W02220

0049192

Analytical Data Package Prepared For

MAY 1998
RECEIVED
EDMC

Bechtel Hanford

FEB 1998
RECEIVED
Data
Log In

Chemical Analysis By

Quanterra Environmental Services
St. Louis Laboratory

Sample Delivery Group Number: W02220

BHI IDENTIFICATION NUMBER	QUANTERRA ID NUMBER
B0N0L7	16832-001

Quanterra Incorporated
13715 Rider Trail North
Earth City, Missouri 63045

314 298-8566 Telephone
314 298-8757 Fax

Quanterra Environmental Services

CASE NARRATIVE

FEB 1998
RECEIVED
Data
Log In

Bechtel Hanford Incorporated
3350 George Washington Way
Richland, Washington 99352

February 19, 1998

Attention: Joan Kessner

Project Number	:	550.261
Date Received by Lab	:	January 30, 1998
Number of Samples	:	One (1)
Sample Type	:	Other Solid
SDG Number	:	W02220
Data Deliverable	:	Summary

I. Introduction

On January 30, 1998, one (1) other solid sample was received by Quanterra, Richland and was transferred to Quanterra, St. Louis for chemical analyses. Upon receipt, the sample was given the following laboratory ID number to correspond with the specific client ID:

St. Louis ID	BHI ID	Richland ID	Matrix	Date of Receipt
16832-001	B0N0L7	80200501	Other Solid	30-JAN-98

II. 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

pH by EPA Method 9045, TCLP Extraction by EPA Method 1311 followed by TCLP Metals by EPA Method 6010/7470, Semivolatiles by EPA Method 8270, Volatiles by EPA Method 8260 and PCBs by EPA Method 8080.

III. Quality Control

A Laboratory Control Sample and Method Blank were analyzed with each preparation batch. Matrix Spike and Matrix Spike Duplicate were performed per the protocol for each analyte in this SDG. pH analyses require only a Sample Duplicate for matrix QC.

IV. Definitions

The following codes were 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

V. Comments

Shipping and Receiving
There are no comments or nonconformances associated with the shipping and receiving of these samples.

Wet Chemistry
There are no comments or nonconformances associated with this analysis.

TCLP Metals
There are no comments or nonconformances associated with this analysis.

Semivolatiles
The sample would only concentrate down to 2mls during the extraction process. This requires a dilution factor of 2x before the sample is analyzed.

The initial analysis of this sample, run without dilution at the instrument, produced no reportable data. Due to a large interfering peak that masked the internal standards, the instrument was unable to quantitate several compounds.

The sample was re-run with a ten fold dilution applied at the instrument, bringing the total dilution to 20x. The acid surrogates were unrecoverable. Many of the spiking compounds were diluted out in the MS/MSD.

The sample had low internal standard area recovery for d10-Phenanthrene in all three runs.

Volatiles 8260

Samples 16832-001, 16832-001DL, 16832-001MS and 16832-001MSD had high recovery for the surrogates BFB and Toluene-d8. Since all runs had the same results, no further action is required.

The compound Trichloroethene had low recovery in the MS and MSD. This compound had acceptable recovery in the LCS, no further action is required.

Sample -001 had levels of Acetone, 2-Butanone and 2-Hexanone that were over the calibration range of the instrument. The sample was rerun with a 5 fold dilution. Both runs are included in the data package.

PCBs

There are no comments or nonconformances associated with this analysis.

I certify that this data package 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:

Robert E. White

Robert E. White
Project Manager

WO 2220

Quanterra February 03, 1998 04:55 pm
Account: 10722 Project: 550.261 Quanterra-Richland QAS No. 550.261 Rev. 0
Master Sample Login: 16832

Project Manager: W. Price

Draft: (Final:) Entered and Reviewed by: Sue Nelson PM Review: Robert E. White

Sample Header Template:

Sample No. / Comments / Data:	Client ID	C-Matrix	Date: Collected	Received	Due	Shipper	Rad Category	Rad Sample No.
16832-001	BONOL7	Solid	28-JAN-98 14:00	30-JAN-98 14:45	06-FEB-98	AIRBORNE	2	R6904-001
RICHLAND I.D. 80200501								

#	Container Type	Analysis	Class	Preservative	Anal. Due Date	Hold Date	Site	(Container Numbers:% Filled)
1	AN - Amber Glass-500ml	EXTMETAL/TCLP/Q4	S	COLD	05-FEB-98	25-FEB-98	R16D	(355240:99)
1		HG/TCLP/Q4	S	COLD	05-FEB-98	25-FEB-98	R16D	(355240:99)
1		ICAP/TCLP/Q4	S	COLD	05-FEB-98	27-JUL-98	R16D	(355240:99)
1	AN - Amber Glass-120ML	BNA/8270/Q4	S	COLD	05-FEB-98	11-FEB-98	R16D	(355239:98)
1		PCB/8080/Q4	S	COLD	05-FEB-98	11-FEB-98	R16D	(355238:99)
1	AN - Amber Glass-60ML	PH/9045/Q4	S	COLD	05-FEB-98	11-FEB-98	R16D	(355237:98)
1		VOA/8260/Q4	S	COLD	05-FEB-98	11-FEB-98	R16D	(355236:99)

16832-001DUP	BONOL7	Solid	28-JAN-98 14:00	30-JAN-98 14:45	06-FEB-98	AIRBORNE	2	R6904-001
RICHLAND I.D. 80200501								

#	Container Type	Analysis	Class	Preservative	Anal. Due Date	Hold Date	Site	(Container Numbers:% Filled)
1	AN - Amber Glass-60ML	PH/9045/Q4	S	COLD	05-FEB-98	11-FEB-98	R16D	(355237:98)

16832-001MS	BONOL7	Solid	28-JAN-98 14:00	30-JAN-98 14:45	06-FEB-98	AIRBORNE	2	R6904-001
RICHLAND I.D. 80200501								

#	Container Type	Analysis	Class	Preservative	Anal. Due Date	Hold Date	Site	(Container Numbers:% Filled)
1	AN - Amber Glass-500ml	EXTMETAL/TCLP/Q4	S	COLD	05-FEB-98	25-FEB-98	R16D	(355240:99)
1		HG/TCLP/Q4	S	COLD	05-FEB-98	25-FEB-98	R16D	(355240:99)
1		ICAP/TCLP/Q4	S	COLD	05-FEB-98	27-JUL-98	R16D	(355240:99)
1	AN - Amber Glass-120ML	BNA/8270/Q4	S	COLD	05-FEB-98	11-FEB-98	R16D	(355239:98)
1		PCB/8080/Q4	S	COLD	05-FEB-98	11-FEB-98	R16D	(355238:99)
1	AN - Amber Glass-60ML	VOA/8260/Q4	S	COLD	05-FEB-98	11-FEB-98	R16D	(355236:99)

16832-001MSD	BONOL7	Solid	28-JAN-98 14:00	30-JAN-98 14:45	06-FEB-98	AIRBORNE	2	R6904-001
RICHLAND I.D. 80200501								

#	Container Type	Analysis	Class	Preservative	Anal. Due Date	Hold Date	Site	(Container Numbers:% Filled)
1	AN - Amber Glass-500ml	EXTMETAL/TCLP/Q4	S	COLD	05-FEB-98	25-FEB-98	R16D	(355240:99)
1		HG/TCLP/Q4	S	COLD	05-FEB-98	25-FEB-98	R16D	(355240:99)
1		ICAP/TCLP/Q4	S	COLD	05-FEB-98	27-JUL-98	R16D	(355240:99)
1	AN - Amber Glass-120ML	BNA/8270/Q4	S	COLD	05-FEB-98	11-FEB-98	R16D	(355239:98)
1		PCB/8080/Q4	S	COLD	05-FEB-98	11-FEB-98	R16D	(355238:99)
1	AN - Amber Glass-60ML	VOA/8260/Q4	S	COLD	05-FEB-98	11-FEB-98	R16D	(355236:99)

3*=Sample has not been rad screened.

[redacted] R16D Temp y:cuyt# 14055
ST 10113 14045

Chain of Custody Record

Quanterra PC

QUA-4124 0797

Client	Project Manager	Date	Chain of Custody Number
Beckel	A. Koprowa	2-2-98	00412
Address	Telephone Number (Area Code)/Fax Number	Lab Number	Page 1 of 1

City	State	Zip Code	Site Contact	Lab Contact

Project Name: SAF B98-055

Carrier/Waybill Number:

Contract/Purchase Order/Quote No.:

Analysis (Attach list if more space is needed): SEE QC

Special Instructions/ Conditions of Receipt

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH
80200501 BONOL7	Chemical Analysis Bottles										

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown

Sample Disposal: ☒ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☒ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other Due 2-6-98

QC Requirements (Specify): SDG 100220

1. Relinquished By	Date	Time	1. Received By	Date	Time
Hildelberg CES	2-2-98	16:00	[illegible]	2-3-98	0830
2. Relinquished By	Date	Time	2. Received By	Date	Time
3. Relinquished By	Date	Time	3. Received By	Date	Time

Comments: Samples Rec'd 1-31-98

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B98-055-01	Page 1 of 2

Collector Bob Fahlberg	**Company Contact** Tom Brown	**Telephone No.** 376-1547	**Project Coordinator** KOERNER, CC
Project Designation 221-U Canyon Legacy Waste - Other Solid	**Sampling Location** 221-U canyon legacy waste		**SAF No.** B98-055
Ice Chest No.	**Field Logbook No.** EL 1309-1		**Method of Shipment** Gov Vehicle
Shipped To Quanterra Incorporated	**Offsite Property No.**		**Bill of Lading/Air Bill No.**

Data Turnaround ~~15 Days~~ 7 DAYS KM 1-30-98

POSSIBLE SAMPLE HAZARDS/REMARKS
RAD

Special Handling and/or Storage
Cool to 4C

SAMPLE ANALYSIS	VOA - 8260A (TCL)	Activity Scan	Americium-241; Isotopic Plutonium; Plutonium-241; Isotopic Uranium	Gross Alpha; Gross Beta	pH (Soil) - 9045	Strontium-89,90 – Total Sr	Technetium-99	PCBs - 8080	Semi-VOA - 8270A (TCL)	Metals by ICP (TCLP) - 1311/6010A; Mercury (TCLP) - 1311/7470
Preservation	Cool 4C	None	None	None	None	None	None	Cool 4C	Cool 4C	None
Type of Container	aG	aG	aG	aG	aG	aG	aG	aG	aG	aG
No. of Container(s)	1	1	1	1	1	1	1	1	1	1
Volume	60ml	60ml	60ml	60ml	60ml	60ml	60ml	120ml	120ml	500ml

Sample No.	Matrix *	Sample Date	Sample Time	VOA - 8260A (TCL)	Activity Scan	Americium-241; Isotopic Plutonium; Plutonium-241; Isotopic Uranium	Gross Alpha; Gross Beta	pH (Soil) - 9045	Strontium-89,90 – Total Sr	Technetium-99	PCBs - 8080	Semi-VOA - 8270A (TCL)	Metals by ICP (TCLP) - 1311/6010A; Mercury (TCLP) - 1311/7470
B0N0L7	Other Solid	1-28-98	1400	X	X	X	X	X	X	X	X	X	X
				100				100			100	100	100
				1-31				1-31			1-31	1-31	1-31

CHAIN OF POSSESSION

Sign/Print Names			
Relinquished By: Bob Fahlberg	Date/Time: 1-30-98 1445	Received By: Karen A. Ettenberg	Date/Time: 1-30-98 1445
Relinquished By: K. Ettenberg	Date/Time: 1-30-98 1600	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received By:	Date/Time:

SPECIAL INSTRUCTIONS
** Close SDG upon receipt of samples

Matrix *

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

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

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B98-055-01	Page 1 of 2

Collector Bob Fahlberg	**Company Contact** Tom Brown	**Telephone No.** 376-1547	**Project Coordinator** KOERNER, CC
Project Designation 221-U Canyon Legacy Waste - Other Solid	**Sampling Location** 221-U canyon legacy waste		**SAF No.** B98-055
Ice Chest No.	**Field Logbook No.** EL 1309-1		**Method of Shipment** Gov Vehicle
Shipped To Quanterra Incorporated	**Offsite Property No.**		**Bill of Lading/Air Bill No.**

Data Turnaround: ~~15 Days~~ 7 DAYS KM 1-30-98

POSSIBLE SAMPLE HAZARDS/REMARKS: RAD

Special Handling and/or Storage: Cool to 4C

Preservation	Cool 4C	None	None	None	None	None	None	Cool 4C	Cool 4C	None
Type of Container	aG	aG	aG	aG	aG	aG	aG	aG	aG	aG
No. of Container(s)	1	1	1	1	1	1	1	1	1	1
Volume	60ml	60ml	60ml	60ml	60ml	60ml	60ml	120ml	120ml	500ml

SAMPLE ANALYSIS

Sample No.	Matrix *	Sample Date	Sample Time	VOA - 8260A (TCL)	Activity Scan	Americium-241; Isotopic Plutonium; Plutonium-241; Isotopic Uranium	Gross Alpha; Gross Beta	pH (Soil) - 9045	Strontium-89,90 -- Total Sr	Technetium-99	PCBs - 8080	Semi-VOA - 8270A (TCL)	Metals by ICP (TCLP) - 1311/6010A; Mercury (TCLP) - 1311/7470
B0N0L7	Other Solid	1-28-98	1400	X	X	X	X	X	X	X	X	X	X
				100				100			100	100	100
				1-31				1-31			1-31	1-31	1-31

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
[illegible]	1/30/98 1445	Karen Ettenburg	1-30-98 1445
Karen Ettenburg	1-30-98 1600		

SPECIAL INSTRUCTIONS
** Close SDG upon receipt of samples.

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

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

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B98-055-01	Page 2 of 2

Collector Bob Fahlberg	**Company Contact** Tom Brown	**Telephone No.** 376-1547	**Project Coordinator** KOERNER, CC	**Date Turnaround** ~~15 Days~~ 7 Day 1-30-98
Project Designation 221-U Canyon Legacy Waste - Other Solid	**Sampling Location** 221-U canyon legacy waste		**SAF No.** B98-055	
Ice Chest No.	**Field Logbook No.** EL 1309-1		**Method of Shipment** Gov Vehicle	
Shipped To Quanterra Incorporated	**Offsite Property No.**		**Bill of Lading/Air Bill No.**	

POSSIBLE SAMPLE HAZARDS/REMARKS
RAD

Special Handling and/or Storage
Cool to 4C

Preservation	None										
Type of Container	eG										
No. of Container(s)	3										
Volume	500ml										
SAMPLE ANALYSIS	See Item (1) in Special Instructions.										

Sample No.	Matrix *	Sample Date	Sample Time										
B0N0L7	Other Solid	1-28-98	1400	X									

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By	Date/Time	Received By	Date/Time
Bill Nelson	1/30/98 1445	Karen Attenburg	1-30-98 1445
Karen Attenburg	1-30-98 1600		

SPECIAL INSTRUCTIONS
** Close SDG upon receipt of samples.

