9613477.1929

START

0045301 W0823

Quanterra
Environmental Services

160 2

CERTIFICATE OF ANALYSIS

Bechtel Hanford Incorporated
P.O. Box 1970
Richland, Washington 99352

December 22, 1995

Attention: Joan Kessner

SEP 1996 RECEIVED EDMC

JAN 1996 RECEIVED Data Log In

Project number	:	550.111
Date Received by Lab	:	November 28, 1995
Number of Samples	:	Six (6)
Sample Type	:	Solid
SDG Number	:	W0823
Data Deliverable	:	Summary

I. Introduction

On November 28, 1995, six (6) water samples were received by Quanterra, Richland and transferred to Quanterra, St. Louis for chemical analysis. Upon receipt, the samples were given the following laboratory ID numbers to correspond with the specific client IDs:

St Louis ID	WHC ID	Richland ID	Matrix	Date of Receipt
9901-001	B0GL71	51131001	Solid	11/28/95
9901-002	B0GL73	51131002	Solid	11/28/95
9901-003	B0GL75	51131003	Solid	11/28/95
9901-004	B0GL79	51131004	Solid	11/28/95
9901-005	B0GL81	51131005	Solid	11/28/95
9901-006	B0GL86	51131006	Solid	11/28/95

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: Chromium, Lead, Cadmium, and Nickel by EPA method 6010.

Quanterra
Environmental Services

III. Quality Control

A Laboratory Control Sample and Method Blank were analyzed with each preparation batch. Matrix Spike and Matrix Spike Duplicate or Sample Duplicate analyses were performed per the protocol for each analyte.

IV. Definitions

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

QCBLK- Quality Control Blank, Method Blank
QCLCS- Quality Control Laboratory Control Sample, Blank Spike

V. Comments

Metals
No comments were doucmented for this analysis.

9613477.1931

Quanterra
Environmental Services

Quanterra Incorporated
13715 Rider Trail North
Earth City, Missouri 63045
314 298-8566 Telephone
314 298-8757 Fax

Bechtel Hanford Incorporated
December 22, 1995
Project Number: 550.111
SDG: W0823
Page 3

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:

Wade H. Price
Project Manager
e:\\price$\abbydave\hanw0823.nar

00003A

Quanterra November 30, 1995 11:16 am

Account: 10722 Project: 550.111 Quanterra Richland QAS No. 550.111 Rev. 0

Master Sample Login: 9901

Project Manager: W. Price

Draft: Final: Entered and Reviewed by: S. Sourie PM Review: Abby Wold

Sample Header Template:

Sample No. / Comments	Client ID	C-Matrix	Date Collected	Received	Due	Shipper	Rad Category	Rad Sample No.
9901-001	B0GL71	Soil	09-NOV-95 09:18	28-NOV-95 11:10	02-JAN-96	FED-EX	2	R4450-006
RICHLAND I.D. 51131001 ICAP=Cr, Cd, Pb, Ni ONLY								

#	Container Type	Analysis	Class	Preservative	Anal Due Date	Hold Date	Site	(Container Numbers:% Filled)
1	AN - Amber Glass-60ML	ICAP/6010/Q4	S	COLD	26-DEC-95	07-MAY-96	S3B	(199271:100)
1		PM/IT/Q4	S	COLD	26-DEC-95	07-MAY-96	S3B	(199271:100)

Sample No.	Client ID	C-Matrix	Date Collected	Received	Due	Shipper	Rad Category	Rad Sample No.
9901-001MS	B0GL71	Soil	09-NOV-95 09:18	28-NOV-95 11:10	02-JAN-96	FED-EX	2	R4450-006
RICHLAND I.D. 51131001 ICAP=Cr, Cd, Pb, Ni ONLY								

#	Container Type	Analysis	Class	Preservative	Anal Due Date	Hold Date	Site	(Container Numbers:% Filled)
1	AN - Amber Glass-60ML	ICAP/6010/Q4	S	COLD	26-DEC-95	07-MAY-96	S3B	(199271:100)

Sample No.	Client ID	C-Matrix	Date Collected	Received	Due	Shipper	Rad Category	Rad Sample No.
9901-001MSD	B0GL71	Soil	09-NOV-95 09:18	28-NOV-95 11:10	02-JAN-96	FED-EX	2	R4450-006
RICHLAND I.D. 51131001 ICAP=Cr, Cd, Pb, Ni ONLY								

#	Container Type	Analysis	Class	Preservative	Anal Due Date	Hold Date	Site	(Container Numbers:% Filled)
1	AN - Amber Glass-60ML	ICAP/6010/Q4	S	COLD	26-DEC-95	07-MAY-96	S3B	(199271:100)

Sample No.	Client ID	C-Matrix	Date Collected	Received	Due	Shipper	Rad Category	Rad Sample No.
9901-002	B0GL73	Soil	10-NOV-95 08:26	28-NOV-95 11:10	02-JAN-96	FED-EX	1	R4450-005
RICHLAND I.D. 51131002 ICAP=Cr, Cd, Pb, NI ONLY								

#	Container Type	Analysis	Class	Preservative	Anal Due Date	Hold Date	Site	(Container Numbers:% Filled)
1	AN - Amber Glass-60ML	ICAP/6010/Q4	S	COLD	26-DEC-95	08-MAY-96	S3B	(199272:100)
1		PM/IT/Q4	S	COLD	26-DEC-95	08-MAY-96	S3B	(199272:100)

Sample No.	Client ID	C-Matrix	Date Collected	Received	Due	Shipper	Rad Category	Rad Sample No.
9901-003	B0GL75	Soil	10-NOV-95 08:26	28-NOV-95 11:10	02-JAN-96	FED-EX	1	R4450-004
RICHLAND I.D. 51131003 ICAP=Cr, Cd, Pb, Ni ONLY								

#	Container Type	Analysis	Class	Preservative	Anal Due Date	Hold Date	Site	(Container Numbers:% Filled)
1	AN - Amber Glass-60ML	ICAP/6010/Q4	S	COLD	26-DEC-95	08-MAY-96	S3B	(199273:100)
1		PM/IT/Q4	S	COLD	26-DEC-95	08-MAY-96	S3B	(199273:100)

Sample No.	Client ID	C-Matrix	Date Collected	Received	Due	Shipper	Rad Category	Rad Sample No.
9901-004	B0GL79	Soil	15-NOV-95 07:45	28-NOV-95 11:10	02-JAN-96	FED-EX	1	R4450-003
RICHLAND I.D. 51131004 ICAP=Cr, Cd, Pb, Ni ONLY								

#	Container Type	Analysis	Class	Preservative	Anal Due Date	Hold Date	Site	(Container Numbers:% Filled)
1	AN - Amber Glass-60ML	ICAP/6010/Q4	S	COLD	26-DEC-95	13-MAY-96	S3B	(199274:100)
1		PM/IT/Q4	S	COLD	26-DEC-95	13-MAY-96	S3B	(199274:100)

Sample No.	Client ID	C-Matrix	Date Collected	Received	Due	Shipper	Rad Category	Rad Sample No.
9901-005	B0GL81	Soil	15-NOV-95 09:07	28-NOV-95 11:10	02-JAN-96	FED-EX	1	R4450-002
RICHLAND I.D. 51131005 ICAP=Cr, Cd, Pb, Ni ONLY								

#	Container Type	Analysis	Class	Preservative	Anal Due Date	Hold Date	Site	(Container Numbers:% Filled)
1	AN - Amber Glass-60ML	ICAP/6010/Q4	S	COLD	26-DEC-95	13-MAY-96	S3B	(199275:100)
1		PM/IT/Q4	S	COLD	26-DEC-95	13-MAY-96	S3B	(199275:100)

Sample No.	Client ID	C-Matrix	Date Collected	Received	Due	Shipper	Rad Category	Rad Sample No.
9901-006	B0GL86	Soil	16-NOV-95 07:50	28-NOV-95 11:10	02-JAN-96	FED-EX	1	R4450-001
RICHLAND I.D. 51131006 ICAP=Cr, Cd, Pb, Ni ONLY								

3*-Sample has not been rad screened.

0000004

9601/16/04

Quanterra November 30, 1995 11:16 am

Account: 10722 Project: 550.111 Quanterra-Richland QAS No. 550.111 Rev. 0

Master Sample Login: 9901

Project Manager: W. Price

Draft: Final: Entered and Reviewed by:_____ PM Review:_____

Sample Header Template: _____

Sample No. #	Client ID / Comments / Container Type	Analysis	C-Matrix / Class	Date: Collected / Preservative	Received / Anal. Due Date	Due / Hold Date	Shipper / Site	Rad Category / (Container Numbers:% Filled)	Rad Sample No.
Data:									
1	AN - Amber Glass-60ML	ICAP/6010/Q4	S	COLD	26-DEC-95	14-MAY-96	S3B	(199276:100)	
1		PM/IT/Q4	S	COLD	26-DEC-95	14-MAY-96	S3B	(199276:100)	

3*-Sample has not been rad screened.

