04	BONVX8MS		181 *
05	BONVX8MSD		102
06	BONVX9		81
07	BONVN7		77
08			
09			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

ADVISORY
QC LIMITS
(61-135)
(61-153)

S1 (DCB) = Decachlorobiphenyl
S2 (TCMX) = Tetrachlorom-m-xylene

Column to be used to flag recovery values

* Values outside of QC limits

D Surrogates diluted out

M Matrix interference

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000025

Date: 25 September 1998
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 105-C Phase II - Verification Sampling - Concrete
Subject: Inorganics - Data Package No. W02414-QES (SDG No. W02414)

INTRODUCTION

This memo presents the results of data validation on Data Package No. W02414-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
BONVX8	6/4/98	Concrete	C	See Note 1
BONVX9	6/4/98	Concrete	C	See Note 1

1- ICP metals by 6010A (lead); mercury by 7471

Data validation was conducted in accordance with the BHI validation statement of work. Appendices 1 through 5 provide the following information as indicated below:

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DATA QUALITY OBJECTIVES

- **Holding Times**

Analytical holding times for mercury and ICP metals are 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 and 28 days for mercury.

All holding times were acceptable.

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- **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 (in ug/L) 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 75% to 125%. 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 74% and a sample result less than the IDL are qualified "UJ". Samples with a spike recovery of greater than 125% or less than 75% and a sample result greater than the IDL are qualified as estimates and flagged "J". Finally, for samples with a spike recovery greater than 125% and a sample result less than the IDL, no qualification is required.

All matrix spike recovery results were acceptable.

000002

- **Precision**

Laboratory Duplicate Samples

Laboratory duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Results must be within RPD limits of plus or minus 35% for solid samples. If RPD values are out of specification and the sample concentration is greater than five times the CRDL, all associated sample results are qualified as estimated and flagged "J". If RPD values are plus or minus two times the CRDL and the sample concentration is less than five times the CRDL, all associated sample results are qualified as estimated and flagged "J/UJ". The performance criteria for aqueous laboratory duplicates are an RPD less than 20% for positive sample results greater than five times the CRDL or plus or minus the CRDL for positive sample results less than five times the CRDL. Sample results outside the criteria are qualified as estimates and flagged "J/UJ".

All laboratory duplicate recovery results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against 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. W02414-QES (SDG No. W02414) 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.

000004

Appendix 1

Glossary of Data Reporting Qualifiers

000005

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

- 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.
- UU - 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: W02414	REVIEWER: TLI	DATE: 9/25/98	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

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

000013

Quanterra Incorporated
13715 Rider Trail North
Earth City, Missouri 63045

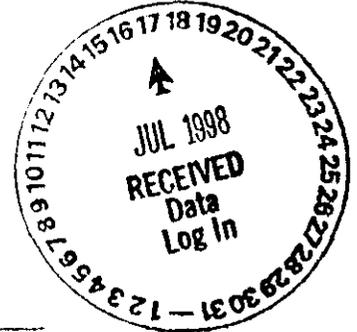
314 298-8566 Telephone
314 298-8757 Fax

CASE NARRATIVE

Bechtel Hanford Incorporated
3350 George Washington Way
Richland, Washington 99352

July 16, 1998

Attention: Joan Kessner



Project Number	:	550.260
SDG	:	W02414
Number of Samples	:	Two (2)
Sample Matrix	:	Other Solid
Data Deliverable	:	Summary
Date SDG Closed	:	June 05, 1998

II. Introduction

On June 05, 1998, two (2) "other solid" samples, were received by Quanterra, Richland and transferred to Quanterra, St. Louis for chemical analysis. There are no comments or nonconformances associated with the shipping and receiving of these samples. Upon receipt, the samples were given the following laboratory ID numbers to correspond with the specific client ID:

<u>St. Louis ID</u>	<u>BHI ID</u>	<u>Richland ID</u>	<u>Matrix</u>	<u>Date of Receipt</u>
18072-001	BONVX8	80611401	Other Solid	05-JUNE-98
18072-002	BONVX9	80611402	Other Solid	05-JUNE-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.

Analyses requested: ICP Metals by EPA method 6010A.
 HG by EPA method 7471/7470.
 PCBs by EPA 8080.