(1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155)

Matrix *

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

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

Post-it® Fax Note 7671	Date 1-30-98	# of pages ▶ 1
To Bill Fullington	From A. I. Davis	
Co./Dept.	Co.	
Phone #	Phone # 373-7231	
Fax # 376-8851	Fax #	

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

Project	221 U Canyon	Leagcy Waste	
Customer ID	80N0L8	Other Solid	
RCF ID	RCF2692		
	Sample time, date	1400	1/27/98
	Analysis date		1/28/98

Isotope		Activity pCi/gm		2 s err	Ci/gm	
K40		1.2e+01	+/-	8.4e+00	1.2e-11	
Co60	<	6.7e-01			6.7e-13	
I129	<	7.0e+00			7.0e-12	
Cs137		9.0e+02	+/-	3.7e+01	9.0e-10	
Eu152	<	4.3e+00			4.3e-12	
Eu154	<	1.4e+00			1.4e-12	
Eu155	<	6.7e+00			6.7e-12	
Th232dau	<	4.7e+00			4.7e-12	
U235	<	8.9e+00			8.9e-12	
U238	<	1.1e+02			1.1e-10	
U238dau	<	4.0e+00			4.0e-12	
Np237	<	2.7e+00			2.7e-12	
Am241	<	2.0e+00			2.0e-12	
Tot Act Gam (pCi/gm)		9.1e+02		Ci/gm	9.1e-10	
Y/Sr-90	<	N/R				
Gross Alpha		2.1e+01	+/-	3.4e+00	2.1e-11	
Gross Beta		5.8e+02	+/-	4.3e+01	5.8e-10	Reported as 137-Cs Betas.
AEA total	<	N/R				

Total Activity (pCi/gm) 9.1e+02
(Ci/gm) 9.1e-10

Note! 152-Eu is not a 100% Beta emitter.

Definitions.

All errors reported at 2 standard deviations
A Assigned as residual beta than Gamma/Beta balance.

For soils and natural samples, the following applies:

The analysis of U238 is based on the activity of Pa234m

The analysis of Np237 is based on the activity of Pa233

U238dau is the activity of Pb214 and Bi214, short lived daughter products of U238. Equilibrium between parent and daughter products probably does not exist in disturbed materials

Th32dau is the activity of Ac228, Pb212, and Tl208, short lived daughter products of 232Th. Equilibrium between parent and daughter products may not exist in disturbed materials.

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

N/R means no result or analysis not requested.

Radiological Analyst — Date 1-30-98

Albert I. Davis, Radiological Manager — Date 1/30/98

000010

Post-it® Fax Note 7671 | Date 1-30-98 | # of pages ▶ 1
To Bill Fullerton | From A. Davis
Co./Dept. | Co.
Phone # | Phone # 373-9731
Fax # 376-8851 | Fax #

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

Project	221 U Canyon	Leagcy Waste	
Customer ID	B0N0L8	Other Solid	2ANALT
RCF ID	RCF2082		
	Sample time, date	1400	1/27/98
	Analysis date		1/28/98

Solid 300g

Isotope		Activity pCi/gm		2 s err	Ci/gm
K40		1.2e+01	+/-	8.4e+00	1.2e-11
Co60	<	8.7e-01			8.7e-13
I129	<	7.0e+00			7.0e-12
Cs137		9.0e+02	+/-	3.7e+01	9.0e-10
Eu152	<	4.3e+00			4.3e-12
Eu154	<	1.4e+00			1.4e-12
Eu155	<	8.7e+00			8.7e-12
Th232dau	<	4.7e+00			4.7e-12
U235	<	8.9e+00			8.9e-12
U238	<	1.1e+02			1.1e-10
U238dau	<	4.0e+00			4.0e-12
Np237	<	2.7e+00			2.7e-12
Am241	<	2.0e+00			2.0e-12
Tot Act Gam (pCi/gm)		9.1e+02		Ci/gm	9.1e-10
Y/Sr-90	<	NR			
Gross Alpha		2.1e+01	+/-	3.4e+00	2.1e-11
Gross Beta		5.8e+02	+/-	4.3e+01	5.8e-10
AEA total	<	NR			

CAT II 2/2/98

6300 < 10K pCi = CAT I

Reported as 137-Cs Betas. 174,000 > 100K pCi = CAT II

Total Activity (pCi/gm) 9.1e+02 < 2K pCi/g
(Ci/gm) 9.1e-10

2/2/98
1/28/98

Definitions.

All errors reported at 2 standard deviations

A Assigned as residual from the Gamma/Beta balance.

For soils and natural samples, the following applies:

The analysis of U238 is based on the activity of Pa234m

The analysis of Np237 is based on the activity of Pa233

U238dau is the activity of Pb214 and Bi214, short lived daughter products of U238. Equilibrium between parent and daughter products probably does not exist in disturbed materials.

Th32dau is the activity of Ac228, Pb212, and Tl208, short lived daughter products of 232Th. Equilibrium between parent and daughter products may not exist in disturbed materials.

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

N/R means no result or analysis not requested.

Note! 152-Eu is not a 100% Beta emitter.

Radiological Analyst — Date 1-30-98

Albert I. Davis, Radiological Manager — Date 1/30/98

000011

Figure 1

SAMPLE CHECK-IN LIST

Date/Time Received: 1-30-98 SG#: W02220

Work Order Number: 802005 + 006 SAF #: B98-054 B98-055

Shipping Container ID: SML-555 Chain of Custody #: B98-054-1 B98-055-01

1. Custody Seals on shipping container intact? Yes [✓] No [ ]
2. Custody Seals dated and signed? Yes [✓] No [ ]
3. Chain-of-Custody record present? Yes [ ] No [✓]
4. Cooler temperature 4°C
5. Vermiculite/packing materials is Wet [ ] Dry [✓]
6. Number of samples in shipping container: 22
7. Sample holding times exceeded? Yes [ ] No [✓]

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

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

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

Sample Custodian/Laboratory: [signature] Date: 1-30-98

Telephoned To: _____ On _____ By _____

000012

Post-it® Fax Note 7671 | Date 1-30-98 | # pages ▶ 1
To Bill Fullbright | From A. Davis
Co./Dept. | Co.
Phone # | Phone # 373-9731
Fax # 376-8851 | Fax #

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

Project	221 U Canyon	Leagcy Waste	
Customer ID	B0N0L6	Other Solid	
RCF ID	RCF2692		
	Sample time, date	1400	1/27/98
	Analysis date		1/28/98

Isotope		Activity pCi/gm		2 s err	Ci/gm
K40		1.2e+01	+/-	8.4e+00	1.2e-11
Co60	<	6.7e-01			6.7e-13
I129	<	7.0e+00			7.0e-12
Cs137		9.0e+02	+/-	3.7e+01	9.0e-10
Eu152	<	4.3e+00			4.3e-12
Eu154	<	1.4e+00			1.4e-12
Eu155	<	6.7e+00			6.7e-12
Th232dau	<	4.7e+00			4.7e-12
U235	<	8.9e+00			8.9e-12
U238	<	1.1e+02			1.1e-10
U238dau	<	4.0e+00			4.0e-12
Np237	<	2.7e+00			2.7e-12
Am241	<	2.0e+00			2.0e-12
Tot Act Gam (pCi/gm)		9.1e+02		Ci/gm	9.1e-10
Y/Sr-90	<	N/R			
Gross Alpha		2.1e+01	+/-	3.4e+00	2.1e-11
Gross Beta		5.8e+02	+/-	4.3e+01	5.8e-10 Reported as 137-Cs Betas.
AEA total	<	N/R			

Total Activity (pCi/gm) 9.1e+02
(Ci/gm) 9.1e-10

Note! 152-Eu is not a 100% Beta emitter.

Definitions.

All errors reported at 2 standard deviations
A Assigned as residual beta from Gamma/Beta balance.
For soils and natural samples, the following applies:
The analysis of U236 is based on the activity of Pa234m

The analysis of Np237 is based on the activity of Pa233

U238dau is the activity of Pb214 and Bi214, short lived daughter products of U238. Equilibrium between parent and daughter products probably does not exist in disturbed materials

Th32dau is the activity of Ac228, Pb212, and Tl208, short lived daughter products of 232Th. Equilibrium between parent and daughter products may not exist in disturbed materials.

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

N/R means no result or analysis not requested.

Radiological Analyst — Date 1-30-98

Albert I. Davis — Date 1/30/98
Radiological Manager

Quanterra Environmental Services

BW&SL

014055

Login No.: 16832

Condition Upon Receipt Variance Report
St. Louis Laboratory

Client: Rockland

Date: 2-3-98 Time: 0830

Project No: 550-261

Initiated by: [illegible]

Shipper/No: Airborne

RFA/COC Numbers: 412

Condition/Variance (Check all that apply):

1. ☐ Sample received broken/leaking.
2. ☐ Sample received without proper preservative.
   - ☐ Cooler temperature not within 4°C ± 2°C
     Record temperature: _____
   - ☐ pH _____
   - ☐ other: _____
3. ☐ Sample received in improper container.
4. ☐ Sample received without proper paperwork. Explain: _____
5. ☐ Paperwork received without sample.
6. ☐ No sample ID on sample container.
7. ☐ Custody tape disturbed/broken/missing.
8. ☐ Sample ID on container does not match sample ID on paperwork. Explain: _____
9. ☐ All coolers on airbill not received with shipment.
10. ☐ Other (explain below): _____

☑ No variances were noted during sample receipt. Cooler Temperature Upon Receipt: 4°C

Notes: Samples Recv'd 1-31-98
Rec-DAS 2-3-98. SW

Corrective Action:

☐ Client's Name: _____ Informed verbally on: _____ By: _____

☐ Client's Name: _____ Informed in writing on: _____ By: _____

☐ Sample(s) processed "as is". _____

☐ Sample(s) on hold until: _____ If released, notify: _____

Sample Control Supervisor Review: (or designate) [illegible] Date: 2-3-98

Project Management Review: Robert E. White Date: 2-4-98

SIGNED ORIGINAL MUST BE RETAINED IN THE PROJECT FILE

SL-ADMIN-0004, Revised 11/24/95

000014

Quanterra Environmental Services

BW&SL

014045

Login No.: 16832

Condition Upon Receipt Variance Report
St. Louis Laboratory

Client: Richland

Date: 01-31-98 Time: 0-31-98

Project No: 550.261

Initiated by: [illegible]

Shipper/No: AB 5999730 811

RFA/COC Numbers: No Rich Coc B98-055

Condition/Variance (Check all that apply):

1. ☐ Sample received broken/leaking.
2. ☐ Sample received without proper preservative.
   - ☐ Cooler temperature not within 4°C ± 2°C
     Record temperature: _____
   - ☐ pH _____
   - ☐ other: _____
3. ☐ Sample received in improper container.
4. ☐ Sample received without proper paperwork. Explain: _____
5. ☐ Paperwork received without sample.
6. ☐ No sample ID on sample container.
7. ☐ Custody tape disturbed/broken/missing.
8. ☐ Sample ID on container does not match sample ID on paperwork. Explain: _____
9. ☐ All coolers on airbill not received with shipment.
10. ☐ Other (explain below): _____

☑ No variances were noted during sample receipt. Cooler Temperature Upon Receipt: 4°C

Notes:

Corrective Action:

☐ Client's Name: _____ Informed verbally on: _____ By: _____

☐ Client's Name: _____ Informed in writing on: _____ By: _____

☐ Sample(s) processed "as is". _____

☐ Sample(s) on hold until: _____ If released, notify: _____

Sample Control Supervisor Review: (or designate) [illegible] Date: 2-2-98

Project Management Review: Robert E. White Date: 2-4-98

SIGNED ORIGINAL MUST BE RETAINED IN THE PROJECT FILE

SL-ADMIN-0004, Revised 11/24/95

000015

Quanterra-Richland
3350 George Washington Way
Richland, WA 99352-1613

Project: 550.261

Category: PCB's
Method: EPA 8080
Matrix: SOLID

Sample Date : 01/28/98
Receipt Date : 01/30/98
Report Date : 02/12/98

Client ID: BOWOL7

Quanterra ID : 16832-001

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Aroclor-1016	12674-11-2	QCBLK164291-1	02/04/98	02/06/98	33	UG/KG	U	33	1
Aroclor-1221	11104-28-2	QCBLK164291-1	02/04/98	02/06/98	33	UG/KG	U	33	1
Aroclor-1232	11141-16-5	QCBLK164291-1	02/04/98	02/06/98	33	UG/KG	U	33	1
Aroclor-1242	53469-21-9	QCBLK164291-1	02/04/98	02/06/98	33	UG/KG	U	33	1
Aroclor-1248	12672-29-6	QCBLK164291-1	02/04/98	02/06/98	33	UG/KG	U	33	1
Aroclor-1254	11097-69-1	QCBLK164291-1	02/04/98	02/06/98	33	UG/KG	U	33	1
Aroclor-1260	11096-82-5	QCBLK164291-1	02/04/98	02/06/98	33	UG/KG	U	33	1
DCB	2051-24-3	QCBLK164291-1	02/04/98	02/06/98	96	%REC			1
TCMX	877-09-8	QCBLK164291-1	02/04/98	02/06/98	48	%REC			1

Quanterra-Richland
3350 George Washington Way
Richland, WA 99352-1613

Project: 550.261

Category: PCB's
Method: EPA 8080
Matrix: SOLID

Sample Date : 01/28/98
Receipt Date : 01/30/98
Report Date : 02/12/98

Client ID: 80NOL7

Quanterra ID : 16832-001MS

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Aroclor-1016	12674-11-2	QCBLK164291-1	02/04/98	02/06/98	56	%REC			.5
Aroclor-1260	11096-82-5	QCBLK164291-1	02/04/98	02/06/98	88	%REC			.5
DCB	2051-24-3	QCBLK164291-1	02/04/98	02/06/98	98	%REC			.5
TCMX	877-09-8	QCBLK164291-1	02/04/98	02/06/98	66	%REC			.5

Quanterra-Richland
3350 George Washington Way
Richland, WA 99352-1613

Project: 550.261

Category: PCB's
Method: EPA 8080
Matrix: SOLID

Sample Date : 01/28/98
Receipt Date : 01/30/98
Report Date : 02/12/98

Client ID: BDWOL7

Quanterra ID : 16852-001MSD

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Aroclor-1016	12674-11-2	QCBLK164291-1	02/04/98	02/06/98	53	%REC			.5
Aroclor-1260	11096-82-5	QCBLK164291-1	02/04/98	02/06/98	72	%REC			.5
DCB	2051-24-3	QCBLK164291-1	02/04/98	02/06/98	86	%REC			.5
TCMX	877-09-8	QCBLK164291-1	02/04/98	02/06/98	61	%REC			.5

1D
PCB ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BONOL7

Lab Name: QUANTERRA,MO Contract: 550.261

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W02220

Matrix: (soil/water) SOIL Lab Sample ID: 16832-001

Sample wt/vol: 30.0 (g/ml) G Lab File ID: _____

Level: (low/med) LOW Date Sampled: 01-28-98

% Moisture: not dec._____ dec._____ Date Extracted: 02-04-98

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 02-06-98

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1

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	33	U
11096-82-5	Aroclor-1260	33	U

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

FORM I PEST

Quanterra-Richland
3350 George Washington Way
Richland, WA 99352-1613

Project: 550.261

Category : TCLP Metals
Matrix : SOLID

Sample Date : 01/28/98
Receipt Date : 01/30/98
Report Date : 02/11/98

Client ID: BOWOL7

Quanterra ID : 16832-001

Analyte	Method	Extract Date	Prep Date	Analyses Date	Result	Units	Qual.	Detection Limit	Regulatory Level	Dilution
Mercury	EPA 7470	02/04/98	02/06/98	02/06/98	0.0001	MG/L	B	0.0002	0.20	1
Arsenic	EPA 6010	02/04/98	02/06/98	02/06/98	0.0020	MG/L	B	0.30	5.0	1
Barium	EPA 6010	02/04/98	02/06/98	02/06/98	0.22	MG/L		0.20	100	1
Cadmium	EPA 6010	02/04/98	02/06/98	02/06/98	0.040	MG/L		0.005	1.0	1
Chromium	EPA 6010	02/04/98	02/06/98	02/06/98	0.0092	MG/L	B	0.010	5.0	1
Lead	EPA 6010	02/04/98	02/06/98	02/06/98	0.011	MG/L	B	0.10	5.0	1
Selenium	EPA 6010	02/04/98	02/06/98	02/06/98	0.066	MG/L	B	0.25	1.0	1
Silver	EPA 6010	02/04/98	02/06/98	02/06/98	0.0008	MG/L	U	0.010	5.0	1