9613477.1973

0000005

Temp 3°c Cur# 5905

To: St Louis

Chain of Custody Record

Quanterra Environmental Services

QUA-4124-1

Client: Bechtel Hanford	Project Manager: Van Pettey	Date: 11-28-95	Chain Of Custody Number: 43702
Address:	Telephone Number (Area Code)/Fax Number:	Lab Number:	Page 1 of 1
City:	State:	Zip Code:	
Site Contact:	Lab Contact:		
Project Name: SAF B95-089	Carrier/Waybill Number:		
Contract/Purchase Order/Quote No.:			

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

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
51131001 B06-L71											
2 L73											
3 L75											
4 L79											
5 L81											
6 L86											

SEE CoC

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 ____

QC Requirements (Specify): SDG W0813

1. Relinquished By: Heidelberg Quanterra	Date: 11-28-95	Time: 16:00	1. Received By: [signature]	Date: 11-29-95	Time: 0830
2. Relinquished By	Date	Time	2. Received By	Date	Time
3. Relinquished By	Date	Time	3. Received By	Date	Time

Comments

DISTRIBUTION: WHITE - Stays with the Sample; YELLOW - Sample Receipt

9000006

9511271.1196

Bechtel Hanford, Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	Page ____ of ____
		Data Turnaround: ☐ Priority ■ Normal

Collector: W. S. Thompson	Company Contact: K. L. Sykes / W. S. Thompson	Telephone: (509) 376-8031
Project Designation: 1301N/1325N SI (Limited Field Investigation)	Sampling Location: 1301-N/1325-N Cribs 100N	SAF No.: B95-089
Ice Chest No.: ER-210	Field Logbook No.: EL-1275	Method of Shipment: Hand Carry in DOE vehicle.
Shipped To: QUANTERRA	Offsite Property No.: N/A	Bill of Lading/Air Bill No.: N/A

Possible Sample Hazards/Remarks: Radioactive

Special Handling and/or Storage

SAMPLE ANALYSIS: 511310 SDG W0813

	Preservation	NONE	NONE	NONE
	Type of Container	Glass	Glass	Plastic
	No. of Container(s)	1	1	1
	Volume	60 ml 40 ml 11/19/95	60 ml.	20 ml.
		ICP Metals Cadmium Chromium Lead Nickel	Radio-nuclides (see note #1)	Activity Scan

	Sample No.	Matrix*	Date Sampled	Time Sampled					
1	BOGL71	Soil	11/09/95	0918	X	X	X		1006
2	BOGL73	SOIL	11/10/95	0826	X	X	X		
3	BOGL75	SOIL	11/10/95	0826	X	X	X		
4	BOGL79	SOIL	11/15/95	0745	X	X	X		
5	BOGL81	SOIL	11/15/95	0907	X	X	X		
6	BOGL86	Soil	11/16/95	0750	X	X	X		

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
W S Thompson	11/28/95 0907	Bullitter	11-28-95 0907
Bullitter	11-28-95 1110	Karen Dahl Lindsay	11-28-95 1110

SPECIAL INSTRUCTIONS

Note #1: Radionuclides - Gross alpha; gross beta; Sr-90; U-233,U-234; U-238; Pu-238; Pu-239/240; Gamma Spec (to include) - K-40, Mn-54, C0-60, Ru-106, Cs-134, Cs-137, Ce-144, Eu-154, Eu-155, Ra-226, Th-228, Th-232.

SUMMARY DATA DELIVERABLES

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

9513172.1855

0000007

RL 4450

to Joe K. 11/29/95

Client Sample Screening Results

28-Nov-95

CLIENT CODE ID	MATRIX	RECEIVED	DETECTOR	ACQ DATE	SAMPLE	MINUTES	CNTS A	NET CPM A	CNTS B	NET CPM B
WHC B0GL71		11/28/95 11:00:00 AM	QUAD22D	11/28/95 2:15:38 PM	B0GL71	30	312	10.335	16672	554.785
	SOLID		Bkg:	11/28/95 1:32:58 AM	BKG	600	39	0.065	569	0.9483333

Anl Date: 11/28/95 Tot Sa, Alq: 3.28E+02 , 6.32E+01 Alp; (Dpm/ 2.17E+01 (uCi/ 5.08E-02 (pCi/ 1.55E+02 ± 1.4E+01 CAT III 3.2E-01 Lab Alq
Ppt mg: 63.2 Units: g , mg Bet; Alq): 1.17E+03 Sa): 2.73E+00 Lig): 8.33E+03 ± 6.4E+01 1.2E-02 Lig

WHC B0GL73		11/28/95 11:00:00 AM	QUAD23A	11/28/95 2:15:42 PM	B0GL73	30	31	0.965	3371	111.41
	SOLID		Bkg:	11/28/95 1:33:06 AM	BKG	600	41	0.06833333	574	0.9566667

Anl Date: 11/28/95 Tot Sa, Alq: 2.72E+02 , 3.45E+01 Alp; (Dpm/ 1.94E-01 (uCi/ 6.90E-04 (pCi/ 2.54E+00 ± 8.7E+00 CAT II 2.0E+01 Lab Alq
Ppt mg: 34.5 Units: g , mg Bet; Alq): 2.25E+02 Sa): 8.00E-01 Lig): 2.94E+03 ± 5.1E+01 3.4E-02 Lig

WHC B0GL75		11/28/95 11:00:00 AM	QUAD23B	11/28/95 2:15:42 PM	B0GL75	30	19	0.57	1816	59.623333
	SOLID		Bkg:	11/28/95 1:33:06 AM	BKG	600	38	0.06333333	546	0.91

Anl Date: 11/28/95 Tot Sa, Alq: 2.76E+02 , 1.92E+01 Alp; (Dpm/ 3.10E-01 (uCi/ 2.01E-03 (pCi/ 7.27E+00 ± 1.3E+01 CAT II 6.9E+00 Lab Alq
Ppt mg: 19.2 Units: g , mg Bet; Alq): 1.18E+02 Sa): 7.63E-01 Lig): 2.77E+03 ± 6.6E+01 3.6E-02 Lig

WHC B0GL79		11/28/95 11:00:00 AM	QUAD23C	11/28/95 2:15:42 PM	B0GL79	30	11	0.30333333	48	0.6033333
	SOLID		Bkg:	11/28/95 1:33:06 AM	BKG	600	38	0.06333333	598	0.9966667

Anl Date: 11/28/95 Tot Sa, Alq: 3.36E+02 , 7.39E+01 Alp; (Dpm/ 1.79E+00 (uCi/ 3.66E-03 (pCi/ 1.09E+01 ± 6.4E+00 CAT I 4.6E+00 Lab Alq
Ppt mg: 73.9 Units: g , mg Bet; Alq): 1.10E+00 Sa): 2.26E-03 Lig): 6.73E+00 ± 3.0E+00 1.3E+01 Lig

WHC B0GL81		11/28/95 11:00:00 AM	QUAD23D	11/28/95 2:15:42 PM	B0GL81	30	16	0.48	286	5.9133333
	SOLID		Bkg:	11/28/95 1:33:06 AM	BKG	600	32	0.05333333	572	0.9533333

Anl Date: 11/28/95 Tot Sa, Alq: 3.47E+02 , 3.18E+01 Alp; (Dpm/ 1.62E+00 (uCi/ 8.95E-03 (pCi/ 2.58E+01 ± 1.1E+01 CAT I 1.9E+00 Lab Alq
Ppt mg: 31.8 Units: g , mg Bet; Alq): 1.16E+01 Sa): 5.72E-02 Lig): 1.65E+02 ± 1.4E+01 6.1E-01 Lig

Reviewed 11/28/95 [illegible]

28-Nov-95

(no info. for B0GL86.)

8000008

CLIENT CODE ID	MATRIX	RECEIVED	DETECTOR	ACQ DATE	SAMPLE	MINUTES	CNTS A	NET CPM A	CNTS B	NET CPM B
WHC B0GL86		11/28/95 11:00:00 AM	QUAD24A	11/28/95 2:15:34 PM	B0GL86	30	11	0.295	407	12.643333
	SOLID		Bkg:	11/28/95 1:32:54 AM	BKG	600	43	0.07166667	554	0.9233333
Anl Date: 11/28/95	Tot Sa, Alq: 3.45E+02	, 3.42E+01	Alp; (Dpm/ 7.80E-01	(uCi/ 3.54E-03	(pCi/ 1.03E+01	± 9.9E+00	CAT II	4.9E+00	Lab	
Ppt mg: 34.2	Units: g	, mg	Bet; Alq): 2.61E+01	Sa): 1.19E-01	Lig): 3.44E+02	± 1.8E+01		2.9E-01	Alq Lig	
WHC B0GRM9		11/28/95 11:00:00 AM	QUAD24B	11/28/95 2:15:34 PM	B0GRM9	30	34	1.04166667	91	2.01
	LIQUID		Bkg:	11/28/95 1:32:54 AM	BKG	600	55	0.09166667	614	1.0233333
Anl Date: 11/28/95	Tot Sa, Alq: 1.00E+00	, 1.00E+01	Alp; (Dpm/ 3.24E+00	(uCi/ 1.46E-04	(pCi/ 1.46E+02	± 3.2E+01	CAT I	1.7E-01	Lab	
Ppt mg: 4.4	Units: L	, ml	Bet; Alq): 3.32E+00	Sa): 1.50E-04	Lig): 1.50E+02	± 2.7E+01		3.3E-01	Alq Lig	
WHC B0GRN0		11/28/95 11:00:00 AM	QUAD24C	11/28/95 2:15:34 PM	B0GRN0	30	23	0.68833333	101	2.37
	LIQUID		Bkg:	11/28/95 1:32:54 AM	BKG	600	47	0.07833333	598	0.9966667
Anl Date: 11/28/95	Tot Sa, Alq: 1.00E+00	, 1.00E+01	Alp; (Dpm/ 2.10E+00	(uCi/ 9.44E-05	(pCi/ 9.44E+01	± 2.8E+01	CAT I	2.6E-01	Lab	
Ppt mg: 4.7	Units: L	, ml	Bet; Alq): 4.11E+00	Sa): 1.85E-04	Lig): 1.85E+02	± 2.8E+01		2.7E-01	Alq Lig	

Reviewed 11/29/95

TOTAL P.11
0000009

9613477.1938

Environmental Restoration Contractor **ERC Team**

Interoffice Memorandum

Job No. 22192
Written Response Required? NO
Closes CCN: N/A
OU: 100-NR-1
TSD: N/A
ERA: N/A
Subject Code: 8610

TO: RC Smith B1-35

DATE: November 27, 1995

COPIES: See Below

FROM: WS Thompson 11/27/95
ER Field Sampling
N1-28 / 6-8031

SUBJECT: **ESTIMATE OF CURIE CONTENT FOR SOIL SAMPLES SHIPPED ON NOVEMBER 28, 1995, TO QUANTERRA FROM THE 1301N/1325N CRIB DRILLING PROJECT**

This memo provides estimated curie content information for 6 soil samples (B0GL71, B0GL73, B0GL75, B0GL79, B0GL81, B0GL86) to be shipped to Quanterra on November 28, 1995. The information is provided in order for Quanterra to evaluate acceptance of the samples in accordance with their NRC license. A Radioactive Shipment Record (RSR) will accompany the samples stating the isotopes and the curie content of the shipment. An onsite lab provided detailed analytical data which was used to prepare the RSR, however, this isotopic specific data will not be provided to Quanterra as it could be viewed as compromising the independence of the requested analysis to be performed by Quanterra. Therefore, in lieu of a laboratory total activity report, the following Curie data is provided:

- Five of the soil samples have detectable radioactivity.
- For the five samples, an approximate total soil sample weight it 1120 grams. This is determined using the formula, 140 ml x 1.6 gm/ml, for Hanford soil. The samples were not weighed and 1.6 gms/ml is a Hanford site specific soil weight.
- Using available data, the approximate curie content for the five radioactive samples is:
  Total alpha - 690 picocuries
  Total beta - 1.81 microcuries
  Total Co60 - 0.13 microcuries
  Total Cs137 - 0.82 microcuries
  Total Sr90 - I still need data to complete-will have later today - about 0.7 microcuries

Additionally, each soil sample has an accompanying activity scan aliquot for Quanterra to conduct radiological screening to evaluate acceptance criteria.