000014

000002

Bechtel Hanford Incorporated
July 16, 1998
Project Number: 550.260
SDG: W02414
Page 2

III. Analytical Results/ Methodology (continued)

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.
DUP- Laboratory Duplicate.
MSD- Matrix Spike Duplicate.

V. Comments

General: All analyses were cancelled for B0NVN7.

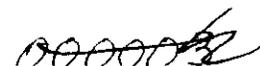
Inorganics: A Laboratory Control Sample, Method Blank, Matrix Spike and Matrix Spike Duplicate were analyzed with each preparation batch per the protocol for this analysis.

Percent solids was not determined for the samples in SDG W02414. Due to software configuration, the CLP forms list solid sample result units as "dry weight" and % solids as "100". The results on the forms are actually mg/Kg as is and are not corrected for percent solids. The figure of 100 was used as percent solids for calculation purposes only and does not represent measured solids content of the samples.

The recoveries of the Lead matrix spike (77.3%) and the matrix spike duplicate (74.5) were not within the 80%-120% range, therefore all associated data was not flagged with a "N".

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

000015



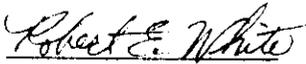
Bechtel Hanford Incorporated
July 16, 1998
Project Number: 550.260
SDG: W02414
Page 3

The MS/MSD recoveries were very high due to the high level of Arochlor 1254 in the sample, which has peaks in common with the spiked Arochlor.

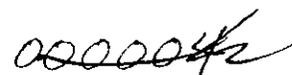
The surrogate recovery for DCB could not be calculated in the samples due to the high levels of PCB and/or interferences. The TCMX recovery was also high in the MSD.

I certify that this data package is in compliance with the terms and conditions of the contract 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:


Robert E. White
Project Manager

000016



Long 410 500 = 315500

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			B98-087-08	Page 1 of 1
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Collector R Fahlberg	Company Contact S Marke	Telephone No. 373-4316	Project Coordinator TRENT, SJ	Data Turnaround 21 Days
Project Designation 105-C Phase II - Verification Sampling - Concrete	Sampling Location 100 C	SAF No. B98-087		

Ice Chest No. ERC-96-085	Field Logbook No. EL 1309-2	Method of Shipment HAND DELIVERED
-----------------------------	--------------------------------	--------------------------------------

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

Waste Designation Client determined no waste codes associated with this project.	COA
---	-----

R13K

POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	None	Cool 4C	None	None								
	Type of Container	aG	aG	aG	aG								
	No. of Container(s)	0	1	1	1								
	Special Handling and/or Storage	Volume	60mL	60mL	60mL	60mL							

00001

SAMPLE ANALYSIS	Activity Seen	PCBs - 8080	See Item (1) in Special Instructions	ICP Metals - 6010A (Add-on) (Lead); Mercury - 7471 - (CV)
806114				

Sample No.	Matrix *	Sample Date	Sample Time										
BONVW8 01	Other Solid	6.4.98	0810	X	X	X	X						BONVW4
BONVW9 02	Other Solid	6.4.98	0825	X	X	X	X						BONVW5
BONVW7 03	Other Solid	6.4.98	0840	X	X	X	X						BONVW6
					100%		100%						

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS	Matrix *
Relinquished By D. St. John 4/5/98 13:30 Date/Time	Received By Dawn DeKorver 6-5-98 Date/Time	** Quanterra is to analyze samples for PCBs only upon receipt. All additional sample material is to be held for potential analyses at a later date.	S - Soil SE - Sediment SO - Solid SL - Sludge W - Water O - Oil A - Air DS - Drum Solids DL - Drum Liquids T - Tissue W1 - Wipe L - Liquid V - Vegetation X - Other
Relinquished By Dawn DeKorver 6-5-98 Date/Time	Received By Joe Terence 6-5-98 0900 Date/Time	(1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Isotopic Plutonium; Isotopic Uranium; Americium-241; Strontium-89,90 - Total Sr; Technetium-99; Nickel-63; Carbon-14	
Relinquished By	Received By	D. St. John relinquished to Quanterra Custodian because Robert Fahlberg was not available for sample delivery.	