Quanterra-Richland
3350 George Washington Way
Richland, WA 99352-1613

Project: 550.261

Category : TCLP Metals
Matrix : SOLID

Sample Date : 01/28/98
Receipt Date : 01/30/98
Report Date : 02/11/98

Client ID: BOWOL7

Quanterra ID : 16832-001MS

Analyte	Method	Extract Date	Prep Date	Analyses Date	Result	Units	Qual.	Detection Limit	Regulatory Level	Dilution
Mercury	EPA 7470	02/04/98	02/06/98	02/06/98	95	%REC				1
Arsenic	EPA 6010	02/04/98	02/06/98	02/06/98	99	%REC				1
Barium	EPA 6010	02/04/98	02/06/98	02/06/98	98	%REC				1
Cadmium	EPA 6010	02/04/98	02/06/98	02/06/98	86	%REC				1
Chromium	EPA 6010	02/04/98	02/06/98	02/06/98	92	%REC				1
Lead	EPA 6010	02/04/98	02/06/98	02/06/98	88	%REC				1
Selenium	EPA 6010	02/04/98	02/06/98	02/06/98	101	%REC				1
Silver	EPA 6010	02/04/98	02/06/98	02/06/98	94	%REC				1

Quanterra-Richland
3350 George Washington Way
Richland, WA 99352-1613

Project: 550.261

Category : TCLP Metals
Matrix : SOLID

Sample Date : 01/28/98
Receipt Date : 01/30/98
Report Date : 02/11/98

Client ID: BONOL7

Quanterra ID : 16832-001MSD

Analyte	Method	Extract Date	Prep Date	Analyses Date	Result	Units	Qual.	Detection Limit	Regulatory Level	Dilution
Mercury	EPA 7470	02/04/98	02/06/98	02/06/98	98	%REC				1
Arsenic	EPA 6010	02/04/98	02/06/98	02/06/98	100	%REC				1
Barium	EPA 6010	02/04/98	02/06/98	02/06/98	98	%REC				1
Cadmium	EPA 6010	02/04/98	02/06/98	02/06/98	87	%REC				1
Chromium	EPA 6010	02/04/98	02/06/98	02/06/98	93	%REC				1
Lead	EPA 6010	02/04/98	02/06/98	02/06/98	89	%REC				1
Selenium	EPA 6010	02/04/98	02/06/98	02/06/98	103	%REC				1
Silver	EPA 6010	02/04/98	02/06/98	02/06/98	100	%REC				1

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0NOL7

Lab Name: QUANTERRA_MO Contract: 550.261

Lab Code: ITMO Case No.: SAS No.: SDG No.: W02220

Matrix (soil/water): WATER Lab Sample ID: P16832-001

Level (low/med): LOW Date Received: 01/30/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	2.0	B		P
7440-39-3	Barium	217			P
7440-43-9	Cadmium	40.2			P
7440-47-3	Chromium	9.2	B		P
7439-92-1	Lead	11.0	B		P
7439-97-6	Mercury	0.13	B		CV
7782-49-2	Selenium	66.0	B		P
7440-22-4	Silver	0.80	U		P

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

TCLP

Quanterra-Richland
3350 George Washington Way
Richland, WA 99352-1613

Project: 550.261

Category: Semivolatile
Method: EPA 8270
Matrix: SOLID

Sample Date : 01/28/98
Receipt Date : 01/30/98
Report Date : 02/19/98

Client ID: 80WOL7

Quanterra ID : 16832-001

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Phenol	108-95-2	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
bis(2-Chloroethyl)Ether	111-44-4	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
2-Chlorophenol	95-57-8	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
1,3-Dichlorobenzene	541-73-1	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
1,4-Dichlorobenzene	106-46-7	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
1,2-Dichlorobenzene	95-50-1	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
2-Methylphenol	95-48-7	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
2,2'-oxybis (1-Chloropropane)	108-60-1	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
4-Methylphenol	106-44-5	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
N-nitroso-di-n-propylamine	621-64-7	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
Hexachloroethane	67-72-1	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
Nitrobenzene	98-95-3	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
Isophorone	78-59-1	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
2-Nitrophenol	88-75-5	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
2,4-Dimethylphenol	105-67-9	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
bis(2-Chloroethoxy)Methane	111-91-1	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
2,4-Dichlorophenol	120-83-2	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
1,2,4-Trichlorobenzene	120-82-1	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
Naphthalene	91-20-3	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
4-Chloroaniline	106-47-8	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
Hexachlorobutadiene	87-68-3	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
4-Chloro-3-Methylphenol	59-50-7	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
2-Methylnaphthalene	91-57-6	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
Hexachlorocyclopentadiene	77-47-4	QCBLK164315-1	02/04/98	02/06/98	32000	UG/KG	U	32000	10
2,4,6-Trichlorophenol	88-06-2	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
2,4,5-Trichlorophenol	95-95-4	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
2-Chloronaphthalene	91-58-7	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
2-Nitroaniline	88-74-4	QCBLK164315-1	02/04/98	02/06/98	32000	UG/KG	U	32000	10
DimethylPhthalate	131-11-3	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
Acenaphthylene	208-96-8	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
2,6-Dinitrotoluene	606-20-2	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
3-Nitroaniline	99-09-2	QCBLK164315-1	02/04/98	02/06/98	32000	UG/KG	U	32000	10
Acenaphthene	83-32-9	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
2,4-Dinitrophenol	51-28-5	QCBLK164315-1	02/04/98	02/06/98	32000	UG/KG	U	32000	10
4-Nitrophenol	100-02-7	QCBLK164315-1	02/04/98	02/06/98	32000	UG/KG	U	32000	10
Dibenzofuran	132-64-9	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
2,4-Dinitrotoluene	121-14-2	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
Diethylphthalate	84-66-2	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
4-Chlorophenyl-PhenylEther	7005-72-3	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
Fluorene	86-73-7	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
4-Nitroaniline	100-01-6	QCBLK164315-1	02/04/98	02/06/98	32000	UG/KG	U	32000	10
4,6-Dinitro-2-Methylphenol	534-52-1	QCBLK164315-1	02/04/98	02/06/98	32000	UG/KG	U	32000	10
n-Nitrosodiphenylamine	86-30-6	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
4-Bromophenyl-Phenyl Ether	101-55-3	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
Hexachlorobenzene	118-74-1	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
Pentachlorophenol	87-86-5	QCBLK164315-1	02/04/98	02/06/98	32000	UG/KG	U	32000	10
Phenanthrene	85-01-8	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
Anthracene	120-12-7	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
Carbazole	86-74-8	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
Di-N-Butylphthalate	84-74-2	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
Fluoranthene	206-44-0	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
Pyrene	129-00-0	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
ButylBenzylPhthalate	85-68-7	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
3,3'-Dichlorobenzidine	91-94-1	QCBLK164315-1	02/04/98	02/06/98	32000	UG/KG	U	32000	10
Benzo(a)Anthracene	56-55-3	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
Chrysene	218-01-9	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
bis(2-Ethylhexyl)Phthalate	117-81-7	QCBLK164315-1	02/04/98	02/06/98	3000	UG/KG	BJ	6600	10
di-N-OctylPhthalate	117-84-0	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
Benzo(b)Fluoranthene	205-99-2	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
Benzo(k)Fluoranthene	207-08-9	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
Benzo(a)Pyrene	50-32-8	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10

Quanterra-Richland
3350 George Washington Way
Richland, WA 99352-1613

Project: 550.261

Category: Semivolatile
Method: EPA 8270
Matrix: SOLID

Sample Date : 01/28/98
Receipt Date : 01/30/98
Report Date : 02/19/98

Client ID: BOWOL7

Quanterra ID : 16832-001

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Indeno(1,2,3-CD)Pyrene	193-39-5	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
Dibenz(a,h)Anthracene	53-70-3	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
Benzo(g,h,i)Perylene	191-24-2	QCBLK164315-1	02/04/98	02/06/98	6600	UG/KG	U	6600	10
Undecane	1120-21-4	QCBLK164315-1	02/04/98	02/06/98	7100	UG/KG	JN		10
Unknown-1	TIC-32	QCBLK164315-1	02/04/98	02/06/98	3000	UG/KG	J		10
Undecane, 2-methyl-	7045-71-8	QCBLK164315-1	02/04/98	02/06/98	2200	UG/KG	JN		10
Dodecane	112-40-3	QCBLK164315-1	02/04/98	02/06/98	14000	UG/KG	JN		10
Undecane, 2,6-dimethyl-	17301-23-4	QCBLK164315-1	02/04/98	02/06/98	11000	UG/KG	JN		10
Unknown-2	TIC-33	QCBLK164315-1	02/04/98	02/06/98	2900	UG/KG	J		10
Unknown-3	TIC-34	QCBLK164315-1	02/04/98	02/06/98	2200	UG/KG	J		10
Unknown-4	TIC-35	QCBLK164315-1	02/04/98	02/06/98	4900	UG/KG	J		10
Unknown-5	TIC-36	QCBLK164315-1	02/04/98	02/06/98	5300	UG/KG	J		10
Unknown-6	TIC-37	QCBLK164315-1	02/04/98	02/06/98	19000	UG/KG	J		10
Unknown-7	TIC-7	QCBLK164315-1	02/04/98	02/06/98	2100	UG/KG	J		10
Unknown-8	TIC-8	QCBLK164315-1	02/04/98	02/06/98	3000	UG/KG	J		10
Tridecane	629-50-5	QCBLK164315-1	02/04/98	02/06/98	14000	UG/KG	JN		10
Unknown-9	TIC-9	QCBLK164315-1	02/04/98	02/06/98	2200	UG/KG	J		10
Dodecane, 2,5-dimethyl-	56292-65-0	QCBLK164315-1	02/04/98	02/06/98	3100	UG/KG	JN		10
Unknown-10	TIC-10	QCBLK164315-1	02/04/98	02/06/98	11000	UG/KG	J		10
Unknown-11	TIC-11	QCBLK164315-1	02/04/98	02/06/98	14000	UG/KG	J		10
Tetradecane	629-59-4	QCBLK164315-1	02/04/98	02/06/98	28000	UG/KG	JN		10
Unknown-12	TIC-12	QCBLK164315-1	02/04/98	02/06/98	12000	UG/KG	J		10
Pentadecane	629-62-9	QCBLK164315-1	02/04/98	02/06/98	14000	UG/KG	JN		10
Unknown-13	TIC-13	QCBLK164315-1	02/04/98	02/06/98	840000	UG/KG	J		10
Unknown-14	TIC-14	QCBLK164315-1	02/04/98	02/06/98	180000	UG/KG	J		10
Nitrobenzene-d5	4165-60-0	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
2-Fluorobiphenyl	321-60-8	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
Terphenyl-d14	1718-51-0	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
Phenol-d5	4165-62-2	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
2-Fluorophenol	367-12-4	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
2,4,6-Tribromophenol	118-79-6	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10

Quanterra-Richland
3350 George Washington Way
Richland, WA 99352-1613

Project: 550.261

Category: Semivolatile
Method: EPA 8270
Matrix: SOLID

Sample Date : 01/28/98
Receipt Date : 01/30/98
Report Date : 02/12/98

Client ID: BONOL7

Quanterra ID : 16832-001MS

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Phenol	108-95-2	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
2-Chlorophenol	95-57-8	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
1,4-Dichlorobenzene	106-46-7	QCBLK164315-1	02/04/98	02/06/98	65	%REC	D		10
N-nitroso-di-n-propylamine	621-64-7	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
1,2,4-Trichlorobenzene	120-82-1	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
4-Chloro-3-Methylphenol	59-50-7	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
Acenaphthene	83-32-9	QCBLK164315-1	02/04/98	02/06/98	100	%REC	D		10
4-Nitrophenol	100-02-7	QCBLK164315-1	02/04/98	02/06/98	45	%REC	D		10
2,4-Dinitrotoluene	121-14-2	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
Pentachlorophenol	87-86-5	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
Pyrene	129-00-0	QCBLK164315-1	02/04/98	02/06/98	130	%REC	D		10
Nitrobenzene-d5	4165-60-0	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
2-Fluorobiphenyl	321-60-8	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
Terphenyl-d14	1718-51-0	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
Phenol-d5	4165-62-2	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
2-Fluorophenol	367-12-4	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
2,4,6-Tribromophenol	118-79-6	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10

Quanterra-Richland
3350 George Washington Way
Richland, WA 99352-1613

Project: 550.261

Category: Semivolatile
Method: EPA 8270
Matrix: SOLID

Sample Date : 01/28/98
Receipt Date : 01/30/98
Report Date : 02/12/98

Client ID: BONOL7

Quanterra ID : 16832-001MSD

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Phenol	108-95-2	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
2-Chlorophenol	95-57-8	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
1,4-Dichlorobenzene	106-46-7	QCBLK164315-1	02/04/98	02/06/98	80	%REC	D		10
N-nitroso-di-n-propylamine	621-64-7	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
1,2,4-Trichlorobenzene	120-82-1	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
4-Chloro-3-Methylphenol	59-50-7	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
Acenaphthene	83-32-9	QCBLK164315-1	02/04/98	02/06/98	100	%REC	D		10
4-Nitrophenol	100-02-7	QCBLK164315-1	02/04/98	02/06/98	55	%REC	D		10
2,4-Dinitrotoluene	121-14-2	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
Pentachlorophenol	87-86-5	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
Pyrene	129-00-0	QCBLK164315-1	02/04/98	02/06/98	130	%REC	D		10
Nitrobenzene-d5	4165-60-0	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
2-Fluorobiphenyl	321-60-8	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
Terphenyl-d14	1718-51-0	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
Phenol-d5	4165-62-2	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
2-Fluorophenol	367-12-4	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10
2,4,6-Tribromophenol	118-79-6	QCBLK164315-1	02/04/98	02/06/98	0	%REC	D		10

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B0N0L7

Lab Name: QUANTERRA MO Contract: 550-261

Lab Code: ITMO Case No.: S83201 SAS No.: SDG No.: W02220

Matrix: (soil/water) SOIL Lab Sample ID: 16832-001

Sample wt/vol: 30.10 (g/mL) G Lab File ID: H5519

Level: (low/med) LOW Date Received: 01/30/98

% Moisture: decanted: (Y/N) N Date Extracted: 02/04/98

Concentrated Extract Volume: 2000 (uL) Date Analyzed: 02/06/98

Injection Volume: 2.0(uL) Dilution Factor: 10.0

GPC Cleanup: (Y/N) N pH:

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	6600	U
111-44-4	bis(2-Chloroethyl)Ether	6600	U
95-57-8	2-Chlorophenol	6600	U
541-73-1	1,3-Dichlorobenzene	6600	U
106-46-7	1,4-Dichlorobenzene	6600	U
95-50-1	1,2-Dichlorobenzene	6600	U
95-48-7	2-Methylphenol	6600	U
108-60-1	2,2'-oxybis(1-Chloropropane)	6600	U
106-44-5	4-Methylphenol	6600	U
621-64-7	N-Nitroso-Di-n-Propylamine	6600	U
67-72-1	Hexachloroethane	6600	U
98-95-3	Nitrobenzene	6600	U
78-59-1	Isophorone	6600	U
88-75-5	2-Nitrophenol	6600	U
105-67-9	2,4-Dimethylphenol	6600	U
111-91-1	bis(2-Chloroethoxy)Methane	6600	U
120-83-2	2,4-Dichlorophenol	6600	U
120-82-1	1,2,4-Trichlorobenzene	6600	U
91-20-3	Naphthalene	6600	U
106-47-8	4-Chloroaniline	6600	U
87-68-3	Hexachlorobutadiene	6600	U
59-50-7	4-Chloro-3-Methylphenol	6600	U
91-57-6	2-Methylnaphthalene	6600	U
77-47-4	Hexachlorocyclopentadiene	32000	U
88-06-2	2,4,6-Trichlorophenol	6600	U
95-95-4	2,4,5-Trichlorophenol	6600	U
91-58-7	2-Chloronaphthalene	6600	U
88-74-4	2-Nitroaniline	32000	U
131-11-3	Dimethyl Phthalate	6600	U
208-96-8	Acenaphthylene	6600	U
606-20-2	2,6-Dinitrotoluene	6600	U
99-09-2	3-Nitroaniline	32000	U
83-32-9	Acenaphthene	6600	U