If you have any questions, please give me a call.

WST:wst

Copies
BHI Document Control H4-79
KL Sykes X0-37
JH Kessner B1-35
JA Lerch B1-35
RL Weiss B1-35

9613477.1939

RADIOACTIVE SHIPMENT RECORD

3. Page 1 of 1 — 34764

1. SHIP TO
Company: Quantera
Address: 2800 GEORGE WASH. WAY
City, State, Zip: Richland WA 99352
Attention: Karen Ackenburgh
Phone: 375-3131 EXT 135

2. SHIP FROM U.S. DEPT. OF ENERGY C/O
Company: Bechtel Hanford Co
Address: 100N/1301-1325 CKIBS
City, State, Zip: Richland, WA 99352
Contact: Wendy Thompson
Phone: 376-8031

4. Ship: [X] Prepaid [ ] Collect
Via: [X] Motor-~~Rail~~ [ ] Air Psgr [ ] Excl. Use [ ] Air Cargo [ ] UPS Surface [ ] Mail [X] Site Carrier
SHIPMENT AUTHORIZATION NUMBER

5. HM — Proper Shipping Name: Radioactive Material,

	excepted package - empty packaging	7	UN2910
	excepted package - instruments or articles	7	UN2910
X	excepted package - limited quantity of material	7	UN2910
	excepted package - articles manufactured from natural or depleted uranium or natural thorium	7	UN2910
	Special Form, n.o.s.	7	UN2974
	Low Specific Activity, n.o.s.	7	UN2912
	n.o.s.	7	UN2982
	Fissile, n.o.s.	7	UN2918
	(other)		

6. Markings Applied: Package Orientation [ ]; Gross Weight [X]; Radioactive - LSA [ ]; Type A [ ]; Type B [ ]

7. For Normal Form Identify
Physical Form: [ ] Liquid [ ] Gas [X] Solid
Chemical Form: [ ] Metal [ ] Oxide [X] Elemental [ ] Nitrate [ ] Mixture
Other

8. Additional RAM Desc.: Limited Quantity Radioactive Material [X]; Highway Route Controlled Quantity [ ]

9. Placards Applied [ ] Yes [X] No
If Rail Specify Placards
Route Plan [ ] Yes [X] No

10. EMERGENCY RESPONSE
Telephone (509) 373-3800
Emergency Response Guide(s): #61

11a. TYPE PACKAGE: Strong Tight [X]; Type A [ ]; Type B [ ]; Type B(U) [ ]; Type B(M) [ ]

11b. CONSTRUCTION: Box, FB [ ]; Wood [ ]; Steel [ ]; Drum [ ]; Cask [ ]; Other Polycoter

11c. FISSILE CLASS: Non-Fissile [X]; Fissile Exempt [ ]; Fissile I [ ]; Fissile II [ ]; Fissile III [ ]; Gms Fissile

11d. Labels Applied: Empty [ ]; Radioactive White I [ ]; Radioactive Yellow II [ ]; Radioactive Yellow III [ ]; Subsidiary Hazard N/A [ ]

Warning -- Fissile Class III Shipment. Do Not Load More Than ____ Packages Per Vehicle. In Loading and Storage Areas, Keep at Least 20 Feet From Other Packages Bearing Radioactive Labels.

12. No. Pkgs.	Model Package	COC/Spec	Serial No.	Seal No.	Isotopes	T.I.	Curies/Pkg	Gr. Wt.
1	Strong tight	N/A	N/A	N/A	Co_{60}, Cs_{137}, Sr_{90}	N/A	1.63 µCi	55 lb
Polycoter # ER210 contains soil samples in glass jars.								
Samples are double-bagged.								
BOGL71, BOGL73, BOGL75, BOGL79, BOGL81, BOGL86								
(Shipper may describe package in detail on one of the unused lines above)					TOTALS	N/A	1.63 µCi	55 lb

13. This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable federal, state, local and international regulations for the transportation of hazardous materials.
Certifier's Signature: Wendy S Thompson — On behalf of DOE-RL — Date: 11/28/95 — Organization: ER Field Sampling — Complete Cost Code (Inc. End Function): X60037

14. Surface Dose Rate of Package: [✓] <0.5 or NA mrem/hr (N + β γ)
Dose Rate at 1 Meter from Surface of Package: [✓] <0.5 or NA mrem/hr (N + β γ)
Smears of Outer Container: [ ] <22 dpm β γ/cm² [✓] <2.2 dpm α/cm² [ ] <Tbl. 2-2 HSRCM Onsite Limits
TRUCK LOAD OR EXCLUSIVE USE: Surface [✓] <200 mrem/hr (N + β γ); @ 6 feet [✓] <10 mrem/hr (N + β γ); @ Cab or sleeper [✓] <2 mrem/hr (N + β γ)
Additional Data and Instructions (inc. Readings on Internal Packaging): NA
Signature - Radiation Monitoring: [signature] — Bldg. 1301N — Survey No. 95-1301-159 — Date: 11/28/95

15. PICKUP OF SHIPMENT — Vehicle: HJ2598 — Driver: Bill Whitten
RECEIPT — Signature: Karen Ackenburgh — Date: 11/28/95

16. Shipment has been inspected and verified to be in compliance with DOT regulations
Authorized Signature: [signature] — Printed Name: M.A. SAMS — Date: 11-28-95

17. AIR TRANSPORT CERTIFICATION
CARGO AIRCRAFT: [ ] Cargo Aircraft Only Labels Applied
PASSENGER AIRCRAFT: [ ] 1. Ltd Qty [ ] 2. <3 T.I. [ ] 3. Research/Medical Diagnosis [ ] 4. Human Medical Research
Pkg. Dimensions: NA

18. OFFSITE AUTHORIZATION
B/L: RMW 9707 — Date Shipped: 11-28-95 — Routing: SITE — ETA: 11-28-95
Surveyed By: — Date: — Approved for Shipment Offsite: [signature] — Date: 11-28-95

☆ U.S. GOVERNMENT PRINTING OFFICE: 1995—633-181/21013 — Receipt: ____ Date: ____ — 54-8000-088 (07/95)

0000011

9613477.1940

Figure 1

SAMPLE CHECK-IN LIST

(1 Per Shipping Container)

Date/Time Received 11/28/95 11:10 Client Name BHI

Project/Client # B95-089 Batch or Case # _____

Cooler ID (if noted on outside of cooler) ER-210

1. Condition of shipping container? OK.
2. Custody Seals on cooler intact? Yes [X] No [ ]
3. Custody Seals dated and signed? Yes [X] No [ ]
4. Chain of Custody record is taped on inside of cooler lid? Yes [ ] No [X]
5. Vermiculite/packing material is: Wet [ ] Dry [X] _____
6. Each sample is in a plastic bag? Yes [X] No [ ] _____
7. Number of sample containers in cooler: 18
8. Samples have: ✓ tape ____ hazard labels
   ✓ custody seals ____ appropriate sample labels
9. Samples are: ✓ in good condition ____ leaking
   ____ broken ____ have air bubbles
   ____ other
10. Coolant Present? Yes [X] No [ ] Sample Temperature 6°C
11. The following paperwork should be accounted for (N/A if not applicable):
    Chain of Custody #(s) n/a
    Request for Analysis #(s) ✓
    Airbill # ✓ Carrier n/a
12. Have any anomalies been identified above? Yes [ ] No [X]
13. Memos have been initiated for all anomalies identified above? Yes [X]

Printed Name/Signature Karen Dektmulug Date/Time 11/28/95

0000012

9613477.1941

THIS PACKAGE CONFORMS TO THE CONDITIONS AND LIMITATIONS SPECIFIED IN 49 CFR 173.421 FOR RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, UN2910

BECHTEL HANFORD COMPANY

9613477.1942

POTENTIAL HAZARDS

HEALTH HAZARDS

Low-level radioactive material; little personal radiation hazard.
Many packages are not required to have radioactive materials labels or markings.
Some radioactive materials cannot be detected by commonly available instruments.

FIRE OR EXPLOSION

Some of these materials may burn, but none of them ignites readily.
Radioactivity does not change flammability or other properties of the materi

EMERGENCY ACTION

Keep unnecessary people away; isolate hazard area and deny entry.
Response actions may be performed prior to any radiation measurements.
Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection.
Notify Radiation Authority of accident conditions.
Detain uninjured persons, isolate equipment with suspected contamination, and delay cleanup until instruction of Radiation Authority.

FIRE

Do not move damaged containers; move undamaged containers out of fire zone.
Small Fires: Dry chemical, CO_2, water spray or regular foam.
Large Fires: Water spray, fog (flooding amounts).

SPILL OR LEAK

Do not touch damaged containers or spilled material.
Small Liquid Spills: Take up with sand, earth or other noncombustible absorbent material.
Cover powder spill with plastic sheet or tarp to minimize spreading.

FIRST AID

Use first aid treatment according to the nature of the injury.
Advise medical personnel that victim may be contaminated with low-level radioactive material.

Radioactive Material, excepted package - limited quantity of material, 7, UN2910

CAUTION

"Internal Contamination - Soil Samples"

Handle sample containers in a hood designated as Radiological Materials Area (RMA).