LABORATORY SECTION	Received By	Title	Date/Time
--------------------	-------------	-------	-----------

FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time
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Appendix 5

Data Validation Supporting Documentation

000018

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: BOS-C ph II			DATA PACKAGE: W02414		
VALIDATOR: JLI		LAB: QES		DATE: 9/13/98	
CASE:			SDG: W02414		
ANALYSES PERFORMED					
<input type="checkbox"/> CLP/CP	<input type="checkbox"/> CLP/GFAA	<input checked="" type="checkbox"/> CLP/Hg	<input type="checkbox"/> CLP/Cyanide	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> SW-846/CP	<input type="checkbox"/> SW-846/GFAA	<input type="checkbox"/> SW-846/Hg	<input type="checkbox"/> SW-846 Cyanide	<input type="checkbox"/>	<input type="checkbox"/>
SAMPLES/MATRIX BOUJX8, BOUJX9					
solid					

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: _____

A-19/11

000019

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: _____

CA-2012

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: _____

Date: 25 September 1998
To: Bechtel Hanford, Inc. (technical representative)
From: TechLaw, Inc.
Project: 105-C Phase II - Verification Sampling - Concrete
Subject: Radiochemistry - Data Package No. W02414-QES (SDG No. W02414)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. W02414-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
BONVN7	6/4/98	Concrete	C	See note 1
BONVX8	6/4/98	Concrete	C	See note 1
BONVX9	6/4/98	Concrete	C	See note 1

1 - Gamma spectroscopy; isotopic uranium, plutonium and americium; strontium-90.

Data validation was conducted in accordance with the BHI validation statement of work (BHI 1997). 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.

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- **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 recovery range is 70% to 130%, while that for a matrix spike is 60% to 140%. 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 percent recovery outside QC limits, all uranium-235 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 35 percent for soil samples and 20 percent for water samples, 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

000002

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.

All duplicate results were acceptable.

- **Detection Levels**

Reported laboratory detection levels are reviewed to ensure that they are at or below the contract required MDA. The laboratory reported detection levels exceeded the contract required MDA for the following: uranium-238 (BONVX8), cobalt-60 (all); cesium-137 (BONVX9, BONVN7), europium-152 (BONVX9), europium-154 (BONVX9), europium-155 (BONVX9, BONVX8), and strontium-90 (all). All other reported MDAs were at or below the analyte-specific CRDL.

- **Completeness**

Data Package No. W02414 (SDG No. W02414) was submitted for validation and verified for completeness. The completion rate was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Due to an LCS percent recovery outside QC limits, all uranium-235 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.

000003

Appendix 1

Glossary of Data Reporting Qualifiers

000004

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.

000005

Appendix 2

Summary of Data Qualification

000006

DATA QUALIFICATION SUMMARY

SDG: W02414	REVIEWER: TLI	DATE: 9/25/98	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Uranium-235	J	All	LCS recovery

000007

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

000008

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02441 / 5534
 LAB SAMPLE ID: 80650304 MATRIX: OTHER
 CLIENT ID: B0NVX8 DATE RECEIVED: 6/30/1998 11:00:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	3.67E-01		1.7E-01	1.7E-01	5.23E-02	pCi/g	80.80%	RICHRC5062-F
PU-238	0.00E+00	U	0.0E+00	7.4E-02	6.71E-02	pCi/g	63.10%	RICHRC5062-F
PU239/40	6.66E-01	J	2.6E-01	2.7E-01	1.07E-01	pCi/g	63.10%	RICHRC5062-F
U-234	2.17E-01	J	1.4E-01	1.4E-01	1.09E-01	pCi/g	79.80%	RICHRC5062-U
U-235	1.63E-02	<i>U Sus</i>	4.1E-02	4.1E-02	9.74E-02	pCi/g	79.80%	RICHRC5062-U
U-238	3.03E-01		1.6E-01	1.6E-01	8.79E-02	pCi/g	79.80%	RICHRC5062-U
CO-60	1.87E-01	U	1.2E-01	1.3E-01	3.44E-01	pCi/g	N/A	RICHRC5017
CS-137DA	8.68E-02	U	1.4E-01	1.4E-01	2.72E-01	pCi/g	N/A	RICHRC5017
EU-152	2.11E-02	U	3.0E-01	3.0E-01	5.50E-01	pCi/g	N/A	RICHRC5017
EU-154	-8.48E-01	U	5.4E-01	5.4E-01	5.52E-01	pCi/g	N/A	RICHRC5017
EU-155	1.79E-01	U	2.2E-01	2.2E-01	3.97E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	1.14E-01	U	2.4E-01	2.4E-01	6.59E-01	pCi/g	99.00%	RICHRC5006