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B0N0L7

Lab Name: QUANTERRA MO Contract: 550-261

Lab Code: ITMO Case No.: S83201 SAS No.: SDG No.: W02220

Matrix: (soil/water) SOIL Lab Sample ID: 16832-001

Sample wt/vol: 30.10 (g/mL) G Lab File ID: H5519

Level: (low/med) LOW Date Received: 01/30/98

% Moisture: decanted: (Y/N) N Date Extracted: 02/04/98

Concentrated Extract Volume: 2000 (uL) Date Analyzed: 02/06/98

Injection Volume: 2.0(uL) Dilution Factor: 10.0

GPC Cleanup: (Y/N) N pH:

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	32000	U
100-02-7	4-Nitrophenol	32000	U
132-64-9	Dibenzofuran	6600	U
121-14-2	2,4-Dinitrotoluene	6600	U
84-66-2	Diethylphthalate	6600	U
7005-72-3	4-Chlorophenyl-phenylether	6600	U
86-73-7	Fluorene	6600	U
100-01-6	4-Nitroaniline	32000	U
534-52-1	4,6-Dinitro-2-Methylphenol	32000	U
86-30-6	N-Nitrosodiphenylamine (1)	6600	U
101-55-3	4-Bromophenyl-phenylether	6600	U
118-74-1	Hexachlorobenzene	6600	U
87-86-5	Pentachlorophenol	32000	U
85-01-8	Phenanthrene	6600	U
120-12-7	Anthracene	6600	U
86-74-8	Carbazole	6600	U
84-74-2	Di-n-Butylphthalate	6600	U
206-44-0	Fluoranthene	6600	U
129-00-0	Pyrene	6600	U
85-68-7	Butylbenzylphthalate	6600	U
91-94-1	3,3'-Dichlorobenzidine	32000	U
56-55-3	Benzo(a)Anthracene	6600	U
218-01-9	Chrysene	6600	U
117-81-7	bis(2-Ethylhexyl)Phthalate	3000	BJ
117-84-0	Di-n-Octyl Phthalate	6600	U
205-99-2	Benzo(b)Fluoranthene	6600	U
207-08-9	Benzo(k)Fluoranthene	6600	U
50-32-8	Benzo(a)Pyrene	6600	U
193-39-5	Indeno(1,2,3-cd)Pyrene	6600	U
53-70-3	Dibenz(a,h)Anthracene	6600	U
191-24-2	Benzo(g,h,i)Perylene	6600	U

(1) - Cannot be separated from Diphenylamine

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B0N0L7

Lab Name: QUANTERRA MO Contract: 550-261

Lab Code: ITMO Case No.: S83201 SAS No.: SDG No.: W02220

Matrix: (soil/water) SOIL Lab Sample ID: 16832-001

Sample wt/vol: 30.10 (g/mL) G Lab File ID: H5519

Level: (low/med) LOW Date Received: 01/30/98

% Moisture: decanted: (Y/N) N Date Extracted: 02/04/98

Concentrated Extract Volume: 2000 (uL) Date Analyzed: 02/06/98

Injection Volume: 2.0(uL) Dilution Factor: 10.0

GPC Cleanup: (Y/N) N pH:

Number TICs found: 22

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

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 1120214	Undecane	8.82	7100	JN
2.	UNKNOWN	9.74	3000	J
3. 7045718	Undecane, 2-methyl-	9.91	2200	JN
4. 112403	Dodecane	10.57	14000	JN
5. 17301234	Undecane, 2,6-dimethyl-	10.75	11000	JN
6.	UNKNOWN	10.94	2900	J
7.	UNKNOWN	11.07	2200	J
8.	UNKNOWN	11.21	4900	J
9.	UNKNOWN	11.33	5300	J
10.	UNKNOWN	11.70	19000	J
11.	UNKNOWN	11.81	2100	J
12.	UNKNOWN	11.96	3000	J
13. 629505	Tridecane	12.12	14000	JN
14.	UNKNOWN	12.25	2200	J
15. 56292650	Dodecane, 2,5-dimethyl-	12.33	3100	JN
16.	UNKNOWN	12.78	11000	J
17.	UNKNOWN	13.21	14000	J
18. 629594	Tetradecane	13.58	28000	JN
19.	UNKNOWN	14.35	12000	J
20. 629629	Pentadecane	14.88	14000	JN
21.	UNKNOWN	16.72	840000	J
22.	UNKNOWN	17.06	180000	J

Quanterra-Richland
3350 George Washington Way
Richland, WA 99352-1613

Project: 550.261

Category: Volatiles 8260
Method: EPA 8260A
Matrix: SOLID

Sample Date : 01/28/98
Receipt Date : 01/30/98
Report Date : 02/19/98

Client ID: BOWOL7

Quanterra ID : 16832-001

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Chloromethane	74-87-3	QCBLK164361-1	02/04/98	02/04/98	10	UG/KG	U	10	1
Bromomethane	74-83-9	QCBLK164361-1	02/04/98	02/04/98	10	UG/KG	U	10	1
Vinyl Chloride	75-01-4	QCBLK164361-1	02/04/98	02/04/98	10	UG/KG	U	10	1
Chloroethane	75-00-3	QCBLK164361-1	02/04/98	02/04/98	10	UG/KG	U	10	1
Methylene Chloride	75-09-2	QCBLK164361-1	02/04/98	02/04/98	15	UG/KG	B	5	1
Acetone	67-64-1	QCBLK164361-1	02/04/98	02/04/98	820	UG/KG	BE	20	1
Carbon Disulfide	75-15-0	QCBLK164361-1	02/04/98	02/04/98	2	UG/KG	J	5	1
1,1-Dichloroethene	75-35-4	QCBLK164361-1	02/04/98	02/04/98	5	UG/KG	U	5	1
1,2-Dichloroethene (total)	540-59-0	QCBLK164361-1	02/04/98	02/04/98	5	UG/KG	U	5	1
1,1-Dichloroethane	75-34-3	QCBLK164361-1	02/04/98	02/04/98	5	UG/KG	U	5	1
Chloroform	67-66-3	QCBLK164361-1	02/04/98	02/04/98	5	UG/KG	U	5	1
1,2-Dichloroethane	107-06-2	QCBLK164361-1	02/04/98	02/04/98	5	UG/KG	U	5	1
2-Butanone (MEK)	78-93-3	QCBLK164361-1	02/04/98	02/04/98	500	UG/KG	BE	20	1
1,1,1-Trichloroethane	71-55-6	QCBLK164361-1	02/04/98	02/04/98	5	UG/KG	U	5	1
Carbon Tetrachloride	56-23-5	QCBLK164361-1	02/04/98	02/04/98	5	UG/KG	U	5	1
Bromodichloromethane	75-27-4	QCBLK164361-1	02/04/98	02/04/98	5	UG/KG	U	5	1
1,2-Dichloropropane	78-87-5	QCBLK164361-1	02/04/98	02/04/98	5	UG/KG	U	5	1
cis-1,3-Dichloropropene	10061-01-5	QCBLK164361-1	02/04/98	02/04/98	5	UG/KG	U	5	1
Trichloroethene	79-01-6	QCBLK164361-1	02/04/98	02/04/98	5	UG/KG	U	5	1
Dibromochloromethane	124-48-1	QCBLK164361-1	02/04/98	02/04/98	5	UG/KG	U	5	1
1,1,2-Trichloroethane	79-00-5	QCBLK164361-1	02/04/98	02/04/98	5	UG/KG	U	5	1
Benzene	71-43-2	QCBLK164361-1	02/04/98	02/04/98	5	UG/KG	U	5	1
trans-1,3-Dichloropropene	10061-02-6	QCBLK164361-1	02/04/98	02/04/98	5	UG/KG	U	5	1
Bromoform	75-25-2	QCBLK164361-1	02/04/98	02/04/98	5	UG/KG	U	5	1
4-Methyl-2-Pentanone (MIBK)	108-10-1	QCBLK164361-1	02/04/98	02/04/98	45	UG/KG		20	1
2-Hexanone	591-78-6	QCBLK164361-1	02/04/98	02/04/98	450	UG/KG	E	20	1
Tetrachloroethene	127-18-4	QCBLK164361-1	02/04/98	02/04/98	5	UG/KG	U	5	1
Toluene	108-88-3	QCBLK164361-1	02/04/98	02/04/98	5	UG/KG	J	5	1
1,1,2,2-Tetrachloroethane	79-34-5	QCBLK164361-1	02/04/98	02/04/98	5	UG/KG	U	5	1
Chlorobenzene	108-90-7	QCBLK164361-1	02/04/98	02/04/98	5	UG/KG	U	5	1
EthylBenzene	100-41-4	QCBLK164361-1	02/04/98	02/04/98	5	UG/KG	U	5	1
Styrene	100-42-5	QCBLK164361-1	02/04/98	02/04/98	5	UG/KG	U	5	1
Xylene (total)	1330-20-7	QCBLK164361-1	02/04/98	02/04/98	5	UG/KG	U	5	1
Unknown C7H14O	TIC-3489	QCBLK164361-1	02/04/98	02/04/98	105	UG/KG	J		1
Undecane	1120-21-4	QCBLK164361-1	02/04/98	02/04/98	263	UG/KG	JN		1
Unknown-1	TIC-32	QCBLK164361-1	02/04/98	02/04/98	119	UG/KG	J		1
Unknown Alkane-1	TIC-42	QCBLK164361-1	02/04/98	02/04/98	366	UG/KG	J		1
Dodecane	112-40-3	QCBLK164361-1	02/04/98	02/04/98	392	UG/KG	JN		1
Unknown Alkane-2	TIC-43	QCBLK164361-1	02/04/98	02/04/98	744	UG/KG	J		1
Tridecane	629-50-5	QCBLK164361-1	02/04/98	02/04/98	1187	UG/KG	JN		1
Unknown Dodecane	TIC-8866	QCBLK164361-1	02/04/98	02/04/98	370	UG/KG	J		1
Tetradecane	629-59-4	QCBLK164361-1	02/04/98	02/04/98	274	UG/KG	JN		1
Toluene-d8	2037-26-5	QCBLK164361-1	02/04/98	02/04/98	135	%REC	*		1
Bromofluorobenzene	460-00-4	QCBLK164361-1	02/04/98	02/04/98	130	%REC	*		1
Dibromofluoromethane	1868-53-7	QCBLK164361-1	02/04/98	02/04/98	113	%REC			1

Quanterra-Richland
3350 George Washington Way
Richland, WA 99352-1613

Project: 550.261

Category: Volatiles 8260
Method: EPA 8260A
Matrix: SOLID

Sample Date : 01/28/98
Receipt Date : 01/30/98
Report Date : 02/11/98

Client ID: BOWOL7

Quanterra ID : 16832-001MS

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
1,1-Dichloroethene	75-35-4	QCBLK164361-1	02/04/98	02/04/98	135	%REC			1
Trichloroethene	79-01-6	QCBLK164361-1	02/04/98	02/04/98	62	%REC	*		1
Benzene	71-43-2	QCBLK164361-1	02/04/98	02/04/98	108	%REC			1
Toluene	108-88-3	QCBLK164361-1	02/04/98	02/04/98	106	%REC			1
Chlorobenzene	108-90-7	QCBLK164361-1	02/04/98	02/04/98	83	%REC			1
Toluene-d8	2037-26-5	QCBLK164361-1	02/04/98	02/04/98	138	%REC	*		1
Bromofluorobenzene	460-00-4	QCBLK164361-1	02/04/98	02/04/98	174	%REC	*		1
Dibromofluoromethane	1868-53-7	QCBLK164361-1	02/04/98	02/04/98	113	%REC			1

Quanterra-Richland
3350 George Washington Way
Richland, WA 99352-1613

Project: 550.261

Category: Volatiles 8260
Method: EPA 8260A
Matrix: SOLID

Sample Date : 01/28/98
Receipt Date : 01/30/98
Report Date : 02/11/98

Client ID: BONOL7

Quanterra ID : 16832-001MSD

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
1,1-Dichloroethene	75-35-4	QCBLK164361-1	02/04/98	02/04/98	139	%REC			1
Trichloroethene	79-01-6	QCBLK164361-1	02/04/98	02/04/98	66	%REC	*		1
Benzene	71-43-2	QCBLK164361-1	02/04/98	02/04/98	111	%REC			1
Toluene	108-88-3	QCBLK164361-1	02/04/98	02/04/98	122	%REC			1
Chlorobenzene	108-90-7	QCBLK164361-1	02/04/98	02/04/98	96	%REC			1
Toluene-d8	2037-26-5	QCBLK164361-1	02/04/98	02/04/98	146	%REC	*		1
Bromofluorobenzene	460-00-4	QCBLK164361-1	02/04/98	02/04/98	153	%REC	*		1
Dibromofluoromethane	1868-53-7	QCBLK164361-1	02/04/98	02/04/98	107	%REC			1