The outside of the sample containers may have potential smearable radioactive contamination because they were packaged inside of a glovebox. The outside of the plastic bag surrounding the containers was surveyed with no detectable smearable radioactive contamination. Remove the plastic bag in a hood.

9613477.1944

Quanterra Environmental Services

C.U.R. and C.O.C.
COPIED TO: B.W. / W P
DATE: 11-29-95
TIME: 0925
MN

Login No.: 9901

Condition Upon Receipt Variance Report
St. Louis Laboratory

Client: Richland

Date: 11-29-95 Time: 9:30

Project No: 550.111

Initiated by: Fred Mitchell

Shipper/No: Fed-Ex / 349-9265-682

RFA/COC Numbers: 43702

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:** 3°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) Fred Mitchell Date: 11/29/95

Project Management Review: Abby Wold Date: 11-30-95

SIGNED ORIGINAL MUST BE RETAINED IN THE PROJECT FILE

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

5995

0000016

9613477.1945

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.111

Category: ICP Metals; Cr, Cd, Pb, Ni EPA
Method: EPA 6010
Matrix: SOLID

Sample Date : 11/09/95
Receipt Date : 11/28/95
Report Date : 12/21/95

Client ID: BOGL71

Quanterra ID : 9901-001

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Cadmium	7440-43-9	QCBLK86463-1	12/15/95	12/18/95	0.32	MG/KG	U	2.1	1
Chromium	7440-47-3	QCBLK86463-1	12/15/95	12/18/95	0.29	MG/KG	U	2.1	1
Lead	7439-92-1	QCBLK86463-1	12/15/95	12/18/95	4.3	MG/KG	U	10.4	1
Nickel	7440-02-0	QCBLK86463-1	12/15/95	12/18/95	1.5	MG/KG	U	4.2	1

9613477.1946

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.111

Category: ICP Metals; Cr, Cd, Pb, Ni EPA
Method: EPA 6010
Matrix: SOLID

Sample Date : 11/09/95
Receipt Date : 11/28/95
Report Date : 12/21/95

Client ID: BOGL71

Quanterra ID : 9901-001MS

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Cadmium	7440-43-9	QCBLK86463-1	12/15/95	12/18/95	97	%REC			1
Chromium	7440-47-3	QCBLK86463-1	12/15/95	12/18/95	259	%REC			1
Lead	7439-92-1	QCBLK86463-1	12/15/95	12/18/95	110	%REC			1
Nickel	7440-02-0	QCBLK86463-1	12/15/95	12/18/95	140	%REC			1

9613477.1947

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.111

Category: ICP Metals; Cr, Cd, Pb, Ni EPA
Method: EPA 6010
Matrix: SOLID

Sample Date : 11/09/95
Receipt Date : 11/28/95
Report Date : 12/21/95

Client ID: BOGL71

Quanterra ID : 9901-001MSD

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Cadmium	7440-43-9	QCBLK86463-1	12/15/95	12/18/95	94	%REC			1
Chromium	7440-47-3	QCBLK86463-1	12/15/95	12/18/95	396	%REC			1
Lead	7439-92-1	QCBLK86463-1	12/15/95	12/18/95	115	%REC			1
Nickel	7440-02-0	QCBLK86463-1	12/15/95	12/18/95	163	%REC			1

9613477.1948

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.111

Category: ICP Metals; Cr, Cd, Pb, Ni EPA
Method: EPA 6010
Matrix: SOLID

Sample Date : 11/10/95
Receipt Date : 11/28/95
Report Date : 12/21/95

Client ID: BOGL73

Quanterra ID : 9901-002

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Cadmium	7440-43-9	QCBLK86463-1	12/15/95	12/18/95	0.33	MG/KG	U	2.1	1
Chromium	7440-47-3	QCBLK86463-1	12/15/95	12/18/95	20.8	MG/KG		2.1	1
Lead	7439-92-1	QCBLK86463-1	12/15/95	12/18/95	6.4	MG/KG	B	10.7	1
Nickel	7440-02-0	QCBLK86463-1	12/15/95	12/18/95	11.4	MG/KG		4.3	1

9613477.1949

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.111

Category: ICP Metals; Cr, Cd, Pb, Ni EPA
Method: EPA 6010
Matrix: SOLID

Sample Date : 11/10/95
Receipt Date : 11/28/95
Report Date : 12/21/95

Client ID: BOGL75

Quanterra ID : 9901-003

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Cadmium	7440-43-9	QCBLK86463-1	12/15/95	12/18/95	0.33	MG/KG	U	2.1	1
Chromium	7440-47-3	QCBLK86463-1	12/15/95	12/18/95	21.4	MG/KG		2.1	1
Lead	7439-92-1	QCBLK86463-1	12/15/95	12/18/95	6.7	MG/KG	B	10.7	1
Nickel	7440-02-0	QCBLK86463-1	12/15/95	12/18/95	12.5	MG/KG		4.3	1

9613477.1950

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.111

Category: ICP Metals; Cr, Cd, Pb, Ni EPA
Method: EPA 6010
Matrix: SOLID

Sample Date : 11/15/95
Receipt Date : 11/28/95
Report Date : 12/21/95

Client ID: BOGL79

Quanterra ID : 9901-004

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Cadmium	7440-43-9	QCBLK86463-1	12/15/95	12/18/95	0.31	MG/KG	U	2.0	1
Chromium	7440-47-3	QCBLK86463-1	12/15/95	12/18/95	0.28	MG/KG	U	2.0	1
Lead	7439-92-1	QCBLK86463-1	12/15/95	12/18/95	4.1	MG/KG	U	10.0	1
Nickel	7440-02-0	QCBLK86463-1	12/15/95	12/18/95	1.4	MG/KG	U	4.0	1

9613477.1951

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.111

Category: ICP Metals; Cr, Cd, Pb, Ni EPA
Method: EPA 6010
Matrix: SOLID

Sample Date : 11/15/95
Receipt Date : 11/28/95
Report Date : 12/21/95

Client ID: BOGL81

Quanterra ID : 9901-005

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Cadmium	7440-43-9	QCBLK86463-1	12/15/95	12/18/95	0.32	MG/KG	U	2.1	1
Chromium	7440-47-3	QCBLK86463-1	12/15/95	12/18/95	32.7	MG/KG		2.1	1
Lead	7439-92-1	QCBLK86463-1	12/15/95	12/18/95	4.9	MG/KG	B	10.4	1
Nickel	7440-02-0	QCBLK86463-1	12/15/95	12/18/95	18.2	MG/KG		4.2	1

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.111

Category: ICP Metals; Cr, Cd, Pb, Ni EPA
Method: EPA 6010
Matrix: SOLID

Sample Date : 11/16/95
Receipt Date : 11/28/95
Report Date : 12/21/95

Client ID: BOGL86

Quanterra ID : 9901-006

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Cadmium	7440-43-9	QCBLK86463-1	12/15/95	12/18/95	0.32	MG/KG	U	2.0	1
Chromium	7440-47-3	QCBLK86463-1	12/15/95	12/18/95	20.1	MG/KG		2.0	1
Lead	7439-92-1	QCBLK86463-1	12/15/95	12/18/95	5.2	MG/KG	B	10.2	1
Nickel	7440-02-0	QCBLK86463-1	12/15/95	12/18/95	16.8	MG/KG		4.1	1

9613477.1953

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0GL71

Lab Name: QUANTERRA MO Contract: 550.111

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0823

Matrix (soil/water): SOIL Lab Sample ID: 9901-001

Level (low/med): LOW Date Received: 11/28/95

% Solids: 96.1

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

CAS No.	Analyte	Concentration	C	Q	M
7440-43-9	Cadmium	0.32	U		P
7440-47-3	Chromium	0.29	U	N	P
7439-92-1	Lead	4.3	U		P
7440-02-0	Nickel	1.5	U	N	P

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

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SW-846

9613477.1954

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0GL73

Lab Name: QUANTERRA_MO Contract: 550.111
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0823
Matrix (soil/water): SOIL Lab Sample ID: 9901-002
Level (low/med): LOW Date Received: 11/28/95
% Solids: 93.8

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

CAS No.	Analyte	Concentration	C	Q	M
7440-43-9	Cadmium	0.33	U		P
7440-47-3	Chromium	20.8		N	P
7439-92-1	Lead	6.4	B		P
7440-02-0	Nickel	11.4		N	P

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

SW-846

9613477.1955

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0GL75

Lab Name: QUANTERRA MO Contract: 550.111
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0823
Matrix (soil/water): SOIL Lab Sample ID: 9901-003
Level (low/med): LOW Date Received: 11/28/95
% Solids: 93.7

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

CAS No.	Analyte	Concentration	C	Q	M
7440-43-9	Cadmium	0.33	U		P
7440-47-3	Chromium	21.4		N	P
7439-92-1	Lead	6.7	B		P
7440-02-0	Nickel	12.5		N	P

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

SW-846

9613477.1956

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0GL79

Lab Name: QUANTERRA_MO Contract: 550.111
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0823
Matrix (soil/water): SOIL Lab Sample ID: 9901-004
Level (low/med): LOW Date Received: 11/28/95
% Solids: 100.0

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

CAS No.	Analyte	Concentration	C	Q	M
7440-43-9	Cadmium	0.31	U		P
7440-47-3	Chromium	0.28	U	N	P
7439-92-1	Lead	4.1	U		P
7440-02-0	Nickel	1.4	U	N	P

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

SW-846

9613477.1957

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0GL81

Lab Name: QUANTERRA_MO Contract: 550.111
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0823
Matrix (soil/water): SOIL Lab Sample ID: 9901-005
Level (low/med): LOW Date Received: 11/28/95
% Solids: 96.2

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

CAS No.	Analyte	Concentration	C	Q	M
7440-43-9	Cadmium	0.32	U		P
7440-47-3	Chromium	32.7		N	P
7439-92-1	Lead	4.9	B		P
7440-02-0	Nickel	18.2		N	P