Number of Results: 12

000010

JCE
9/21/98

000010

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland **SDG: /RPT GRP:** W02441 / 5534
LAB SAMPLE ID: 80650305 **MATRIX:** OTHER
CLIENT ID: B0NVX9 **DATE RECEIVED:** 6/30/1998 11:00:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	6.37E-02		7.4E-02	7.4E-02	5.74E-02	pCi/g	71.70%	RICHRC5062-A
PU-238	0.00E+00	U	0.0E+00	7.9E-02	7.10E-02	pCi/g	58.00%	RICHRC5062-P
PU239/40	1.04E-01	J	1.0E-01	1.1E-01	9.54E-02	pCi/g	58.00%	RICHRC5062-P
U-234	2.40E-01	J	1.5E-01	1.5E-01	1.16E-01	pCi/g	75.20%	RICHRC5062-U
U-235	6.72E-02	J	7.8E-02	7.8E-02	6.06E-02	pCi/g	75.20%	RICHRC5062-U
U-238	2.02E-01		1.3E-01	1.4E-01	6.06E-02	pCi/g	75.20%	RICHRC5062-U
CO-60	1.21E-01	U	2.5E-01	2.5E-01	5.27E-01	pCi/g	N/A	RICHRC5017
CS-137DA	1.23E-01	U	1.7E-01	1.7E-01	3.50E-01	pCi/g	N/A	RICHRC5017
EU-152	1.48E-01	U	4.0E-01	4.0E-01	7.58E-01	pCi/g	N/A	RICHRC5017
EU-154	6.05E-01	U	4.3E-01	4.3E-01	1.20E+00	pCi/g	N/A	RICHRC5017
EU-155	8.30E-02	U	2.2E-01	2.2E-01	4.22E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	1.63E-01	U	2.4E-01	2.5E-01	6.40E-01	pCi/g	100.00%	RICHRC5006

Number of Results: 12

000011

[Signature]
9/21/98

[Signature]

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02441 / 5534
 LAB SAMPLE ID: 80650306 MATRIX: OTHER
 CLIENT ID: B0NVN7 DATE RECEIVED: 6/30/1998 11:00:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	6.58E-02		7.6E-02	7.6E-02	5.94E-02	pCi/g	71.60%	RICHRC5062-A
PU-238	0.00E+00	U	0.0E+00	9.0E-02	8.08E-02	pCi/g	52.60%	RICHRC5062-F
PU239/40	1.77E-01	J	1.5E-01	1.5E-01	1.20E-01	pCi/g	52.60%	RICHRC5062-F
U-234	3.54E-01	J	1.8E-01	1.9E-01	1.32E-01	pCi/g	81.10%	RICHRC5062-L
U-235	-3.64E-03	U J	3.6E-03	3.7E-03	1.04E-01	pCi/g	81.10%	RICHRC5062-L
U-238	1.97E-01		1.4E-01	1.4E-01	1.21E-01	pCi/g	81.10%	RICHRC5062-L
CO-60	2.23E-01	U	1.5E-01	1.5E-01	4.13E-01	pCi/g	N/A	RICHRC5017
CS-137DA	1.03E-01	U	1.6E-01	1.6E-01	3.19E-01	pCi/g	N/A	RICHRC5017
EU-152	3.38E-02	U	3.9E-01	3.9E-01	6.91E-01	pCi/g	N/A	RICHRC5017
EU-154	1.00E-01	U	4.3E-01	4.3E-01	9.43E-01	pCi/g	N/A	RICHRC5017
EU-155	-3.19E-01	U	3.0E-01	3.0E-01	4.55E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	2.71E-01	U	2.9E-01	3.1E-01	7.51E-01	pCi/g	98.00%	RICHRC5006