Quanterra-Richland
3350 George Washington Way
Richland, WA 99352-1613

Project: 550.261

Category: Volatiles 8260
Method: EPA 8260A
Matrix: SOLID

Sample Date : 01/28/98
Receipt Date : 01/30/98
Report Date : 02/11/98

Client ID: BONOL7

Quanterra ID : 16832-001DL1

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Chloromethane	74-87-3	QCBLK164504-1	02/05/98	02/05/98	50	UG/KG	U	50	5
Bromomethane	74-83-9	QCBLK164504-1	02/05/98	02/05/98	50	UG/KG	U	50	5
Vinyl Chloride	75-01-4	QCBLK164504-1	02/05/98	02/05/98	50	UG/KG	U	50	5
Chloroethane	75-00-3	QCBLK164504-1	02/05/98	02/05/98	50	UG/KG	U	50	5
Methylene Chloride	75-09-2	QCBLK164504-1	02/05/98	02/05/98	38	UG/KG	BD	25	5
Acetone	67-64-1	QCBLK164504-1	02/05/98	02/05/98	840	UG/KG	BD	100	5
1,1-Dichloroethene	75-35-4	QCBLK164504-1	02/05/98	02/05/98	25	UG/KG	U	25	5
1,1-Dichloroethane	75-34-3	QCBLK164504-1	02/05/98	02/05/98	25	UG/KG	U	25	5
1,2-Dichloroethene (total)	540-59-0	QCBLK164504-1	02/05/98	02/05/98	25	UG/KG	U	25	5
Chloroform	67-66-3	QCBLK164504-1	02/05/98	02/05/98	25	UG/KG	U	25	5
1,2-Dichloroethane	107-06-2	QCBLK164504-1	02/05/98	02/05/98	25	UG/KG	U	25	5
2-Butanone (MEK)	78-93-3	QCBLK164504-1	02/05/98	02/05/98	330	UG/KG	D	100	5
1,1,1-Trichloroethane	71-55-6	QCBLK164504-1	02/05/98	02/05/98	25	UG/KG	U	25	5
Carbon Tetrachloride	56-23-5	QCBLK164504-1	02/05/98	02/05/98	25	UG/KG	U	25	5
Bromodichloromethane	75-27-4	QCBLK164504-1	02/05/98	02/05/98	25	UG/KG	U	25	5
1,2-Dichloropropane	78-87-5	QCBLK164504-1	02/05/98	02/05/98	25	UG/KG	U	25	5
cis-1,3-Dichloropropene	10061-01-5	QCBLK164504-1	02/05/98	02/05/98	25	UG/KG	U	25	5
Trichloroethene	79-01-6	QCBLK164504-1	02/05/98	02/05/98	25	UG/KG	U	25	5
Dibromochloromethane	124-48-1	QCBLK164504-1	02/05/98	02/05/98	25	UG/KG	U	25	5
1,1,2-Trichloroethane	79-00-5	QCBLK164504-1	02/05/98	02/05/98	25	UG/KG	U	25	5
Benzene	71-43-2	QCBLK164504-1	02/05/98	02/05/98	25	UG/KG	U	25	5
trans-1,3-Dichloropropene	10061-02-6	QCBLK164504-1	02/05/98	02/05/98	25	UG/KG	U	25	5
Bromoform	75-25-2	QCBLK164504-1	02/05/98	02/05/98	25	UG/KG	U	25	5
4-Methyl-2-Pentanone (MIBK)	108-10-1	QCBLK164504-1	02/05/98	02/05/98	100	UG/KG	U	100	5
2-Hexanone	591-78-6	QCBLK164504-1	02/05/98	02/05/98	190	UG/KG	D	100	5
Tetrachloroethene	127-18-4	QCBLK164504-1	02/05/98	02/05/98	25	UG/KG	U	25	5
Toluene	108-88-3	QCBLK164504-1	02/05/98	02/05/98	25	UG/KG	U	25	5
1,1,2,2-Tetrachloroethane	79-34-5	QCBLK164504-1	02/05/98	02/05/98	25	UG/KG	U	25	5
Chlorobenzene	108-90-7	QCBLK164504-1	02/05/98	02/05/98	25	UG/KG	U	25	5
EthylBenzene	100-41-4	QCBLK164504-1	02/05/98	02/05/98	25	UG/KG	U	25	5
Styrene	100-42-5	QCBLK164504-1	02/05/98	02/05/98	25	UG/KG	U	25	5
Xylene (total)	1330-20-7	QCBLK164504-1	02/05/98	02/05/98	25	UG/KG	U	25	5
Unknown Alkane-1	TIC-42	QCBLK164504-1	02/05/98	02/05/98	767	UG/KG	DJ		5
Naphthalene, decahydro-2-methy	2958-76-1	QCBLK164504-1	02/05/98	02/05/98	1717	UG/KG	DJN		5
Unknown-1	TIC-32	QCBLK164504-1	02/05/98	02/05/98	1047	UG/KG	DJ		5
Unknown Alkane-2	TIC-43	QCBLK164504-1	02/05/98	02/05/98	1547	UG/KG	DJ		5
Undecane, 2,5-dimethyl-	17301-22-3	QCBLK164504-1	02/05/98	02/05/98	2036	UG/KG	DJN		5
Naphthalene, decahydro-2,6-dim	1618-22-0	QCBLK164504-1	02/05/98	02/05/98	1783	UG/KG	DJN		5
Octadecane, 2,6-dimethyl-	75163-97-2	QCBLK164504-1	02/05/98	02/05/98	3679	UG/KG	DJN		5
Unknown Alkane-3	TIC-142	QCBLK164504-1	02/05/98	02/05/98	3246	UG/KG	DJ		5
1-Tetradecene	1120-36-1	QCBLK164504-1	02/05/98	02/05/98	4048	UG/KG	DJN		5
Unknown Alkane-4	TIC-143	QCBLK164504-1	02/05/98	02/05/98	1803	UG/KG	DJ		5
Unknown Alkane-5	TIC-144	QCBLK164504-1	02/05/98	02/05/98	1622	UG/KG	DJ		5
Unknown-2	TIC-33	QCBLK164504-1	02/05/98	02/05/98	1668	UG/KG	DJ		5
Unknown-3	TIC-34	QCBLK164504-1	02/05/98	02/05/98	2299	UG/KG	DJ		5
Toluene-d8	2037-26-5	QCBLK164504-1	02/05/98	02/05/98	130	%REC	*		5
Bromofluorobenzene	460-00-4	QCBLK164504-1	02/05/98	02/05/98	109	%REC			5
Dibromofluoromethane	1868-53-7	QCBLK164504-1	02/05/98	02/05/98	101	%REC			5

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B0N0L7

Lab Name: QUANTERRA MO Contract: 550.261

Lab Code: ITMO Case No.: SAS No.: SDG No.: W02220

Matrix: (soil/water) SOIL Lab Sample ID: 16832-001

Sample wt/vol: 5.0 (g/mL) G Lab File ID: BSMP1246

Level: (low/med) LOW Date Received: 01/30/98

% Moisture: not dec. _____ Date Analyzed: 02/04/98

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	15	B
67-64-1	Acetone	820	EB
75-15-0	Carbon Disulfide	2	J
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	500	EB
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Chlorodibromomethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-pentanone	45	
591-78-6	2-Hexanone	450	E
127-18-4	Tetrachloroethene	5	U
108-88-3	Toluene	5	J
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylenes (total)	5	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B0N0L7

Lab Name: QUANTERRA MO Contract: 550.261

Lab Code: ITMO Case No.: SAS No.: SDG No.: W02220

Matrix: (soil/water) SOIL Lab Sample ID: 16832-001

Sample wt/vol: 5.0 (g/mL) G Lab File ID: BSMP1246

Level: (low/med) LOW Date Received: 01/30/98

% Moisture: not dec. _____ Date Analyzed: 02/04/98

Column: (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 9

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

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	Unknown C7H14O	19.298	105	J
2. 1120-21-4	Undecane	22.605	263	NJ
3.	Unknown	22.762	119	J
4.	Unknown Alkane	23.546	366	J
5. 112-40-3	Dodecane	24.033	392	NJ
6.	Unknown Alkane	24.694	744	J
7. 629-50-5	Tridecane	25.008	1187	NJ
8.	Unknown Dodecane	25.635	370	J
9. 629-59-4	Tetradecane	25.861	274	NJ
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BONOL7 DL

Lab Name: QUANTERRA MO Contract: 550.261

Lab Code: ITMO Case No.: SAS No.: SDG No.: W02220

Matrix: (soil/water) SOIL Lab Sample ID: 16832-001 DL

Sample wt/vol: 1.0 (g/mL) G Lab File ID: ESMP0764

Level: (low/med) LOW Date Received: 01/30/98

% Moisture: not dec. _____ Date Analyzed: 02/05/98

Column: (pack/cap) CAP Dilution Factor: 5.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
74-87-3	Chloromethane	50	U
74-83-9	Bromomethane	50	U
75-01-4	Vinyl Chloride	50	U
75-00-3	Chloroethane	50	U
75-09-2	Methylene Chloride	38	DB
67-64-1	Acetone	840	DB
75-15-0	Carbon Disulfide	25	U
75-35-4	1,1-Dichloroethene	25	U
75-34-3	1,1-Dichloroethane	25	U
540-59-0	1,2-Dichloroethene (total)	25	U
67-66-3	Chloroform	25	U
107-06-2	1,2-Dichloroethane	25	U
78-93-3	2-Butanone	330	D
71-55-6	1,1,1-Trichloroethane	25	U
56-23-5	Carbon Tetrachloride	25	U
75-27-4	Bromodichloromethane	25	U
78-87-5	1,2-Dichloropropane	25	U
10061-01-5	cis-1,3-Dichloropropene	25	U
79-01-6	Trichloroethene	25	U
124-48-1	Chlorodibromomethane	25	U
79-00-5	1,1,2-Trichloroethane	25	U
71-43-2	Benzene	25	U
10061-02-6	trans-1,3-Dichloropropene	25	U
75-25-2	Bromoform	25	U
108-10-1	4-Methyl-2-pentanone	100	U
591-78-6	2-Hexanone	190	D
127-18-4	Tetrachloroethene	25	U
108-88-3	Toluene	25	U
79-34-5	1,1,2,2-Tetrachloroethane	25	U
108-90-7	Chlorobenzene	25	U
100-41-4	Ethylbenzene	25	U
100-42-5	Styrene	25	U
1330-20-7	Xylenes (total)	25	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BONOL7 DL

Lab Name: QUANTERRA MO Contract: 550.261

Lab Code: ITMO Case No.: SAS No.: SDG No.: W02220

Matrix: (soil/water) SOIL Lab Sample ID: 16832-001 DL

Sample wt/vol: 1.0 (g/mL) G Lab File ID: ESMP0764

Level: (low/med) LOW Date Received: 01/30/98

% Moisture: not dec. _____ Date Analyzed: 02/05/98

Column: (pack/cap) CAP Dilution Factor: 5.0

Number TICs found: 13

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

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	Unknown Alkane	22.617	767	JD
2. 2958-76-1	Naphthalene, decahydro-2-met	23.384	1717	NJD
3.	Unknown	23.611	1047	JD
4.	Unknown Alkane	23.803	1547	JD
5. 17301-22-3	Undecane, 2,5-dimethyl-	23.890	2036	NJD
6. 1618-22-0	Naphthalene, decahydro-2,6-d	24.099	1783	NJD
7. 75163-97-2	Octadecane, 2,6-dimethyl-	24.360	3679	NJD
8.	Unknown Alkane	24.622	3246	JD
9. 1120-36-1	1-Tetradecene	24.744	4048	NJD
10.	Unknown Alkane	25.145	1803	JD
11.	Unknown Alkane	25.337	1622	JD
12.	Unknown	25.511	1668	JD
13.	Unknown	25.772	2299	JD
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Quanterra-Richland
3350 George Washington Way
Richland, WA 99352-1613

Project: 550.261

Category: pH
Method: EPA 9045
Matrix: SOLID

Sample Date : 01/28/98
Receipt Date : 01/30/98
Report Date : 02/06/98

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
BONOL7	16832-001	pH	PH	QCBLK164420-1	02/05/98	02/05/98	7.35	PH			1
BONOL7	16832-001DUP	pH	PH	QCBLK164420-1	02/05/98	02/05/98	7.36	PH			1
NA	QCBLK164420-1	pH	PH	QCBLK164420-1	02/05/98	02/05/98	4.57	PH			1

W02220

Quanterra Environmental Services

Quanterra Incorporated
2800 George Washington Way
Richland, Washington 99352

509 375-3131 Telephone
509 375-5590 Fax

CERTIFICATE OF ANALYSIS

FEB 1998
RECEIVED
Data
Log In

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

February 17, 1998

Attention: Joan Kessner

SAF Number	:	B98-055
Date First Sample Received	:	January 30, 1998
Number of Samples	:	One (1)
Sample Type	:	Other (solid)
SDG Number	:	W02220
Data Deliverable	:	Summary

I. Introduction

On January 30, 1998, one 15-day TAT other (oil & grease) sample was received by the Quanterra Environmental Services Richland Laboratory (QESRL) for radiochemical and chemical analysis. Upon receipt, the sample was assigned the following laboratory ID number to correspond with the Bechtel Hanford, Inc. (BHI) specific ID:

QESRL ID#	BHI ID#	MATRIX	DATE OF RECEIPT
80200601	B0N0L7	Other	1/30/98

II. Analytical Results/Methodology

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

The requested analyses were:

Alpha Spectroscopy
Americium-241 by method RICH-RC-5057
Plutonium-238, -239/40 by method RICH-RC-5010
Uranium-234, 235, 238 by method RICH-RC-5030
Gamma Spectroscopy
Gamma Scan by method RICH-RC-5017

Gas Proportional Counting
Gross Alpha by method RICH-RC-5014
Gross Beta by method RICH-RC-5014
Total Strontium by method RICH-RC-5006
Liquid Scintillation Counting
Technicium-99 by method RICH-RC-5029
Plutonium-241 by method RICH-RC-5010

III. Quality Control

The analytical results for each analysis performed under SDG W02217 include a minimum of one Laboratory Control Sample (LCS), one method (reagent) blank, and one duplicate. Any exceptions have been noted in the "Comments" section.

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

IV. Comments

Alpha Spectroscopy

Americium-241 by method RICH-RC-5057
The LCS, batch blank, sample and sample duplicate (B0N0L7) results are within contractual requirements.

Plutonium-238, -239/40 by method RICH-RC-5010
The LCS, sample and sample duplicate (B0N0L7) results are within contractual requirements. There was not any tracer added to the batch blank vial, therefore, we could not accurately determine the plutonium concentration in the blank. This sample batch was processed with BHI samples in SDG W02217 whose batch blank was acceptable. The LCS tracer recovery was low at 18.9% but the spike recovery was acceptable at 108.7%.

Uranium-234, 235, 238 by method RICH-RC-5030
The LCS, batch blank, sample and sample duplicate (B0N0L7) results are within contractual requirements.

Gamma Spectroscopy

Gamma Scan by method RICH-RC-5017
The LCS, batch blank, sample and sample duplicate (B0N0L7) results are within contractual requirements. The Co-60 in the duplicate was not within contractual requirements, therefore, the target sample and duplicate were recounted. The recount results from the sample duplicate are within contractual requirements.

Gas Proportional Counting

Gross Alpha by method RICH-RC-5014
The LCS, batch blank, sample and sample duplicate (B0N0L7) results are within contractual requirements. The duplicate was not within contractual requirements, therefore, the target sample and duplicate were recounted. The recount result from the sample duplicate is within contractual requirements.

Gross Beta by method RICH-RC-5014
The LCS, batch blank, sample and sample duplicate (B0N0L7) results are within contractual requirements.

Total Strontium by method RICH-RC-5006
The LCS, batch blank, sample and sample duplicate (B0N0L7) results are within contractual requirements.

Liquid Scintillation Counting

Plutonium-241 by method RICH-RC-5010
The LCS, batch blank, sample and sample duplicate (B0N0L7) results are within contractual requirements.