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

SW-846

9613477.1958

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0GL86

Lab Name: QUANTERRA_MO Contract: 550.111

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0823

Matrix (soil/water): SOIL Lab Sample ID: 9901-006

Level (low/med): LOW Date Received: 11/28/95

% Solids: 97.6

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

CAS No.	Analyte	Concentration	C	Q	M
7440-43-9	Cadmium	0.32	U		P
7440-47-3	Chromium	20.1		N	P
7439-92-1	Lead	5.2	B		P
7440-02-0	Nickel	16.8		N	P

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

SW-846

9613472.1998

Quanterra
Environmental Services

Quanterra Incorporated
13715 Rider Trail North
Earth City, Missouri 63045

314 298-8566 Telephone
314 298-8757 Fax

REVISED
CERTIFICATE OF ANALYSIS

JAN 1996
RECEIVED
Data
Log In

Bechtel Hanford Incorporated
P.O. Box 1970
Richland, Washington 99352

January 11, 1996

Attention: Joan Kessner

Project number	:	550.111
Date Received by Lab	:	November 28, 1995
Number of Samples	:	Six (6)
Sample Type	:	Solid
SDG Number	:	W0823R
Data Deliverable	:	Summary

I. Introduction

On November 28, 1995, six (6) solid samples were received by Quanterra, Richland and transferred to Quanterra, St. Louis for chemical analysis. Upon receipt, the samples were given the following laboratory ID numbers to correspond with the specific client IDs:

St Louis ID	WHC ID	Richland ID	Matrix	Date of Receipt
9901-001	B0GL71	51131001	Solid	11/28/95
9901-002	B0GL73	51131002	Solid	11/28/95
9901-003	B0GL75	51131003	Solid	11/28/95
9901-004	B0GL79	51131004	Solid	11/28/95
9901-005	B0GL81	51131005	Solid	11/28/95
9901-006	B0GL86	51131006	Solid	11/28/95

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: Chromium, Lead, Cadmium, and Nickel by EPA method 6010.

III. Quality Control

A Laboratory Control Sample and Method Blank were analyzed with each preparation batch. Matrix Spike and Matrix Spike Duplicate or Sample Duplicate analyses were performed per the protocol for each analyte.

IV. Definitions

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

QCBLK- Quality Control Blank, Method Blank
QCLCS- Quality Control Laboratory Control Sample, Blank Spike

V. Comments

The samples were reanalyzed to meet the required detection limits. This report contains the results of the reanalysis.

Metals
Samples 9901-001, 9901-001S, 9901-001SD, 9901-002, 9901-003 and 9901-005 required dilution due to interelement interferences. The instrument software flagged the undiluted run with an error code indicating that an interferant, in this case Iron, was interfering with the analysis of Cadmium and Chromium. The samples were diluted by a factor of 4 and reanalyzed without interference errors.

The Matrix Spike recovery for Lead (5.8%) and Nickel (72.8%) and the Matrix Spike Duplicate recovery for Lead (27.9%) were less than 80%, therefore all associated data was flagged with an " N ". See NCM # SL-2335.

The ICP prep was 4.0 g to 100 mls.

9615477.1961

Quanterra
Environmental Services

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:

Wade H. Price
Project Manager
e:\\price$\abbydave\hanw0823.nar

9613477 1962

Quanterra Environmental Services

LOG #: SL-94- 2335 page 1 of 2

LABORATORY NONCONFORMANCE MEMO (NCM)

PROJECT ID (Name/Number): 550.111 W0823RD
NCM INITIATED BY (Name/Date): K. CLAY 01-05-96
PARAMETER(S): Pb - GFAA Ni - ICP
SAMPLE NUMBER(S) AFFECTED: 9901-001S, 9901-001SD

AREA:

☐ SHIP/REC	☐ GC	☐ GEN CHEM	☐ BIOASSAY	☐ IH
☐ ORG EXT	☐ HPLC	☑ METALS	☐ RADIOCHEM	☐ DATA VERIFICATION
☐ INORG PREP	☐ GCMS	☐ GEO	☐ COUNTING	☐ REPORTING
☐ OTHER	☐	☐	☐	☐

NONCONFORMANCE [check appropriate item(s)]:

1. ☐ Not enough sample received for proper analysis.
2. ☐ Holding time exceeded by _____ days due to:
   - 2.1 ☐ **CATEGORY I: Out of Laboratory Control**
     - ☐ Holding time expired at receipt.
   - 2.2 ☐ **CATEGORY II: Laboratory Dependent**
     - ☐ work backlog ☐ instrument failure
     - ☐ communication ☐ other (see #10)
   - 2.3 ☐ **CATEGORY III: Laboratory Reruns**
     - 2.3.1 ☐ ***QA/QC:***
       - ☐ surrogates ☐ internal standards
       - ☐ spike recoveries ☐ blank contamination
     - 2.3.2 ☐ ***CONFIRMATION:***
       - ☐ second column ☐ contamination check
       - ☐ other (see #10)
     - 2.3.3 ☐ ***DILUTION:***
       - ☐ over calibration ☐ under calibration
       - ☐ other (see #10)
     - 2.3.4 ☐ ***OTHER: (see #10)***
3. ☐ Sample lost during extraction/analysis: no re-prep or re-analysis possible.
4. ☐ QC data reported to client outside of:
   - ☑ method limits ☐ internal limits
   - ☐ QAPP limits ☐ contract limits
   - ☐ regulatory limits ☐ blank criteria
5. ☐ Incorrect procedure(s) used. (See #10)
6. ☐ Invalid instrument calibration. (See #10)
7. ☐ Incorrect/incomplete data reported to client. (See #10)
8. ☐ Reported detection limit(s) higher than:
   - ☐ method limits ☐ QAPP limits
   - ☐ contract limits ☐ other (see #10)

   Due to:
   - ☐ sample matrix ☐ insufficient sample
   - ☐ instrumentation ☐ other (see #10)
9. ☐ **Other (specify):** Matrix Spike Recovery for Pb + Ni and matrix spike duplicate for Pb not within 80-120% range 01-05-96 Pb MS 5.8% MSD 27.9% RPD 131. Ni MS 56.9% MSD 88.9% 48.4 * meets method criteria.
10. ☐ **Comments/Explanation:**

NOTIFICATION [check appropriate item(s)]:

1. ☑ Client notified by (name and date): 1/11/96 AW
   - ☑ in writing ☐ by FAX
   - ☐ by phone in case narrative ☐ Other (explain)
2. ☐ Client's name _____ and response
   - ☐ process "as is" ☐ resample
   - ☐ on hold til ____ ☐ Other (explain)

PROJECT MANAGER (signature & date): Abigail Walden

FURTHER ACTION REQUIRED, SEE PAGE 2 OF 2

0004A

CORRECTIVE ACTION

☐ ROOT CAUSE: INITIALS/DATE KEC 01-05-96

Sample matrix

☐ CORRECTIVE ACTION: INITIALS/DATE KEC 01-05-96

Report Data

☐ RESPONSIBILITY FOR PERFORMING CORRECTIVE ACTION ASSIGNED TO:

☐ ACTIONS TO PREVENT RECURRENCE: INITIALS/DATE KEC 01-05-96

None

FIRST LEVEL SUPERVISOR: [signature] DATE: 1-5-96

RESPONSIBLE MANAGER: DATE:

QC REVIEW

☐ NONCONFORMANCE ☒ DEFICIENCY ☐ RERUN

☐ FURTHER ACTION REQUIRED:

ASSIGNED TO:

QC COORDINATOR: [signature] DATE: 1-5-96

CORRECTIVE ACTION VERIFICATION

☐ VERIFIED ☐ CANNOT VERIFY (specify reason)

REASON:

NCM CLOSURE

QC COORDINATOR: DATE:

SIGNED ORIGINAL MUST BE RETAINED IN FILE: ☐ QUALITY/OPERATIONS FILE ☐ PROJECT FILE

000043

Quanterra January 04, 1996 03:34 pm
Account: 10722 Project: 550.111 Quanterra-Richland QAS No. 550.111 Rev. 0
Master Sample Login: 9901

Project Manager: W. Price

Draft: Final: Entered and Reviewed by: PM Review:

Sample Header Template:

Sample No. / Comments / # / Data:	Client ID / Container Type	C-Matrix / Analysis	Date: Collected / Class	Received / Preservative	Due / Anal. Due Date	Shipper / Hold Date	Site	Rad Category	Rad Sample No. (Container Numbers:% Filled)
9901-001	BOGL71	Soil	09-NOV-95 09:18	28-NOV-95 11:10	02-JAN-96	FED-EX		2	R4450-006
DL OF 1 MG/KG REQUIRED FOR ALL/RICHLAND I.D. 51131001 ICAP=Cr, Cd, Ni ONLY									
1	AN - Amber Glass-60ML	ICAP/6010/Q4	S	COLD	26-DEC-95	07-MAY-96	S3B		(199271:100)
1		PB/7421/Q4	S	COLD	26-DEC-95	07-MAY-96	S3B		(199271:100)
1		PM/IT/Q4	S	COLD	26-DEC-95	07-MAY-96	S3B		(199271:100)
9901-001MS	BOGL71	Soil	09-NOV-95 09:18	28-NOV-95 11:10	02-JAN-96	FED-EX		2	R4450-006
DL OF 1 MG/KG REQUIRED FOR ALL/RICHLAND I.D. 51131001 ICAP=Cr, Cd, Ni ONLY									
1	AN - Amber Glass-60ML	ICAP/6010/Q4	S	COLD	26-DEC-95	07-MAY-96	S3B		(199271:100)
1		PB/7421/Q4	S	COLD	26-DEC-95	07-MAY-96	S3B		(199271:100)
9901-001MSD	BOGL71	Soil	09-NOV-95 09:18	28-NOV-95 11:10	02-JAN-96	FED-EX		2	R4450-006
DL OF 1 MG/KG REQUIRED FOR ALL/RICHLAND I.D. 51131001 ICAP=Cr, Cd, Ni ONLY									
1	AN - Amber Glass-60ML	ICAP/6010/Q4	S	COLD	26-DEC-95	07-MAY-96	S3B		(199271:100)
1		PB/7421/Q4	S	COLD	26-DEC-95	07-MAY-96	S3B		(199271:100)
9901-001MSDRD1	BOGL71	Soil	09-NOV-95 09:18	28-NOV-95 11:10	02-JAN-96	FED-EX		2	R4450-006
DL OF 1 MG/KG REQUIRED FOR ALL/RICHLAND I.D. 51131001 ICAP=Cr, Cd, Ni ONLY									
9901-001MSRD1	BOGL71	Soil	09-NOV-95 09:18	28-NOV-95 11:10	02-JAN-96	FED-EX		2	R4450-006
DL OF 1 MG/KG REQUIRED FOR ALL/RICHLAND I.D. 51131001 ICAP=Cr, Cd, Ni ONLY									
9901-001RD1	BOGL71	Soil	09-NOV-95 09:18	28-NOV-95 11:10	02-JAN-96	FED-EX		2	R4450-006
DL OF 1 MG/KG REQUIRED FOR ALL/RICHLAND I.D. 51131001 ICAP=Cr, Cd, Ni ONLY									
9901-002	BOGL73	Soil	10-NOV-95 08:26	28-NOV-95 11:10	02-JAN-96	FED-EX		1	R4450-005
DL OF 1 MG/KG REQUIRED FOR ALL/RICHLAND I.D. 51131002 ICAP=Cr, Cd, NI ONLY									
1	AN - Amber Glass-60ML	ICAP/6010/Q4	S	COLD	26-DEC-95	08-MAY-96	S3B		(199272:100)
1		PB/7421/Q4	S	COLD	26-DEC-95	08-MAY-96	S3B		(199272:100)
1		PM/IT/Q4	S	COLD	26-DEC-95	08-MAY-96	S3B		(199272:100)
9901-002RD1	BOGL73	Soil	10-NOV-95 08:26	28-NOV-95 11:10	02-JAN-96	FED-EX		1	R4450-005
DL OF 1 MG/KG REQUIRED FOR ALL/RICHLAND I.D. 51131002 ICAP=Cr, Cd, NI ONLY									