Number of Results: 12

000012

Handwritten signature
9/24/98

Handwritten initials

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

000013

CERTIFICATE OF ANALYSIS

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

July 23, 1998

Attention: Joan Kessner



SAF Number	:	B98-087	
Date First Sample Received	:	June 30, 1998	
Number of Samples	:	Eighteen (18)	
Sample Type	:	Concrete	
SDG Number	:	W02441	
Data Deliverable	:	Seven Day Quick Turn	

I. Introduction

Between June 2, and June 5, 1998, 18 concrete samples were received by the Quanterra Environmental Services Richland Laboratory (QESRL) for radiochemical and chemical analysis. These samples were originally logged in under SDGs W02409, W02411 and W02414. On June 30, 1998, you requested additional analyses to be performed on these samples on a seven day TAT. The samples in these SDGs were combined under one SDG, W02441. Upon this request for additional analyses, the samples were assigned the following laboratory ID numbers to correspond with the Bechtel Hanford, Inc. (BHI) specific IDs:

<u>QESRL ID#</u>	<u>BHI ID#</u>	<u>MATRIX</u>	<u>DATE OF LOGIN</u>
80650301	B0NVN0	Concrete	6/30/1998
80650302	B0NVM6	Concrete	6/30/1998
80650303	B0NVM9	Concrete	6/30/1998
80650304	B0NVX8	Concrete	6/30/1998
80650305	B0NVX9	Concrete	6/30/1998
80650306	B0NVN7	Concrete	6/30/1998
80650307	B0NVN5	Concrete	6/30/1998
80650308	B0NVN6	Concrete	6/30/1998
80650309	B0NVP7	Concrete	6/30/1998
80650310	B0NVP8	Concrete	6/30/1998
80650311	B0NVP9	Concrete	6/30/1998

000014

Joan Kessner

Bechtel Hanford, Inc.
July 23, 1998
Page 2

80650312	BONVR0	Concrete	6/30/1998
80650313	BONVR1	Concrete	6/30/1998
80650314	BONVR2	Concrete	6/30/1998
80650315	BONVR3	Concrete	6/30/1998
80650316	BONVN1	Concrete	6/30/1998
80650317	BONVN2	Concrete	6/30/1998
80650318	BONVN3	Concrete	6/30/1998

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:

Alpha Spectroscopy

Americium-241 by method RICH-RC-5062

Plutonium-238, -239/40 by method RICH-RC-5062

Uranium-234, -235, -238 by method RICH-RC-5062

Gamma Spectroscopy

Gamma Scan by method RICH-RC-5017

Gas Proportional Counting

Total Strontium by method RICH-RC-5006

III. Quality Control

The samples analyzed under SDG W02441 were processed as quick turn samples and had two Laboratory Control Samples (LCS and LCS duplicate) and one method (reagent) blank analyzed with the batch. 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-5057

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

000015

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Bechtel Hanford, Inc.

July 23, 1998

Page 3

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

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

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

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

Gamma Spectroscopy

Gamma Scan by method RICH-RC-5017

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

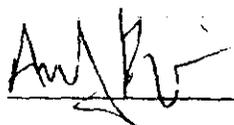
Gas Proportional Counting

Total Strontium by method RICH-RC-5006

The LCS, LCS duplicate, batch blank and sample 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:



Andy Kopriva
Project Manager

000016

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Bechtel Hanford Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

B98-087-08

Page 1 of 1

Collector R Fahlberg	Company Contact S Marke	Telephone No. 373-4316	Project Coordinator TRENT, SJ	Data Turnaround 21 Days
Project Designation 105-C Phase II - Verification Sampling - Concrete	Sampling Location 100 C	SAF No. B98-087		
Ice Chest No. ERC-96-085	Field Logbook No. EL 1309-2	Method of Shipment HAND DELIVERED		
Shipped To Quanterra Incorporated	Offsite Property No. N/A	Bill of Lading/Air Bill No. N/A		
Waste Designation	Client determined no waste codes associated with this project.			COA

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

000017

SAMPLE ANALYSIS

Sample No.	Matrix *	Sample Date	Sample Time	Activity Scan	PCBs - 8080	See Item (1) in Special Instructions.	ICP Metals - 6010A (Add-on) (Lead); Mercury - 7471 - (CV)						
BONVX8 01	Other Solid	6.4.98	0810	X	X	X	X						BONVW4
BONVX9 02	Other Solid	6.4.98	0825	X	X	X	X						BONVW5
BONVX7 03	Other Solid	6.4.98	0840	X	X	X	X						BONVW6