Technicium-99 by method RICH-RC-5029
The LCS, batch blank, sample and sample duplicate (B0N0L7) 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

Quanterra Environmental Services

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	SDG: /RPT GRP:	W02220 / 4440
LAB SAMPLE ID:	80200601	MATRIX:	OTHER
CLIENT ID:	B0N0L7	DATE RECEIVED:	1/30/1998 2:45:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	1.10E+00		3.5E-01	3.9E-01	7.64E-02	pCi/g	91.60%	RICHRC5057
U-234	2.79E+01		1.9E+00	4.7E+00	2.35E-01	pCi/g	87.30%	RICHRC5030
U-235	1.13E+00		3.8E-01	4.2E-01	1.57E-01	pCi/g	87.30%	RICHRC5030
U-238	2.99E+01		1.9E+00	5.0E+00	1.95E-01	pCi/g	87.30%	RICHRC5030
PU-238	1.38E-01		1.6E-01	1.6E-01	1.25E-01	pCi/g	47.60%	RICHRC5010
PU-241	1.10E+00	U	5.3E+00	1.1E+01	1.29E+01	pCi/g	47.60%	ICHRC5010-LS
PU239/40	1.26E+01		1.5E+00	2.7E+00	1.25E-01	pCi/g	47.60%	RICHRC5010
CO-60	4.77E-02	U	2.2E-02	2.3E-02	4.38E-02	pCi/g	N/A	RICHRC5017
CS-137DA	6.30E+02		1.1E+00	6.3E+01	N/A	pCi/g	N/A	RICHRC5017
EU-152	9.98E-02	U	4.8E-01	4.8E-01	7.58E-01	pCi/g	N/A	RICHRC5017
EU-154	-2.31E-02	U	6.1E-02	6.1E-02	1.02E-01	pCi/g	N/A	RICHRC5017
EU-155	2.61E-01	U	2.6E-01	2.6E-01	4.12E-01	pCi/g	N/A	RICHRC5017
K-40	8.36E+00		7.0E-01	1.1E+00	N/A	pCi/g	N/A	RICHRC5017
RA-224DA	6.25E-01		2.3E-01	2.4E-01	N/A	pCi/g	N/A	RICHRC5017
RA-226	1.45E+00		2.8E-01	3.2E-01	N/A	pCi/g	N/A	RICHRC5017
U-238	4.51E+00		1.9E+00	1.9E+00	N/A	pCi/g	N/A	RICHRC5017
ALPHA	6.06E+01		1.1E+01	1.3E+01	4.57E+00	pCi/g	100.00%	RICHRC5014
BETA	2.53E+03		4.1E+01	2.3E+02	6.16E+00	pCi/g	100.00%	RICHRC5014-B
STRONTIUM	8.72E+00		1.7E+00	3.6E+00	2.43E+00	pCi/g	88.40%	RICHRC5006
TC-99	7.28E+00		3.0E+00	9.4E+00	6.72E+00	pCi/g	95.10%	RICHRC5029

Number of Results: 20

Quanterra Data Review Checklist
RADIOCHEMISTRY

Work Order number (s): 8020006

Client ID: BH I

Due Date: 2-6-98

Lab Sample Number or SDG: WP2220

Method Test Parameters: Am 241

Matrix: Other

Review Item	Yes (✓)	No (✓)	N/A (✓)	2nd Level Review (✓)
A. Calibration				
1. Is the calibration documentation included where applicable?			—	
B. Sample Analysis				
1. Are the sample yields within acceptance criteria?	—			—
2. Were all sample holding times met?	—			—
3. Is the sample Minimum Detectable Activity < the Contract Detection Limit?	—			—
C. QC Samples				
1. Is the blank yield within acceptance criteria	—			—
2. Is the Minimum Detectable Activity for the blank result ≤ the Contract Detection Limit?	—			—
3. Is the blank result < 1/2 the Contract Detection Limit?	—			—
4. Is the blank > 1/2 the Contract Detection Limit but < Contract Detection Limit?			—	
5. Is the blank result > the Contract Detection Limit but the sample result < the Contract Detection Limit?			—	
6. Is the LCS result within acceptance criteria?	—			—
7. Is the LCS yield within acceptance criteria	—			—
8. Is the LCS Minimum Detectable Activity ≤ the Contract Detection Limit?	—			—
9. MS/MSD results and yield meet acceptance criteria?			—	
10. Duplicate sample results and yield meet acceptance criteria?	—			—
D. Other				
1. Are all Nonconformances included and noted?			—	
2. Are all required forms filed out?	—			—
3. Correct methodology used?	—			—
4. Transcription checked? JM 2-10-98	—			
5. Were all calculations checked at a minimum frequency?	—			
6. Units checked?	—			—

Comments on any "No" response: _____

First Level Review: [signature] Date: 2-10-98

Second Level Review: [signature] Date: 2/11/98

Form #: LS-038.2 /96, Rev.4

Quanterra Data Review Checklist
RADIOCHEMISTRY

Work Order number (s): 802006

Client ID: BHI

Due Date: 2-6-98

Lab Sample Number or SDG: W02220

Method Test Parameters: Plutonium

Matrix: Other

Review Item	Yes (✓)	No (✓)	N/A (✓)	2nd Level Review (✓)
A. Calibration				
1. Is the calibration documentation included where applicable?			✓	
B. Sample Analysis				
1. Are the sample yields within acceptance criteria?	✓			✓
2. Were all sample holding times met?	✓			✓
3. Is the sample Minimum Detectable Activity < the Contract Detection Limit?	✓			✓
C. QC Samples				
1. Is the blank yield within acceptance criteria		✓		
2. Is the Minimum Detectable Activity for the blank result ≤ the Contract Detection Limit?			✓	
3. Is the blank result < 1/2 the Contract Detection Limit?			✓	
4. Is the blank > 1/2 the Contract Detection Limit but < Contract Detection Limit?			✓	
5. Is the blank result > the Contract Detection Limit but the sample result < the Contract Detection Limit?			✓	
6. Is the LCS result within acceptance criteria?	✓			✓
7. Is the LCS yield within acceptance criteria		✓		
8. Is the LCS Minimum Detectable Activity ≤ the Contract Detection Limit?	✓			✓
9. MS/MSD results and yield meet acceptance criteria?			✓	
10. Duplicate sample results and yield meet acceptance criteria?	✓			✓
D. Other				
1. Are all Nonconformances included and noted?	IN			✓
2. Are all required forms filed out?	✓			✓
3. Correct methodology used?	✓			✓
4. Transcription checked? JM 2-9-98	✓			
5. Were all calculations checked at a minimum frequency?	✓			
6. Units checked?	✓			✓

Comments on any "No" response: _____

First Level Review: [signature] Date: 2-10-98

Second Level Review: [signature] Date: 2/11/98

Form #: LS-038.2 /96, Rev.4

QUANTERRA LABORATORY NONCONFORMANCE MEMO (NCM)

LOG #: RD-98-_____

Project ID: BHI NCM Initiated by: MK 2-10-98

Sample Numbers: J020061B-, J020061S

Tests: Pu30 + Pu241

Matrix: Other WO 2220

Analytical Area (check appropriate area):

- ☐ Sample control
- ☐ Organic preparation
- ☐ Inorganic preparation
- ☐ GC
- ☐ HPLC
- ☐ GC/MS
- ☐ Wet chemistry
- ☐ Metals
- ☐ Reporting
- ☒ Data review
- ☒ Radiochemistry
- ~~☐ Biology~~ MK 2-10-98

Nonconformance (check appropriate area):

Holding Time Violations (exceeded by _____ days)

Category I: Laboratory Independent

- ☐ 1. Holding time expired in transit
- ☐ 2. Sample received > 48 hrs. or 1/2 holding time has expired
- ☐ 3. Test added by client after expiration

Category II: Laboratory Dependent

- ☐ 4. Instrument failure
- ☐ 5. Analyst error
- ☐ 6. Login error
- ☐ 7. Miscommunication
- ☐ 8. Other (complete description required)

Category III: Analysis Reruns (QA/QC)

- ☐ 9. Surrogates
- ☐ 10. Internal Standards
- ☐ 11. Spike Recoveries
- ☐ 12. Blank Contamination

Category IV: Analysis Reruns (Confirmation)

- ☐ 13. Second column
- ☐ 14. Contamination check
- ☐ 15. Confirmation of matrix effects
- ☐ 16. Other (complete description required)

Quality Assurance/Quality Control

- ☐ 17. QC data reported outside of controls
- ☐ 18. Incorrect procedure used
- ☐ 19. SOP intentionally modified with QA and Tech. approval
- ☐ 20. Invalid instrument calibration
- ☐ 21. Insufficient sample received for proper analysis

Incorrect or Incomplete Client Deliverable

- ☐ 22. Hardcopy deliverable error
- ☐ 23. Electronic deliverable error

Reported detection limits elevated due to:

- ☐ 24. Sample matrix
- ☐ 25. Insufficient sample volume
- ☐ 26. Other (complete description required)
- ☒ 27. *Other (specify):* Tracer recoveries are less than 20% minimum

Comments/Explanation:

J020061B- No tracer recovery

J020061S = 18.99%

Notification (check appropriate area):

Client notified by (name and date): _____

- ☒ in writing CN
- ☐ by telephone
- ☐ by facsimile
- ☐ other (explain)

Client's name and response: _____

- ☐ process "as is"
- ☐ on hold until _____
- ☐ re-sample
- ☐ other (explain)

Project Manager (signature and date): [signature] 2/11/98

QUANTERRA LABORATORY NONCONFORMANCE MEMO (NCM)

LOG#: RD-98-_____

Corrective Action

Root Cause Initial and date: MK 2-10-98

Unknown

Corrective Action Initial and Date: MK 2-10-98

Contacted client. Client accepted single results with a failed blank & LCS tracer recovery less than 20%. LCS radiochemical recovery based upon 18.9% yield is 108.7% which is acceptable. Sample & duplicate yields were 47.6% & 72.4% respectively

Responsibility for performing CA assigned to: _____

Actions to prevent recurrence Initial and Date: _____

First Level Supervisor: [signature] Date: 2-10-98

Responsible Manager: [signature] Date: 2/17/98

Quality Assurance Review

☑ Anomaly ☐ Deficiency ☐ Rerun

☐ Further action required: _____

Assigned to: _____

QA signature: [signature] Date: 2-17-98

Corrective Action Verification

☑ Verified

☐ Cannot Verify (specify reason): N/A

Nonconformance Memo Closure

QA signature/date: [signature] 2-17-98

Quanterra Data Review Checklist
RADIOCHEMISTRY

Work Order number(s): 802006

Client ID: BHI

Due Date: 2-6-98

Lab Sample Number or SDG: W92220

Method Test Parameters: UISO

Matrix: Other

Review Item	Yes (✓)	No (✓)	N/A (✓)	2nd Level Review (✓)
A. Calibration				
1. Is the calibration documentation included where applicable?			✓	
B. Sample Analysis				
1. Are the sample yields within acceptance criteria?	✓			✓
2. Were all sample holding times met?	✓			✓
3. Is the sample Minimum Detectable Activity < the Contract Detection Limit?	✓			✓
C. QC Samples				
1. Is the blank yield within acceptance criteria	✓			✓
2. Is the Minimum Detectable Activity for the blank result ≤ the Contract Detection Limit?	✓			✓
3. Is the blank result < 1/2 the Contract Detection Limit?	✓			✓
4. Is the blank > 1/2 the Contract Detection Limit but < Contract Detection Limit?			✓	
5. Is the blank result > the Contract Detection Limit but the sample result < the Contract Detection Limit?			✓	
6. Is the LCS result within acceptance criteria?	✓			✓
7. Is the LCS yield within acceptance criteria	✓			✓
8. Is the LCS Minimum Detectable Activity ≤ the Contract Detection Limit?	✓			✓
9. MS/MSD results and yield meet acceptance criteria?			✓	
10. Duplicate sample results and yield meet acceptance criteria?	✓			✓
D. Other				
1. Are all Nonconformances included and noted?			✓	
2. Are all required forms filed out?	✓			✓
3. Correct methodology used?	✓			✓
4. Transcription checked? JM 2-9-98	✓			
5. Were all calculations checked at a minimum frequency?	✓			
6. Units checked?	✓			✓

Comments on any "No" response: _____

First Level Review: [signature] Date: 2-9-98

Second Level Review: [signature] Date: 2/10/98

Form #: LS-038.2 /96, Rev. 4

Quanterra Data Review Checklist
RADIOCHEMISTRY

Work Order number (s): 802006

Client ID: BHI

Due Date: 2-6-98

Lab Sample Number or SDG: W02220

Method Test Parameters: Gamma

Matrix: Other

Review Item	Yes (✓)	No (✓)	N/A (✓)	2nd Level Review (✓)
A. Calibration				
1. Is the calibration documentation included where applicable?			✓	
B. Sample Analysis				
1. Are the sample yields within acceptance criteria?			✓	
2. Were all sample holding times met?	✓			✓
3. Is the sample Minimum Detectable Activity < the Contract Detection Limit?		✓		
C. QC Samples				
1. Is the blank yield within acceptance criteria			✓	
2. Is the Minimum Detectable Activity for the blank result ≤ the Contract Detection Limit?	✓			✓
3. Is the blank result < 1/2 the Contract Detection Limit?	✓			✓
4. Is the blank > 1/2 the Contract Detection Limit but < Contract Detection Limit?			✓	
5. Is the blank result > the Contract Detection Limit but the sample result < the Contract Detection Limit?			✓	
6. Is the LCS result within acceptance criteria?	✓			✓
7. Is the LCS yield within acceptance criteria			✓	
8. Is the LCS Minimum Detectable Activity ≤ the Contract Detection Limit?			✓	
9. MS/MSD results and yield meet acceptance criteria?			✓	
10. Duplicate sample results and yield meet acceptance criteria?	✓ NCM 0060			✓
D. Other				
1. Are all Nonconformances included and noted?	NCM			✓
2. Are all required forms filed out?	✓			✓
3. Correct methodology used?	✓			✓
4. Transcription checked?	✓			
5. Were all calculations checked at a minimum frequency?	✓			
6. Units checked?	✓			✓

Comments on any "No" response:

First Level Review: [signature] Date: 2-6-98

Second Level Review: [signature] Date: 2/10/98

Form #: LS-038.2/96, Rev.4

0018

Report BHI "S" + K40 (009), Ra224DA (067), Ra226DA (032), U238DAP (603) in sample + duplicate

Report recount results for sample + duplicate.

QUANTERRA LABORATORY NONCONFORMANCE MEMO (NCM)

LOG #: RD-98-

Project ID: BHI
NCM Initiated by: Joel Kengama
Sample Numbers: 80200601, D0200601
Tests: Gamma
Matrix: Other W02220

Analytical Area (check appropriate area):

- ☐ Sample control
- ☐ Organic preparation
- ☐ Inorganic preparation
- ☐ GC
- ☐ HPLC
- ☐ GC/MS
- ☐ Wet chemistry
- ☐ Metals
- ☐ Reporting
- ☒ Data review
- ☒ Radiochemistry
- ☐ Bioassay

Nonconformance (check appropriate area):

Holding Time Violations (exceeded by _____ days)

Category I: Laboratory Independent

- ☐ 1. Holding time expired in transit
- ☐ 2. Sample received > 48 hrs. or 1/2 holding time has expired
- ☐ 3. Test added by client after expiration

Category II: Laboratory Dependent

- ☐ 4. Instrument failure
- ☐ 5. Analyst error
- ☐ 6. Login error
- ☐ 7. Miscommunication
- ☐ 8. Other (complete description required)

Category III: Analysis Reruns (QA/QC)

- ☐ 9. Surrogates
- ☐ 10. Internal Standards
- ☐ 11. Spike Recoveries
- ☐ 12. Blank Contamination

Category IV: Analysis Reruns (Confirmation)

- ☐ 13. Second column
- ☐ 14. Contamination check
- ☐ 15. Confirmation of matrix effects
- ☐ 16. Other (complete description required)

Quality Assurance/Quality Control

- ☐ 17. QC data reported outside of controls
- ☐ 18. Incorrect procedure used
- ☐ 19. SOP intentionally modified with QA and Tech. approval
- ☐ 20. Invalid instrument calibration
- ☐ 21. Insufficient sample received for proper analysis

Incorrect or Incomplete Client Deliverable

- ☐ 22. Hardcopy deliverable error
- ☐ 23. Electronic deliverable error

Reported detection limits elevated due to:

- ☐ 24. Sample matrix
- ☐ 25. Insufficient sample volume
- ☒ 26. Other (complete description required)
- ☒ 27. *Other (specify):* low density for volume

Comments/Explanation: QC matrix blank of ottawa sand in same geometry & with same count time has an MDA << RDL

Notification (check appropriate area):

Client notified by (name and date): _____

- ☒ in writing CN
- ☐ by telephone
- ☐ by facsimile
- ☐ other (explain)

Client's name and response: _____

- ☐ process "as is"
- ☐ on hold until _____
- ☐ re-sample
- ☐ other (explain)

Project Manager (signature and date): [signature] 2/10/98

QUANTERRA LABORATORY NONCONFORMANCE MEMO (NCM)

LOG#: RD-98-

Corrective Action

Root Cause Initial and date: MC 2-6-98

Low sample density, also high compton background of sample caused by high Cs137 activity. MC 2-6-98

Corrective Action Initial and Date: MC 2-6-98

Data accepted with MDAs achieved.

Sample + Duplicate results agree for Cs137DA, K40, Ra226 + U238 DHP but not for Co60. Suspect this is a matrix effect that Co60 not evenly distributed in sample. Recounted sample + duplicate at client request.