3*=Sample has not been rad screened.

Quanterra January 04, 1996 03:34 pm
Account: 10722 Project: 550.111 Quanterra-Richland QAS No. 550.111 Rev. 0
Master Sample Login: 9901

Project Manager: W. Price

Draft: Final: Entered and Reviewed by:_____ PM Review:_____

Sample Header Template: _____

Sample No. / Comments	Client ID	C-Matrix	Date: Collected	Received	Due	Shipper	Rad Category	Rad Sample No.
# Container Type / Data:	Analysis	Class	Preservative	Anal. Due Date	Hold Date	Site		(Container Numbers:% Filled)
9901-003	BOGL75	Soil	10-NOV-95 08:26	28-NOV-95 11:10	02-JAN-96	FED-EX	1	R4450-004
DL OF 1 MG/KG REQUIRED FOR ALL/RICHLAND I.D. 51131003 ICAP=Cr, Cd, Ni ONLY								
1 AN - Amber Glass-60ML	ICAP/6010/Q4	S	COLD	26-DEC-95	08-MAY-96	S3B		(199273:100)
1	PB/7421/Q4	S	COLD	26-DEC-95	08-MAY-96	S3B		(199273:100)
1	PM/IT/Q4	S	COLD	26-DEC-95	08-MAY-96	S3B		(199273:100)
9901-003RD1	BOGL75	Soil	10-NOV-95 08:26	28-NOV-95 11:10	02-JAN-96	FED-EX	1	R4450-004
DL OF 1 MG/KG REQUIRED FOR ALL/RICHLAND I.D. 51131003 ICAP=Cr, Cd, Ni ONLY								
9901-004	BOGL79	Soil	15-NOV-95 07:45	28-NOV-95 11:10	02-JAN-96	FED-EX	1	R4450-003
DL OF 1 MG/KG REQUIRED FOR ALL/RICHLAND I.D. 51131004 ICAP=Cr, Cd, Ni ONLY								
1 AN - Amber Glass-60ML	ICAP/6010/Q4	S	COLD	26-DEC-95	13-MAY-96	S3B		(199274:100)
1	PB/7421/Q4	S	COLD	26-DEC-95	13-MAY-96	S3B		(199274:100)
1	PM/IT/Q4	S	COLD	26-DEC-95	13-MAY-96	S3B		(199274:100)
9901-004RD1	BOGL79	Soil	15-NOV-95 07:45	28-NOV-95 11:10	02-JAN-96	FED-EX	1	R4450-003
DL OF 1 MG/KG REQUIRED FOR ALL/RICHLAND I.D. 51131004 ICAP=Cr, Cd, Ni ONLY								
9901-005	BOGL81	Soil	15-NOV-95 09:07	28-NOV-95 11:10	02-JAN-96	FED-EX	1	R4450-002
DL OF 1 MG/KG REQUIRED FOR ALL/RICHLAND I.D. 51131005 ICAP=Cr, Cd, Ni ONLY								
1 AN - Amber Glass-60ML	ICAP/6010/Q4	S	COLD	26-DEC-95	13-MAY-96	S3B		(199275:100)
1	PB/7421/Q4	S	COLD	26-DEC-95	13-MAY-96	S3B		(199275:100)
1	PM/IT/Q4	S	COLD	26-DEC-95	13-MAY-96	S3B		(199275:100)
9901-005RD1	BOGL81	Soil	15-NOV-95 09:07	28-NOV-95 11:10	02-JAN-96	FED-EX	1	R4450-002
DL OF 1 MG/KG REQUIRED FOR ALL/RICHLAND I.D. 51131005 ICAP=Cr, Cd, Ni ONLY								
9901-006	BOGL86	Soil	16-NOV-95 07:50	28-NOV-95 11:10	02-JAN-96	FED-EX	1	R4450-001
DL OF 1 MG/KG REQUIRED FOR ALL/RICHLAND I.D. 51131006 ICAP=Cr, Cd, Ni ONLY								
1 AN - Amber Glass-60ML	ICAP/6010/Q4	S	COLD	26-DEC-95	14-MAY-96	S3B		(199276:100)
1	PB/7421/Q4	S	COLD	26-DEC-95	14-MAY-96	S3B		(199276:100)
1	PM/IT/Q4	S	COLD	26-DEC-95	14-MAY-96	S3B		(199276:100)
9901-006RD1	BOGL86	Soil	16-NOV-95 07:50	28-NOV-95 11:10	02-JAN-96	FED-EX	1	R4450-001
DL OF 1 MG/KG REQUIRED FOR ALL/RICHLAND I.D. 51131006 ICAP=Cr, Cd, Ni ONLY								

3*=Sample has not been rad screened.

90000 2

Temp 3°C Cur # 5905

Joist Lewis

Chain of Custody Record

Quanterra Environmental Services

QUA-4124-1

Client	Project Manager	Date	Chain Of Custody Number
Bechtel Hanford	Van Pettey	11-28-95	43702
Address	Telephone Number (Area Code)/Fax Number	Lab Number	Page 1 of 1

City	State	Zip Code	Site Contact	Lab Contact

Project Name: SAF B95-089

Carrier/Waybill Number:

Contract/Purchase Order/Quote No.:

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

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
51131001 B06-L71											
2 L73											
3 L75											
4 L79											
5 L81											
6 L86											

SEE CoC

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

QC Requirements (Specify): SDG W0813

	Date	Time		Date	Time
1. Relinquished By: Heidelberg Quanterra	11-28-95	16:00	1. Received By: [signature]	11-29-95	0830
2. Relinquished By			2. Received By		
3. Relinquished By			3. Received By		

Comments

DISTRIBUTION: WHITE ...

00007

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page ____ of ____

Data Turnaround
☐ Priority
■ Normal

Collector: W. S. Thompson	Company Contact: K. L. Sykes / W. S. Thompson	Telephone: (509) 376-8031
Project Designation: 1301N/1325N SI (Limited Field Investigation)	Sampling Location: 1301-N/1325-N Cribs 100N	SAF No.: B95-089
Ice Chest No.: ER-210	Field Logbook No.: EL-1275	Method of Shipment: Hand Carry in DOE vehicle.
Shipped To: QUANTERRA	Offsite Property No.: N/A	Bill of Lading/Air Bill No.: N/A

Possible Sample Hazards/Remarks: Radioactive

Special Handling and/or Storage

SAMPLE ANALYSIS 511310 SDG W0813

			Preservation	NONE	NONE	NONE							
			Type of Container	Glass	Glass	Plastic							
			No. of Container(s)	1	1	1							
			Volume	60 ml 40 ml 11/19/95	60 ml.	20 ml.							
				ICP Metals Cadmium Chromium Lead Nickel	Radio-nuclides (see note #1)	Activity Scan							
Sample No.	Matrix*	Date Sampled	Time Sampled										
1 BOGL71	Soil	11/09/95	0918	X	X	X		100GS					
2 BOGL73	SOIL	11/10/95	0826	X	X	X							
3 BOGL75	SOIL	11/10/95	0826	X	X	X							
4 BOGL79	SOIL	11/15/95	0745	X	X	X							
5 BOGL81	Soil	11/15/95	0907	X	X	X							
6 BOGL86	Soil	11/16/95	0750	X	X	X							

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By: WS Thompson	Date/Time: 11/28/95 0907	Received By: Bukstra	Date/Time: 11-28-95 0907
Relinquished By: Bukstra	Date/Time: 11-28-95 1110	Received By: Barry Dahl Lindberg	Date/Time: 11-28-95 1110
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS
Note #1: Radionuclides - Gross alpha; gross beta; Sr-90; U-233,U-234; U-238; Pu-238; Pu-239/240; Gamma Spec (to include) - K-40, Mn-54, C0-60, Ru-106, Cs-134, Cs-137, Ce-144, Eu-154, Eu-155, Ra-226, Th-228, Th-232.