CHAIN OF POSSESSION

Sign/Print Names

Relinquished By <i>D. St. John</i> Date/Time 6/13/98 13:30	Received By <i>Robert Fahlberg</i> Date/Time 6-5-98
Relinquished By <i>Robert Fahlberg</i> Date/Time	Received By <i>D. St. John</i> Date/Time 2:00pm
Relinquished By	Received By
Relinquished By	Received By

SPECIAL INSTRUCTIONS

** Quanterra is to analyze samples for PCBs only upon receipt. All additional sample material is to be held for potential analyses at a later date.

(1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Isotopic Plutonium; Isotopic Uranium; Americium-241; Strontium-89,90 - Total Sr; Technetium-99; Nickel-63; Carbon-14

D. St. John relinquished to Quanterra custodian because Robert Fahlberg was not available for sample delivery.

Matrix *

- S - Soil
- SE - Sediment
- SO - Solid
- SL - Sludge
- W - Water
- O - Oil
- A - Air
- DS - Drum Solids
- DL - Drum Liquids
- T - Tissue
- W1 - Wipe
- L - Liquid
- V - Vegetation
- X - Other

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

Appendix 5

Data Validation Supporting Documentation

000018

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT:	105-C <i>concrete</i>		DATA PACKAGE: W02414		
VALIDATOR:	TLI	LAB:	QES	DATE: 9/19/88	
CASE:	SDG: W02414				
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 type="checkbox"/>		
SAMPLES/MATRIX	BONVY7, BONVY8, BONVN7				
<i>concrete</i>					

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: CS-147 in blank - all U no qual req

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: _____

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 5396 rec J/05

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: _____

ABC

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: _____

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: U-238 X8 Co-60 Cs137 X9, U7

Eu 152 X9 Eu 154-X9 Eu 155 X8, X9

SR90 all



LABORATORY CONTROL SAMPLE

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02441 / 5534
LAB SAMPLE ID: J065032S MATRIX: OTHER

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/ IDL	REPORT UNIT	YIELD	EXPECTED	RECOVER
AM-241	8.97E+00		8.1E-01	1.4E+00	6.66E-02	pCi/g	86.20%	9.13E+00	98.19%
PU239/40	8.32E+00		1.1E+00	1.7E+00	1.59E-01	pCi/g	40.00%	9.05E+00	91.86%
U-234	4.54E+00		5.7E-01	7.9E-01	6.55E-02	pCi/g	89.50%	4.41E+00	102.97%
U-235	1.08E-01	J	8.8E-02	8.9E-02	4.87E-02	pCi/g	89.50%	2.01E-01	53.74%
U-238	4.88E+00		5.9E-01	8.4E-01	7.24E-02	pCi/g	89.50%	4.61E+00	105.72%
CO-60	3.60E+00		7.2E-01	8.1E-01	N/A	pCi/g	N/A	3.53E+00	101.79%
CS-137DA	3.74E+00		6.4E-01	7.4E-01	N/A	pCi/g	N/A	3.54E+00	105.49%
EU-152	2.30E+01		2.0E+00	3.1E+00	N/A	pCi/g	N/A	2.53E+01	90.70%
STRONTIUM	1.41E+01		1.1E+00	5.4E+00	6.61E-01	pCi/g	100.00%	1.36E+01	103.37%

Number of Results: 9

000023

Result = IDL When Not Detected

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

Quanterra Analytical Services, Inc

rptChemRadLcs; v3.41

8028

Janette Luncen

Fran RB Christian

Fax # 509-373-6725

Info Request

- HO140-RAD C14 + U:63 No ms reported?
Is the data available?

- W02441 - Rad

- Do you want all 18 samples validated?

- Do you want it reported as 2414 or 2441

W02414 - PCB

Case Narrative states B0VUN7 was cancelled, but data is reported. Do you want it validated?

W02414 - PCB

Initial ms/msd is way out of spec. Lab says it ran everything but the reported data is from the initial analysis date. Did they re-run it. If so, where is the data.