Responsibility for performing CA assigned to: Recount results reported, Co60 Not detected in either

Actions to prevent recurrence Initial and Date: MC 2-9-98

First Level Supervisor: [signature] Date: 2-6-98

Responsible Manager: [signature] Date: 2/17/98

Quality Assurance Review

☐ Anomaly ☐ Deficiency ☑ Rerun

☐ Further action required:

Assigned to:

QA signature: [signature] Date: 2-17-98

Corrective Action Verification

☑ Verified

☐ Cannot Verify (specify reason): N/A

Nonconformance Memo Closure

QA signature/date: [signature] 2-17-98

Quanterra Data Review Checklist
RADIOCHEMISTRY

Work Order number (s): 802006

Client ID: BHI

Due Date: 2-6-98

Lab Sample Number or SDG: W92220

Method Test Parameters: Alpha

Matrix: Other

Review Item	Yes (✓)	No (✓)	NA (✓)	2nd Level Review (✓)
A. Calibration				
1. Is the calibration documentation included where applicable?			—	
B. Sample Analysis				
1. Are the sample yields within acceptance criteria?			—	
2. Were all sample holding times met?	—			✓
3. Is the sample Minimum Detectable Activity < the Contract Detection Limit?	—			✓
C. QC Samples				
1. Is the blank yield within acceptance criteria			—	
2. Is the Minimum Detectable Activity for the blank result ≤ the Contract Detection Limit?	—			✓
3. Is the blank result < 1/2 the Contract Detection Limit?	—			✓
4. Is the blank > 1/2 the Contract Detection Limit but < Contract Detection Limit?			—	
5. Is the blank result > the Contract Detection Limit but the sample result < the Contract Detection Limit?			—	
6. Is the LCS result within acceptance criteria?	—			✓
7. Is the LCS yield within acceptance criteria			—	
8. Is the LCS Minimum Detectable Activity ≤ the Contract Detection Limit?	—			✓
9. MS/MSD results and yield meet acceptance criteria?			—	
10. Duplicate sample results and yield meet acceptance criteria?	—			✓
D. Other				
1. Are all Nonconformances included and noted?	INCm			✓
2. Are all required forms filed out?	—			✓
3. Correct methodology used?	—			✓
4. Transcription checked? JM 2-4-98	—			
5. Were all calculations checked at a minimum frequency?	—			
6. Units checked?	—			✓

Comments on any "No" response:

First Level Review: [signature] Date: 2-5-98

Second Level Review: [signature] Date: 2/10/98 MK 2-5-98

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Report re-count results for 80200601 + 80200607 D

QUANTERRA LABORATORY NONCONFORMANCE MEMO (NCM)

LOG #: RD-98-_____

Project ID: BHF NCM Initiated by: JK 2-5-98

Sample Numbers: 8200601, D02200601

Tests: alpha

Matrix: Other W02220

Analytical Area (check appropriate area):

- ☐ Sample control
- ☐ Organic preparation
- ☐ Inorganic preparation
- ☐ GC
- ☐ HPLC
- ☐ GC/MS
- ☐ Wet chemistry
- ☐ Metals
- ☐ Reporting
- ☒ Data review
- ☒ Radiochemistry
- ☐ Bioassay

Nonconformance (check appropriate area):

Holding Time Violations (exceeded by _____ days)

Category I: Laboratory Independent

- ☐ 1. Holding time expired in transit
- ☐ 2. Sample received > 48 hrs. or 1/2 holding time has expired
- ☐ 3. Test added by client after expiration

Category II: Laboratory Dependent

- ☐ 4. Instrument failure
- ☐ 5. Analyst error
- ☐ 6. Login error
- ☐ 7. Miscommunication
- ☐ 8. Other (complete description required)

Category III: Analysis Reruns (QA/QC)

- ☐ 9. Surrogates
- ☐ 10. Internal Standards
- ☐ 11. Spike Recoveries
- ☐ 12. Blank Contamination

Category IV: Analysis Reruns (Confirmation)

- ☐ 13. Second column
- ☐ 14. Contamination check
- ☐ 15. Confirmation of matrix effects
- ☐ 16. Other (complete description required)

Quality Assurance/Quality Control

- ☐ 17. QC data reported outside of controls
- ☐ 18. Incorrect procedure used
- ☐ 19. SOP intentionally modified with QA and Tech. approval
- ☐ 20. Invalid instrument calibration
- ☐ 21. Insufficient sample received for proper analysis

Incorrect or Incomplete Client Deliverable

- ☐ 22. Hardcopy deliverable error
- ☐ 23. Electronic deliverable error

Reported detection limits elevated due to:

- ☐ 24. Sample matrix
- ☐ 25. Insufficient sample volume
- ☐ 26. Other (complete description required)
- ☒ 27. *Other (specify):* Sample & Duplicate recounted

Comments/Explanation: _____

Notification (check appropriate area):

Client notified by (name and date): _____

- ☑ in writing CN
- ☐ by telephone
- ☐ by facsimile
- ☐ other (explain)

Client's name and response: _____

- ☐ process "as is"
- ☐ on hold until _____
- ☐ re-sample
- ☐ other (explain)

Project Manager (signature and date): [signature] 2/10/98

QUANTERRA LABORATORY NONCONFORMANCE MEMO (NCM)

LOG#: RD-98-

Corrective Action

Root Cause Initial and date: JK 2-5-98

RPD = 27% initial count

Corrective Action Initial and Date: JK 2-5-98

Recount data accepted with an RPD of approximately 15%.

Responsibility for performing CA assigned to:

Actions to prevent recurrence Initial and Date:

First Level Supervisor: Date: 2-5-98

Responsible Manager: Date: 2/17/98

Quality Assurance Review

☐ Anomaly ☐ Deficiency ☑ Rerun

☐ Further action required:

Assigned to:

QA signature: Date: 2-17-98

Corrective Action Verification

☑ Verified

☐ Cannot Verify (specify reason): N/A

Nonconformance Memo Closure

QA signature/date: 2-17-98

Quanterra Data Review Checklist
RADIOCHEMISTRY

Work Order number (s): 802006

Client ID: BH I

Due Date: 2-6-98

Lab Sample Number or SDG: WP2220

Method Test Parameters: Beta

Matrix: Other

Review Item	Yes (✓)	No (✓)	NA (✓)	2nd Level Review (✓)
A. Calibration				
1. Is the calibration documentation included where applicable?			✓	
B. Sample Analysis				
1. Are the sample yields within acceptance criteria?			✓	
2. Were all sample holding times met?	✓			✓
3. Is the sample Minimum Detectable Activity < the Contract Detection Limit?	✓			✓
C. QC Samples				
1. Is the blank yield within acceptance criteria			✓	
2. Is the Minimum Detectable Activity for the blank result ≤ the Contract Detection Limit?	✓			✓
3. Is the blank result < 1/2 the Contract Detection Limit?	✓			✓
4. Is the blank > 1/2 the Contract Detection Limit but < Contract Detection Limit?			✓	
5. Is the blank result > the Contract Detection Limit but the sample result < the Contract Detection Limit?			✓	
6. Is the LCS result within acceptance criteria?	✓			✓
7. Is the LCS yield within acceptance criteria			✓	
8. Is the LCS Minimum Detectable Activity ≤ the Contract Detection Limit?	✓			✓
9. MS/MSD results and yield meet acceptance criteria?			✓	
10. Duplicate sample results and yield meet acceptance criteria?	✓			✓
D. Other				
1. Are all Nonconformances included and noted?			✓	
2. Are all required forms filed out?	✓			✓
3. Correct methodology used?	✓			✓
4. Transcription checked? JM 2-4-98	✓			
5. Were all calculations checked at a minimum frequency?	✓			
6. Units checked?	✓			✓

Comments on any "No" response: _____

First Level Review: [signature] Date: 2-4-98

Second Level Review: [signature] Date: 2/10/98

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Quanterra Data Review Checklist
RADIOCHEMISTRY

Work Order number (s): 802006

Client ID: BHI

Due Date: 2-6-98

Lab Sample Number or SDG: WQ2220

Method Test Parameters: Total Sr

Matrix: Other

Review Item	Yes (✓)	No (✓)	NA (✓)	2nd Level Review (✓)
A. Calibration				
1. Is the calibration documentation included where applicable?			✓	
B. Sample Analysis				
1. Are the sample yields within acceptance criteria?	✓			✓
2. Were all sample holding times met?	✓			✓
3. Is the sample Minimum Detectable Activity < the Contract Detection Limit?	✓			✓
C. QC Samples				
1. Is the blank yield within acceptance criteria	✓			✓
2. Is the Minimum Detectable Activity for the blank result ≤ the Contract Detection Limit?	✓			✓
3. Is the blank result < 1/2 the Contract Detection Limit?	✓			✓
4. Is the blank > 1/2 the Contract Detection Limit but < Contract Detection Limit?			✓	
5. Is the blank result > the Contract Detection Limit but the sample result < the Contract Detection Limit?			✓	
6. Is the LCS result within acceptance criteria?	✓			✓
7. Is the LCS yield within acceptance criteria	✓			✓
8. Is the LCS Minimum Detectable Activity ≤ the Contract Detection Limit?	✓			✓
9. MS/MSD results and yield meet acceptance criteria?			✓	
10. Duplicate sample results and yield meet acceptance criteria?	✓			✓
D. Other				
1. Are all Nonconformances included and noted?			✓	
2. Are all required forms filed out?	✓			✓
3. Correct methodology used?	✓			✓
4. Transcription checked? zm 2-6-98	✓			
5. Were all calculations checked at a minimum frequency?	✓			
6. Units checked?	✓			✓

Comments on any "No" response: _____

First Level Review: [signature] Date: 2-6-98

Second Level Review: [signature] Date: 2/10/98

Form #: LS-038.2 /96, Rev.4

Quanterra Data Review Checklist
RADIOCHEMISTRY

Work Order number(s): 802006

Client ID: BHI

Due Date: 2-6-98

Lab Sample Number or SDG: W0220

Method Test Parameters: Pu-241

Matrix: Other

Review Item	Yes (✓)	No (✓)	NA (✓)	2nd Level Review (✓)
A. Calibration				
1. Is the calibration documentation included where applicable?			✓	
B. Sample Analysis				
1. Are the sample yields within acceptance criteria?	✓			✓
2. Were all sample holding times met?	✓			✓
3. Is the sample Minimum Detectable Activity < the Contract Detection Limit?	✓			✓
C. QC Samples				
1. Is the blank yield within acceptance criteria		✓	✓	
2. Is the Minimum Detectable Activity for the blank result ≤ the Contract Detection Limit?			✓	
3. Is the blank result < 1/2 the Contract Detection Limit?			✓	
4. Is the blank > 1/2 the Contract Detection Limit but < Contract Detection Limit?			✓	
5. Is the blank result > the Contract Detection Limit but the sample result < the Contract Detection Limit?			✓	
6. Is the LCS result within acceptance criteria?	✓			✓
7. Is the LCS yield within acceptance criteria		✓		
8. Is the LCS Minimum Detectable Activity ≤ the Contract Detection Limit?	✓			✓
9. MS/MSD results and yield meet acceptance criteria?			✓	
10. Duplicate sample results and yield meet acceptance criteria?	✓			✓
D. Other				
1. Are all Nonconformances included and noted?		✓ Non with Pu 80		✓
2. Are all required forms filed out?	✓			✓
3. Correct methodology used?	✓			✓
4. Transcription checked? am 2-11-98	✓			
5. Were all calculations checked at a minimum frequency?	✓			
6. Units checked?	✓			✓

Comments on any "No" response: _____

First Level Review: [signature] Date: 2-11-98

Second Level Review: [signature] Date: 2/17/98

Form #: LS-038.2 /96/ Rev.4

Quanterra Data Review Checklist
RADIOCHEMISTRY

Work Order number (s): 802C06

Client ID: BN I

Due Date: 2·6·98

Lab Sample Number or SDG: W02220

Method Test Parameters: Tc-99

Matrix: Other

Review Item	Yes (✓)	No (✓)	NA (✓)	2nd Level Review (✓)
A. Calibration				
1. Is the calibration documentation included where applicable?			—	
B. Sample Analysis				
1. Are the sample yields within acceptance criteria?			—	
2. Were all sample holding times met?	—			—
3. Is the sample Minimum Detectable Activity < the Contract Detection Limit?	—			—
C. QC Samples				
1. Is the blank yield within acceptance criteria			—	
2. Is the Minimum Detectable Activity for the blank result ≤ the Contract Detection Limit?	—			
3. Is the blank result < 1/2 the Contract Detection Limit?	—			—
4. Is the blank > 1/2 the Contract Detection Limit but < Contract Detection Limit?			—	
5. Is the blank result > the Contract Detection Limit but the sample result < the Contract Detection Limit?			—	
6. Is the LCS result within acceptance criteria?	—			—
7. Is the LCS yield within acceptance criteria			—	
8. Is the LCS Minimum Detectable Activity ≤ the Contract Detection Limit?	—			
9. MS/MSD results and yield meet acceptance criteria?	—			
10. Duplicate sample results and yield meet acceptance criteria?	—			
D. Other				
1. Are all Nonconformances included and noted?			—	
2. Are all required forms filed out?	—			
3. Correct methodology used?	—			
4. Transcription checked? 2·6·98 JM	—			
5. Were all calculations checked at a minimum frequency?	—			
6. Units checked?	—			

Comments on any "No" response: _____

First Level Review: Joel Klingerman Date: 2-6-98

Second Level Review: [illegible] Date: 2/10/98

Form #: LS-038.2 /96, Rev.4

CHAIN OF

CUSTODY FORMS

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B98-055-01	Page 1 of 2

Collector Bob Fahlberg	**Company Contact** Tom Brown	**Telephone No.** 376-1547	**Project Coordinator** KOERNER, CC
Data Turnaround 7day ~~15 Days~~ TH 2/2/98			
Project Designation 221-U Canyon Legacy Waste - Other Solid	**Sampling Location** 221-U canyon legacy waste		**SAF No.** B98-055
Ice Chest No.	**Field Logbook No.** EL 1309-1		**Method of Shipment** Gov Vehicle
Shipped To Quanterra Incorporated	**Offsite Property No.**		**Bill of Lading/Air Bill No.**

POSSIBLE SAMPLE HAZARDS/REMARKS
RAD

Special Handling and/or Storage
Cool to 4C

SAMPLE ANALYSIS

SDG W02220

80200501

				Preservation	Cool 4C	None	None	None	None	None	None	Cool 4C	Cool 4C	None
				Type of Container	sG	sG	sG	sG	sG	sG	sG	sG	sG	sG
				No. of Container(s)	1	1	1	1	1	1	1	1	1	1
				Volume	60ml	60ml	60ml	60ml	60ml	60ml	60ml	120ml	120ml	500ml
					VOA - 8260A (TCL)	Activity Scan	Americium-241; Isotopic Plutonium; Plutonium-241; Isotopic Uranium 802006	Gross Alpha; Gross Beta	pH (Soil) - 9045	Strontium-89,90 – Total Sr 802006	Technetium-99	PCBs - 8080	Semi-VOA - 8270A (TCL)	Metals by ICP (TCLP) - 1311/6010A; Mercury (TCLP) - 1311/7470
Sample No.	Matrix *	Sample Date	Sample Time											
B0N0L7	Other Solid	1-28-98	1400		X	X	X	X	X	X	X	X	X	X

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
[signature]	1/30/98 1445	[signature]	1-30-98 1405
		[signature]	

SPECIAL INSTRUCTIONS
** Close SDG upon receipt of samples.

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

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

0029

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B98-055-01	Page 2 of 2

Collector Bob Fahlberg	**Company Contact** Tom Brown	**Telephone No.** 376-1547	**Project Coordinator** KOERNER, CC
Project Designation 221-U Canyon Legacy Waste - Other Solid	**Sampling Location** 221-U canyon legacy waste		**SAF No.** B98-055
Ice Chest No.	**Field Logbook No.** EL 1309-1		**Method of Shipment** Gov Vehicle
Shipped To Quanterra Incorporated	**Offsite Property No.**		**Bill of Lading/Air Bill No.**

Data Turnaround 7 days ~~15 Days~~ TH 2/2/98

POSSIBLE SAMPLE HAZARDS/REMARKS
RAD

Special Handling and/or Storage
Cool to 4C

Preservation	None										
Type of Container	sG ✓										
No. of Container(s)	3										
Volume	500ml										
	See item (1) in Special Instructions.										