SUMMARY DATA DELIVERABLES

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

00008

RL 4450

to Joe K. 11/29/95

Client Sample Screening Results

28-Nov-95

CLIENT CODE ID	MATRIX	RECEIVED	DETECTOR	ACQ DATE	SAMPLE	MINUTES	CNTS A	NET CPM A	CNTS B	NET CPM B
WHC B0GL71		11/28/95 11:00:00 AM	QUAD22D	11/28/95 2:15:38 PM	B0GL71	30	312	10.335	16672	554.785
	SOLID		Bkg:	11/28/95 1:32:58 AM	BKG	600	39	0.065	569	0.9483333

Anl Date: 11/28/95 Tot Sa, Alq: 3.28E+02 , 6.32E+01 Alp; (Dpm/ 2.17E+01 (uCi/ 5.08E-02 (pCi/ 1.55E+02 ± 1.4E+01 CAT III 3.2E-01 Lab Alq
Ppt mg: 63.2 Units: g , mg Bet; Alq): 1.17E+03 Sa): 2.73E+00 L/g): 8.33E+03 ± 6.4E+01 1.2E-02 L/g

WHC B0GL73		11/28/95 11:00:00 AM	QUAD23A	11/28/95 2:15:42 PM	B0GL73	30	31	0.965	3371	111.41
	SOLID		Bkg:	11/28/95 1:33:06 AM	BKG	600	41	0.06833333	574	0.9566667

Anl Date: 11/28/95 Tot Sa, Alq: 2.72E+02 , 3.45E+01 Alp; (Dpm/ 1.94E-01 (uCi/ 6.90E-04 (pCi/ 2.54E+00 ± 8.7E+00 CAT II 2.0E+01 Lab Alq
Ppt mg: 34.5 Units: g , mg Bet; Alq): 2.25E+02 Sa): 8.00E-01 L/g): 2.94E+03 ± 5.1E+01 3.4E-02 L/g

WHC B0GL75		11/28/95 11:00:00 AM	QUAD23B	11/28/95 2:15:42 PM	B0GL75	30	19	0.57	1816	59.623333
	SOLID		Bkg:	11/28/95 1:33:06 AM	BKG	600	38	0.06333333	546	0.91

Anl Date: 11/28/95 Tot Sa, Alq: 2.76E+02 , 1.92E+01 Alp; (Dpm/ 3.10E-01 (uCi/ 2.01E-03 (pCi/ 7.27E+00 ± 1.3E+01 CAT II 6.9E+00 Lab Alq
Ppt mg: 19.2 Units: g , mg Bet; Alq): 1.18E+02 Sa): 7.63E-01 L/g): 2.77E+03 ± 6.6E+01 3.6E-02 L/g

WHC B0GL79		11/28/95 11:00:00 AM	QUAD23C	11/28/95 2:15:42 PM	B0GL79	30	11	0.30333333	48	0.6033333
	SOLID		Bkg:	11/28/95 1:33:06 AM	BKG	600	38	0.06333333	598	0.9966667

Anl Date: 11/28/95 Tot Sa, Alq: 3.36E+02 , 7.39E+01 Alp; (Dpm/ 1.79E+00 (uCi/ 3.66E-03 (pCi/ 1.09E+01 ± 6.4E+00 CAT I 4.6E+00 Lab Alq
Ppt mg: 73.9 Units: g , mg Bet; Alq): 1.10E+00 Sa): 2.26E-03 L/g): 6.73E+00 ± 3.0E+00 1.5E+01 L/g

WHC B0GL81		11/28/95 11:00:00 AM	QUAD23D	11/28/95 2:15:42 PM	B0GL81	30	16	0.48	206	5.9133333
	SOLID		Bkg:	11/28/95 1:33:06 AM	BKG	600	32	0.05333333	572	0.9533333

Anl Date: 11/28/95 Tot Sa, Alq: 3.47E+02 , 3.18E+01 Alp; (Dpm/ 1.82E+00 (uCi/ 8.95E-03 (pCi/ 2.58E+01 ± 1.1E+01 CAT I 1.9E+00 Lab Alq
Ppt mg: 31.8 Units: g , mg Bet; Alq): 1.16E+01 Sa): 5.72E-02 L/g): 1.65E+02 ± 1.4E+01 6.1E-01 L/g

Reviewed 11/28/95

(no info. for B0GL86.)

00009

NOV-28-1995 15:42 QUANTERRA,RICHLND 509 375 3390 P.10

CLIENT CODE ID	MATRIX	RECEIVED	DETECTOR	ACQ DATE	SAMPLE	MINUTES	CNTS A	NET CPM A	CNTS B	NET CPM B
WHC B0GL86		11/28/95 11:00:00 AM	QUAD24A	11/28/95 2:15:34 PM	B0GL86	30	11	0.295	407	12.643333
	SOLID		Bkg:	11/28/95 1:32:54 AM	BKG	600	43	0.07166667	554	0.9233333

Anl Date: 11/28/95	Tot Sa, Alq: 3.45E+02	, 3.42E+01	Alp; (Dpm/ 7.80E-01	(uCi/ 3.54E-03	(pCi/ 1.03E+01	± 9.9E+00	CAT II	4.9E+00	Lab Alq Lig
Ppt mg: 34.2	Units: g	, mg	Bet; Alq): 2.61E+01	Sa): 1.19E-01	Lig): 3.44E+02	± 1.8E+01		2.9E-01	

CLIENT CODE ID	MATRIX	RECEIVED	DETECTOR	ACQ DATE	SAMPLE	MINUTES	CNTS A	NET CPM A	CNTS B	NET CPM B
WHC B0GRM9		11/28/95 11:00:00 AM	QUAD24B	11/28/95 2:15:34 PM	B0GRM9	30	34	1.04166667	91	2.01
	LIQUID		Bkg:	11/28/95 1:32:54 AM	BKG	600	55	0.09166667	614	1.0233333

Anl Date: 11/28/95	Tot Sa, Alq: 1.00E+00	, 1.00E+01	Alp; (Dpm/ 3.24E+00	(uCi/ 1.46E-04	(pCi/ 1.46E+02	± 3.2E+01	CAT I	1.7E-01	Lab Alq Lig
Ppt mg: 4.4	Units: L	, ml	Bet; Alq): 3.32E+00	Sa): 1.50E-04	Lig): 1.50E+02	± 2.7E+01		3.3E-01	

CLIENT CODE ID	MATRIX	RECEIVED	DETECTOR	ACQ DATE	SAMPLE	MINUTES	CNTS A	NET CPM A	CNTS B	NET CPM B
WHC B0GRN0		11/28/95 11:00:00 AM	QUAD24C	11/28/95 2:15:34 PM	B0GRN0	30	23	0.68833333	101	2.37
	LIQUID		Bkg:	11/28/95 1:32:54 AM	BKG	600	47	0.07833333	598	0.9966667

Anl Date: 11/28/95	Tot Sa, Alq: 1.00E+00	, 1.00E+01	Alp; (Dpm/ 2.10E+00	(uCi/ 9.44E-05	(pCi/ 9.44E+01	± 2.8E+01	CAT I	2.6E-01	Lab Alq Lig
Ppt mg: 4.7	Units: L	, ml	Bet; Alq): 4.11E+00	Sa): 1.85E-04	Lig): 1.85E+02	± 2.8E+01		2.7E-01	

Renewed 11/29/95

TOTAL P.11

00010

Environmental Restoration Contractor **ERC Team**

Interoffice Memorandum

Job No. 22192
Written Response Required? NO
Closes CCN: N/A
OU: 100-NR-1
TSD: N/A
ERA: N/A
Subject Code: 8610

TO: RC Smith B1-35

DATE: November 27, 1995

COPIES: See Below

FROM: WS Thompson WST 11/27/95
ER Field Sampling
N1-28 / 6-8031

SUBJECT: **ESTIMATE OF CURIE CONTENT FOR SOIL SAMPLES SHIPPED ON NOVEMBER 28, 1995, TO QUANTERRA FROM THE 1301N/1325N CRIB DRILLING PROJECT**

This memo provides estimated curie content information for 6 soil samples (B0GL71, B0GL73, B0GL75, B0GL79, B0GL81, B0GL86) to be shipped to Quanterra on November 28, 1995. The information is provided in order for Quanterra to evaluate acceptance of the samples in accordance with their NRC license. A Radioactive Shipment Record (RSR) will accompany the samples stating the isotopes and the curie content of the shipment. An onsite lab provided detailed analytical data which was used to prepare the RSR, however, this isotopic specific data will not be provided to Quanterra as it could be viewed as compromising the independence of the requested analysis to be performed by Quanterra. Therefore, in lieu of a laboratory total activity report, the following Curie data is provided:

- Five of the soil samples have detectable radioactivity.

- For the five samples, an approximate total soil sample weight it 1120 grams. This is determined using the formula, 140 ml x 1.6 gm/ml, for Hanford soil. The samples were not weighed and 1.6 gms/ml is a Hanford site specific soil weight.

- Using available data, the approximate curie content for the five radioactive samples is:
  Total alpha - 690 picocuries
  Total beta - 1.81 microcuries
  Total Co60 - 0.13 microcuries
  Total Cs137 - 0.82 microcuries
  Total Sr90 - I still need data to complete-will have later today - about 0.7 microcuries

Additionally, each soil sample has an accompanying activity scan aliquot for Quanterra to conduct radiological screening to evaluate acceptance criteria.

If you have any questions, please give me a call.