My Fax # is
send also to

281-987-9130 (RM302)

214-754-0819

Thanks

FROM THE DESK OF:

Stephen J. Trent
Sample Management
373-9186/L0-20

TO: R. Bruce Christian

DATE: September 17, 1998

cc: J. M. Duncan
R. L. Weiss

SUBJECT: Disposition of Validation Information Requests - Data Packages H0140 & W02414

We received your information request(s) late 9/16/98 and have the following responses:

1. **Info Request:** H0140 - Rad - C14 & Ni63 - No MS reported. Is the data available?

BHI Response: MS is not available. Validate with the data you have available.

2. **Info Request:** W02441 - Rad - Do you want all 18 samples validated? Do you want it reported as W02414 or W02441?

BHI Response: W02441 - Rad - Lab batched rad together for several SDGs (see SDR B98-063). Please validate rad for samples B0NVX8, B0NVX9 & B0NVN7 and report it under SDG W02414.

3. **Info Request:** W02414 - PCBs - Case narrative states B0NVN7 was cancelled, but data is reported. Do you want it validated?

BHI Response: Yes.

4. **Info Request:** W02414 - PCBs - Initial MS/MSD is way out of spec. Lab says it re-ran everything but the reported data is from the initial analysis date. Did they re-run it? If so, where is the data?

BHI Response: The data table that you are looking at represents the re-run data (see attached pages from data package). If you have any questions, please call me on the number listed above.

1D
PCB ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BONVX8

Lab Name: QUANTERRA, MO Contract: 550.260

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W02414

Matrix: (soil/water) SOIL Lab Sample ID: 18072-001

Sample wt/vol: 6.2 (g/ml) G Lab File ID: _____

Level: (low/med) LOW Date Sampled: 06-04-98

% Moisture: not dec. _____ dec. _____ Date Extracted: 06-16-98

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 06-22-98

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1.0

CAS NO.	Compound	CONCENTRATION UNITS: (ug/L or ug/Kg) <u>UG/KG</u>	Q
12674-11-2-----	Aroclor-1016	32	U
11104-28-2-----	Aroclor-1221	32	U
11141-16-5-----	Aroclor-1232	32	U
53469-21-9-----	Aroclor-1242	32	U
12672-29-6-----	Aroclor-1248	32	U
11097-69-1-----	Aroclor-1254	3800	U
11096-82-5-----	Aroclor-1260	160	U

U: Concentration of analyte is less than the value given.

*: Analyzed for AR1260 and AR1254 at a 5X dilution on GCA 07-01-98.

FORM I PEST

000021

1D
PCB ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BONVX9

Lab Name: QUANTERRA, MO Contract: 550.260

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W02414

Matrix: (soil/water) SOIL Lab Sample ID: 18072-002

Sample wt/vol: 30.1 (g/ml) G Lab File ID: _____

Level: (low/med) LOW Date Sampled: 06-04-98

% Moisture: not dec. _____ dec. _____ Date Extracted: 06-16-98

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 06-22-98

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1.0

CAS NO.	Compound	CONCENTRATION UNITS:		Q
		(ug/L or ug/Kg)	<u>UG/KG</u>	
12674-11-2-----	Aroclor-1016		33	U
11104-28-2-----	Aroclor-1221		33	U
11141-16-5-----	Aroclor-1232		33	U
53469-21-9-----	Aroclor-1242		33	U
12672-29-6-----	Aroclor-1248		33	U
11097-69-1-----	Aroclor-1254		2600	
11096-82-5-----	Aroclor-1260		160	U

U: ~~Concentration of analyte is less than the value given.~~

*: Analyzed for AR1254 at a 5X dilution on GCA 07-02-98.

FORM I PEST

000022

<h1>Review Comment Record (RCR)</h1>	1. Date 9/28/98	2. Review No. BHI/QA98010
	3. Project 105-C Phase II	4. Page Page 1 of 1

5. Document Number(s)/Title(s) WO2414 – QES (SDG No. WO2414)	6. Program/Project/ Building Number 105-C Phase II Verification Sampling – Concrete	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) _____ Reviewer/Point of Contact _____ Reviewer/Point of Contact
 _____ Date _____ Date
 _____ 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	All: Pages need paginated.		<i>Correct</i>	
2			<i>Rev. 9/30/98</i>	
3				