SAMPLE ANALYSIS
80200601

Sample No.	Matrix *	Sample Date	Sample Time										
B0N0L7	Other Solid	1-28-98	1400	X									

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By: Peter Nelson	Date/Time 1/30/98 1445	Received By: Karen Schlenting	Date/Time 1445 1/30/98
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS
"*" Close SDG upon receipt of samples.

(1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155)

Matrix *

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

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

802005-Chem
802006-Rad

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

Project	221 U Canyon	Leaggy Waste	
Customer ID	80N0L8	Other Solid	Bapalt
RCF ID	RCF2882		
	Sample time, date	1400	1/27/98
	Analysis date		1/28/98

Solid 300g

Isotope		Activity pCi/gm		2 s er	Ci/gm
K40		1.2e+01	+/-	8.4e+00	1.2e-11
Co60	<	8.7e-01			8.7e-13
I129	<	7.0e+00			7.0e-12
Cs137		9.0e+02	+/-	3.7e+01	9.0e-10
Eu152	<	4.3e+00			4.3e-12
Eu154	<	1.4e+00			1.4e-12
Eu155	<	6.7e+00			6.7e-12
Th232dau	<	4.7e+00			4.7e-12
U235	<	8.9e+00			8.9e-12
U238	<	1.1e+02			1.1e-10
U238dau	<	4.0e+00			4.0e-12
Np237	<	2.7e+00			2.7e-12
Am241	<	2.0e+00			2.0e-12
Tot Act Gam (pCi/gm)		9.1e+02			Ci/gm 9.1e-10
Y/Sr-90	<	N/R			
Gross Alpha		2.1e+01	+/-	3.4e+00	2.1e-11
Gross Beta		5.8e+02	+/-	4.3e+01	5.8e-10
AEA total	<	N/R			

CAT II 2/2/98

6300 < 10K pCi = CAT I

Reported as 137-Cs Betas. 174,000 > 100K pCi = CAT II

Total Activity (pCi/gm)	9.1e+02	< 2K pCi/g
(Ci/gm)	9.1e-10	

2/2/98

Note! 152-Eu is not a 100% Beta emitter.

Definitions.

All errors reported as 2 standard deviations
A Assigned as residual beta from Gamma/Beta balance
For soils and natural samples, the following applies:
The analysis of U238 is based on the activity of Pa234m

The analysis of Np237 is based on the activity of Pa233

U238dau is the activity of Pb214 and Bi214, short lived daughter products of U238. Equilibrium between parent and daughter products probably does not exist in disturbed materials

Th32dau is the activity of Ac228, Pb212, and Tl208, short lived daughter products of 232Th. Equilibrium between parent and daughter products may not exist in disturbed materials.

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

N/R means no result or analyses not requested.

Radiological Analyst 1-30-98 Date

Albert I. Davis 1/30/98 Date
Radiological Manager

Post-it® Fax Note 7671
To Al Davis
Co./Dept.
Phone #
Fax # 376-8851
Date 1-30-98
From A. Davis
Co.
Phone # 373-9731
Fax #

Figure 1

SAMPLE CHECK-IN LIST

Date/Time Received: 1-30-98 SG#: W02220

Work Order Number: 802005 + 006 SAF #: B98-054 B98-055

Shipping Container ID: SML-SSS Chain of Custody #: B98-054-1 B98-055-01

1. Custody Seals on shipping container intact? Yes [] No [✓]
2. Custody Seals dated and signed? Yes [] No [✓]
3. Chain-of-Custody record present? Yes [] No [✓]
4. Cooler temperature 4°C
5. Vermiculite/packing materials is Wet [] Dry [✓]
6. Number of samples in shipping container: 22
7. Sample holding times exceeded? Yes [] No [✓]

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

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

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

Sample Custodian/Laboratory: [signature] Date: 1-30-98

Telephoned To: _____ On _____ By _____

0032

*** AM-241 ***

Due 2-6-98

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

2-Feb-1998
Page 1

CUSTOMER: BHI SAF

SAMPLE DELIVERY GROUP W02220

MATRIX : OTHER B98-055

BATCH NUMBER 02-006

	GES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
	JC200613				
	JC200613 IQC 155 / IQHI 318 / EQAJ 031				
1)	80200601		BHI	BONOL 7	ALIQUOT REDUCED DUE TO -2 REGRINDS
	PC200601				

ACTIONS (Initial & Date)

1) INITIATED JH 2/2/98

SOP(S) # RD

2) PREP LAB RECEIVED JH 2-2-98

SOP(S) # RICHRC013

3) JH RICHRC014 2-3-98
SAMPLE REMAINDER STORED JH 2-3-98

SOP(S) # NA

4) SEPARATION LAB RECEIVED 2/5/98 CS 5-057

SOP(S) # RICHRC5010 2/6/98

RD 2/6/98

cppt RD 2/9/98
RICHRC5003

5) COUNTING/MEASUREMENT LAB 2/9/98

SOP(S) # RICHRC0002

6) DATA REVIEWED AND ANALYTICAL PREP STORED 2-10-98

SOP(S) # RICHRC0002 Rev 1

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

2-Feb-1998
Page 1

SAF
M18-055

SAMPLE DELIVERY GROUP W02220

BATCH NUMBER 02-006

.D	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
J02006 1B				
J02CC61S IQH1318 / FQO185 / EQAJ031				
) 80200601		BHI	RONOL7	ALIQUOT REDUCED DUE TO SCREENING
P0200601				

ACTIONS (Initial & Date)

1) INITIATED JH 2/2/98
SOP(S) # RO0002

2) PREP LAB RECEIVED 2-6-98
SOP(S) # RICHRC5013

3) 2-3-98 RICHRC5019
SAMPLE REMAINDER STORED 2-3-98
SOP(S) # N/A

4) SEPARATION LAB RECEIVED 2/5/98 CS
SOP(S) # RICHRC5057
RICHRC5010
ED RO 2/6/98
RichRC5039

5) COUNTING/MEASUREMENT LAB (B) 2/6/98
SOP(S) # RICHRDOC08 R.0

6) DATA REVIEWED AND ANALYTICAL PREP STORED 2-10-98
SOP(S) # RICHRC0002 Rev 1

Due 2-6-98

*** U(SD) ***

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

2-Feb-1998
Page 1

CUSTOMER: BHI SAF

SAMPLE DELIVERY GROUP W02220

MATRIX : OTHER B98-055

BATCH NUMBER 02-006

	QES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
	T02006TB				
	T0200613			EQIE230	
1)	80200601		BHI	HONOL 7	ALIQUOT REDUCED DUE TO SCREENING
	D0200601				

ACTIONS (Initial & Date)

1) INITIATED JH 2/2/98

SOP(S) # RD0002

2) PREP LAB RECEIVED 2/2-2-98

SOP(S) # RICHRC0013

3) SAMPLE REMAINDER STORED 2/2-3-98

SOP(S) # VA

4) SEPARATION LAB RECEIVED 02/05/98 fa

SOP(S) # RICHRC 5030

ED RB 2-6-98

ISO Extraction RichRc5039

2/5/98 DM

RICHRC 5020

5) COUNTING/MEASUREMENT LAB (R) 2/6/98

SOP(S) # RICHRD0008 R.0

6) DATA REVIEWED AND ANALYTICAL PREP STORED JRC 2-9-98

SOP(S) # RICHRC0002 Rev1

Quanterra Environmental Services

DUE DATE 2-6-98

*** RECOUNT REQUEST ***

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

CUSTOMER BHI

MATRIX Other

ANALYSIS Gamma

SAMPLE DELIVERY GROUP W0222O

BATCH NUMBER

LAB SAMPLE ID	CUSTOMER ID	COMMENTS
1) 80200601		
2) D0200601		
3)		
4)		
5)		
6)		
7)		
8)		
9)		
10)		
11)		
12)		
13)		
14)		
15)		
16)		
17)		
18)		
19)		
20)		

ACTIONS (Initial & Date)

1) INITIATED MK 2-6-98
SOP(S) # RICHRC0002 Rev 1

2) COUNTING/MEASUREMENT LAB RECEIVED 2/6/98
SOP(S) # RICHR00007

3) DATA REVIEWED AND ANALYTICAL PREP STORED MK 2-8-98 MK 2-9-98
SOP(S) # RICHRC0002 Rev 1

RC-126 10/96 REV 0

GAMMA

Dup 2-6-98

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

2-Feb-1998
Page 1

CUSTOMER: BHI SAF

SAMPLE DELIVERY GROUP W02220

MATRIX : OTHER B98-055

BATCH NUMBER 02-006

	GES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
	~~J0200618~~ J0206/M	~~J0200618~~ CAL 491	~~J0200618~~	03BK	
1)	80200601 PC200601		BHI	BONOI 7	

ACTIONS (Initial & Date)

1) INITIATED 2/2/98
SOP(S) # RD

2) PREP LAB RECEIVED 2-2-98
SOP(S) # RICHRC5013/RICHRC5017

3) SAMPLE REMAINDER STORED 2-3-98
SOP(S) # NA

4) SEPARATION LAB RECEIVED
SOP(S) #

5) COUNTING/MEASUREMENT LAB 2/3/98 2/3/98
SOP(S) # ACHRD00037

6) DATA REVIEWED AND ANALYTICAL PREP STORED 2-6-98 2-6-98
SOP(S) # RICHRC0002 Rev 1

Quanterra Environmental Services

DUE DATE 2-6-98

*** RECOUNT REQUEST ***

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

CUSTOMER BHI

MATRIX Other

ANALYSIS alpha

SAMPLE DELIVERY GROUP W02220

BATCH NUMBER

LAB SAMPLE ID	CUSTOMER ID	COMMENTS
1) 802006 01		
2) D02006 01		
3)		
4)		
5)		
6)		
7)		
8)		
9)		
10)		
11)		
12)		
13)		
14)		
15)		
16)		
17)		
18)		
19)		
20)		

ACTIONS (Initial & Date)

1) INITIATED MK 2-4-98
SOP(S) # RICHRC0002 Rev 1

2) COUNTING/MEASUREMENT
LAB RECEIVED 2/4/98
SOP(S) # RICHRD0003

3) DATA REVIEWED AND
ANALYTICAL PREP STORED MK 2-5-98
SOP(S) # RICHRC0002 Rev 1

RC-126 10/96 REV 0

Due 2-6-98

*** ALPHA ***

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

2-Feb-1998
Page 1

CUSTOMER: BHI SAF SAMPLE DELIVERY GROUP W02220

MATRIX : OTHER B98-055 BATCH NUMBER 02-006

QES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
J020061B				
J020061S EQEG1916				10.136 ± 0.089814 DPM
1) 80200601		BHI	BONOL 7	
D020601				

ACTIONS (Initial & Date)

1) INITIATED JH 2/2/98
SOP(S) # RD8807

2) PREP LAB RECEIVED JH 2-2-98
SOP(S) # RICHRC013/RD3222

3) SAMPLE REMAINDER STORED JH 2-3-98
SOP(S) # NA

4) SEPARATION LAB RECEIVED
SOP(S) #

5) COUNTING/MEASUREMENT LAB 2/3/98
SOP(S) # RICHRD0003

6) DATA REVIEWED AND ANALYTICAL PREP STORED MK 2-4-98
SOP(S) # RICHRC0002 Rev1

*** BETA ***

Due 98
2-6-98

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

2-Feb-1998
Page 1

CUSTOMER: BHI SAF

SAMPLE DELIVERY GROUP W02220

MATRIX : OTHER B98-055

BATCH NUMBER 02-006

	QES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
	J0200618				
	J0200615		QAU 602		30.168 ± 0.37649 DPM
1)	80200601		BHI	BONOL 7	
	P0200601				

ACTIONS (Initial & Date)

1) INITIATED JH 2/2/98

SOP(S) # R03800

2) PREP LAB RECEIVED JH 2-2-98

SOP(S) # RICHRC013/R03222

3) SAMPLE REMAINDER STORED JH 2-3-98

SOP(S) # NA

4) SEPARATION LAB RECEIVED

SOP(S) #

5) COUNTING/MEASUREMENT LAB 2/3/98

SOP(S) # RICHRD0003

6) DATA REVIEWED AND ANALYTICAL PREP STORED JMC 2-4-98

SOP(S) # RICHRC0002

Mel 98
2-6-98

*** TOTAL-SR ***

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

2-Feb-1998
Page 1

CUSTOMER: BHI SAF SAMPLE DELIVERY GROUP WD2220

MATRIX : OTHER B98-055 BATCH NUMBER D2-0006

	QES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
	JC200618				
	JC200615				
1)	80200601		BHI	RONOL 7	
	D0200601	Dup			

ACTIONS (Initial & Date)

1) INITIATED JH 2/2/98
SOP(S) # RD7800

2) PREP LAB RECEIVED pl 2-2-98
SOP(S) # RICHRC 5016-1

3) SAMPLE REMAINDER STORED 2-3-98 DR
SOP(S) # ok

4) SEPARATION LAB RECEIVED 2/4/98 RTM
SOP(S) # RICHRC 5006/2

5) COUNTING/MEASUREMENT LAB 2/6/98 d
SOP(S) # RICHRD0003

6) DATA REVIEWED AND ANALYTICAL PREP STORED MC 2-6-98
SOP(S) # RICHRC0002 fed

prep 2 recd: 2-3-98 DR
RICHRC 5016-1

Aliquot reduced due to high α β screening results DR 2-4-98

SA appears to be something mixed w/sand DR 2-4-98

*** PU-241 ***

Due 2-6-98

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

2-Feb-1998
Page 1

CUSTOMER: BHI SAF

SAMPLE DELIVERY GROUP W002220

MATRIX OTHER B98-005

BATCH NUMBER 02-006

	QES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
	J0200613	Pu241	Pu	Am	
	J0200615	EQAJ031	IQHI318	IQ0195	
1)	80200601		BHI	BONOI 7	
	DC200601				

ACTIONS (Initial & Date)

1) INITIATED JH 2/2/98

SOP(S) # RD8802

2) PREP LAB RECEIVED JH 2-2-98

SOP(S) # RICHRC513

3) JH RICHRC5019 2-3-98 SAMPLE REMAINDER STORED JH 2 3-98

SOP(S) # NA

4) SEPARATION LAB RECEIVED RO 2/10/98

SOP(S) # RICHRC5010

5) COUNTING/MEASUREMENT LAB 2/10/98

SOP(S) # RICHRC0002 2/10/98

6) DATA REVIEWED AND ANALYTICAL PREP STORED JK 2-11-98

SOP(S) # RICHRC0002 Rev 1 JK 2-11-98

0042

*** TC-99 ***

Due 98
2-6

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

2-Feb-1998
Page 1

CUSTOMER: BHI SAF

SAMPLE DELIVERY GROUP W07770

MATRIX : OTHER B98-055

BATCH NUMBER 02-006

	QES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
1)	80200601		BHI	BONOL 7	

ACTIONS (Initial & Date)

1) INITIATED JH 2/2/98

SOP(S) # RD 0001

2) PREP LAB RECEIVED JH 2-2-98

SOP(S) # ~~RB 2/4/98~~ RB 2/4/98

3) SAMPLE REMAINDER STORED ~~RICHC5029~~

SOP(S) # _____

4) SEPARATION LAB RECEIVED RB 2/5/98

SOP(S) # RICHC5029

5) COUNTING/MEASUREMENT LAB 2/5/98 ml

SOP(S) # RICHRD0001

6) DATA REVIEWED AND ANALYTICAL PREP STORED JK 2-6-98

SOP(S) # RICHRC0002 Rev 1