WST:wst

Copies
BHI Document Control H4-79
KL Sykes X0-37
JH Kessner B1-35
JA Lerch B1-35
RL Weiss B1-35

9613477.1971

RADIOACTIVE SHIPMENT RECORD

3. Page 1 of 1 — 34764

4. Ship ☒ Prepaid ☐ Collect

Via ☒ Motor-Rail ☐ Air Psgr ☐ Excl. Use ☐ Air Cargo ☐ UPS Surface ☐ Mail ☒ Site Carrier

SHIPMENT AUTHORIZATION NUMBER

1. SHIP TO
Company: Quanterra
Address: 2800 GEORGE WASH. WAY
City, State, Zip: Richland, WA 99352
Attention: Karen Ackenburgh
Phone: 375-3131 EXT 135

2. SHIP FROM U.S. DEPT. OF ENERGY C/O
Company: Bechtel Hanford Co
Address: 100N/1301-1325 CK135
City, State, Zip: Richland WA 99352
Contact: Wendy Thompson
Phone: 376-8031

5. HM Proper Shipping Name: Radioactive Material,

	excepted package - empty packaging	7	UN2910
	excepted package - instruments or articles	7	UN2910
X	excepted package - limited quantity of material	7	UN2910
	excepted package - articles manufactured from natural or depleted uranium or natural thorium	7	UN2910
	Special Form, n.o.s.	7	UN2974
	Low Specific Activity, n.o.s.	7	UN2912
	n.o.s.	7	UN2982
	Fissile, n.o.s.	7	UN2918
	(other)		

6. Markings Applied: Package Orientation ☐; Gross Weight ☒; Radioactive - LSA ☐; Type A ☐; Type B ☐

8. Additional RAM Desc.: Limited Quantity Radioactive Material ☒; Highway Route Controlled Quantity ☐

7. For Normal Form Identify
Physical Form: ☐ Liquid ☐ Gas ☒ Solid
Chemical Form: ☐ Metal ☐ Oxide ☒ Elemental ☐ Nitrate ☐ Mixture
Other

9. Placards Applied ☐ Yes ☒ No
If Rail Specify Placards
Route Plan ☐ Yes ☒ No

11a. TYPE PACKAGE: Strong Tight ☒; Type A ☐; Type B ☐; Type B(U) ☐; Type B(M) ☐

11b. CONSTRUCTION: ☐ Box, FB; ☐ Wood; ☐ Steel; ☐ Drum; ☐ Cask; Other Polycooler

11c. FISSILE CLASS: Non-Fissile ☒; Fissile Exempt ☐; Fissile I ☐; Fissile II ☐; Fissile III ☐; Gms Fissile

11d. Labels Applied: Empty ☐; Radioactive White I ☐; Radioactive Yellow II ☐; Radioactive Yellow III ☐; Subsidiary Hazard N/A ☐

10. EMERGENCY RESPONSE
Telephone: (509) 373-3800
Emergency Response Guide(s): #61

Warning -- Fissile Class III Shipment. Do Not Load More Than ____ Packages Per Vehicle. In Loading and Storage Areas, Keep at Least 20 Feet From Other Packages Bearing Radioactive Labels.

12.

No. Pkgs.	Model Package	COC/Spec	Serial No.	Seal No.	Isotopes	T.I.	Curies/Pkg	Gr. Wt.
1	Strong tight	N/A	N/A	N/A	Co_{60}, Cs_{137}, Sr_{90}	N/A	1.63 µCi	55 lb
	Polycooler #EK210 contains soil samples in glass jars.							
	Samples are double-bagged.							
	#BOGL71, BOGL73, BOGL75, BOGL79, BOGL81, BOGL86							
	(Shipper may describe package in detail on one of the unused lines above)				TOTALS	N/A	1.63 µCi	55 lb

13. This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable federal, state, local and international regulations for the transportation of hazardous materials.
Certifier's Signature On behalf of DOE-RL: Wendy Thompson | Date: 11/28/95 | Organization: ER Field Sampling | Complete Cost Code (Inc. End Function): X60037

14. Surface Dose Rate of Package: ☑ <0.5 or NA mrem/hr (N + β γ)
Dose Rate at 1 Meter from Surface of Package: ☑ <0.5 or NA mrem/hr (N + β γ)
Smears of Outer Container: ☐ <22 dpm β γ/cm²; ☑ <2.2 dpm α/cm²; ☐ <Tbl. 2-2 HSRCM Onsite Limits
TRUCK LOAD OR EXCLUSIVE USE: Surface ☑ <200 mrem/hr (N + β γ); @ 6 feet ☑ <10 mrem/hr (N + β γ); @ Cab or sleeper ☑ <2 mrem/hr (N + β γ)
Additional Data and Instructions (inc. Readings on Internal Packaging): NA
Signature - Radiation Monitoring: K.W. Wilson | Bldg. 1301N | Survey No. 95-1301-159 | Date 11/28/95

15. PICKUP OF SHIPMENT — Vehicle: HJ2598 | Driver: Bill Whitten
RECEIPT — Signature: Karen Ackenburgh | Date 11/28/95

16. Shipment has been inspected and verified to be in compliance with DOT regulations
Authorized Signature: M A Sams | Printed Name: M.A. SAMS | Date 11-28-95

17. AIR TRANSPORT CERTIFICATION
CARGO AIRCRAFT: ☐ Cargo Aircraft Only Labels Applied
PASSENGER AIRCRAFT: ☐ 1. Ltd Qty ☐ 2. <3 T.I. ☐ 3. Research/Medical Diagnosis ☐ 4. Human Medical Research
Pkg. Dimensions: NA

18. OFFSITE AUTHORIZATION

B/L RMW 9707	Date Shipped 11-28-95	Routing SITE	ETA 11-28-95
Surveyed By	Date	Approved for Shipment Offsite: M A Sams	Date 11-28-95

Receipt: _____ Date: _____

☆ U.S. GOVERNMENT PRINTING OFFICE: 1995—693-181/21013 54-6000-088 (07/95)

00012

Figure 1

SAMPLE CHECK-IN LIST

(1 Per Shipping Container)

Date/Time Received 11/28/95 11:10 Client Name BHI

Project/Client # B95-089 Batch or Case # _____

Cooler ID (if noted on outside of cooler) ER-210

1. Condition of shipping container? air.
2. Custody Seals on cooler intact? Yes [X] No [ ]
3. Custody Seals dated and signed? Yes [X] No [ ]
4. Chain of Custody record is taped on inside of cooler lid? Yes [ ] No [X]
5. Vermiculite/packing material is: Wet [ ] Dry [X] _____
6. Each sample is in a plastic bag? Yes [X] No [ ] _____
7. Number of sample containers in cooler: 18
8. Samples have:
   - ✓ tape
   - ✓ custody seals
   - ____ hazard labels
   - ____ appropriate sample labels
9. Samples are:
   - ✓ in good condition
   - ____ broken
   - ____ other
   - ____ leaking
   - ____ have air bubbles
10. Coolant Present? Yes [X] No [ ] Sample Temperature 6°C
11. The following paperwork should be accounted for (N/A if not applicable):
    Chain of Custody #(s) n/a
    Request for Analysis #(s) ↓
    Airbill # ↓ Carrier n/a
12. Have any anomalies been identified above? Yes [ ] No [X]
13. Memos have been initiated for all anomalies identified above? Yes [X]

Printed Name/Signature Karen Ackerlund Date/Time 11/28/95

5613477.1975

THIS PACKAGE CONFORMS TO THE CONDITIONS AND LIMITATIONS SPECIFIED IN 49 CFR 173.421 FOR RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, UN2910

BECHTEL HANFORD COMPANY

9613477.1974

POTENTIAL HAZARDS

HEALTH HAZARDS

Low-level radioactive material; little personal radiation hazard.
Many packages are not required to have radioactive materials labels or markings.
Some radioactive materials cannot be detected by commonly available instruments.

FIRE OR EXPLOSION

Some of these materials may burn, but none of them ignites readily.
Radioactivity does not change flammability or other properties of the mater

EMERGENCY ACTION

Keep unnecessary people away; isolate hazard area and deny entry.
Response actions may be performed prior to any radiation measurements.
Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection.
Notify Radiation Authority of accident conditions.
Detain uninjured persons, isolate equipment with suspected contamination, and delay cleanup until instruction of Radiation Authority.

FIRE

Do not move damaged containers; move undamaged containers out of fire zone.
Small Fires: Dry chemical, CO_2, water spray or regular foam.
Large Fires: Water spray, fog (flooding amounts).

SPILL OR LEAK

Do not touch damaged containers or spilled material.
Small Liquid Spills: Take up with sand, earth or other noncombustible absorbent material.
Cover powder spill with plastic sheet or tarp to minimize spreading.

FIRST AID

Use first aid treatment according to the nature of the injury.
Advise medical personnel that victim may be contaminated with low-level radioactive material.

Radioactive Material, excepted package - limited quantity of material, 7, UN2910

CAUTION

"Internal Contamination - Soil Samples"

Handle sample containers in a hood designated as Radiological Materials Area (RMA).

The outside of the sample containers may have potential smearable radioactive contamination because they were packaged inside of a glovebox. The outside of the plastic bag surrounding the containers was surveyed with no detectable smearable radioactive contamination. Remove the plastic bag in a hood.

9613477.1976

Quanterra Environmental Services

C.U.R. and C.O.C.
COPIED TO: B.W./WP
DATE: 11-29-95
0925
MN

Login No.: 9901

Condition Upon Receipt Variance Report
St. Louis Laboratory

Client: Richland

Date: 11-29-95 Time: 9:30

Project No: 550.111

Initiated by: [signature]

Shipper/No: FED-EX / 349-9265-682

RFA/COC Numbers: 43702

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:** 3°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) [signature] Date: 11/29/95

Project Management Review: [signature] Date: 11-30-95

SIGNED ORIGINAL MUST BE RETAINED IN THE PROJECT FILE

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

5905

00017

9613477.1977

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.111

Category: ICP Metals; Cr, Cd, Pb, Ni EPA
Method: EPA 6010
Matrix: SOLID

Client ID: B0GL71

Sample Date : 11/09/95
Receipt Date : 11/28/95
Report Date : 01/10/96

Quanterra ID : 9901-001

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Cadmium	7440-43-9	QCBLK87564-1	01/04/96	01/04/95	0.35	MG/KG	U	2.1	4
Chromium	7440-47-3	QCBLK87564-1	01/04/96	01/04/96	22.2	MG/KG		2.1	4
Nickel	7440-02-0	QCBLK87564-1	01/04/96	01/04/96	13.1	MG/KG		1.0	1

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.111

Category: ICP Metals; Cr, Cd, Pb, Ni EPA
Method: EPA 6010
Matrix: SOLID

Client ID: BOGL71

Sample Date : 11/09/95
Receipt Date : 11/28/95
Report Date : 01/10/96

Quanterra ID : 9901-001MS

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Cadmium	7440-43-9	QCBLK87564-1	01/04/96	01/04/95	95	%REC			4
Chromium	7440-47-3	QCBLK87564-1	01/04/96	01/04/96	485	%REC			4
Nickel	7440-02-0	QCBLK87564-1	01/04/96	01/04/96	146	%REC			1

9613477.1979

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.111

Category: ICP Metals; Cr, Cd, Pb, Ni EPA
Method: EPA 6010
Matrix: SOLID

Sample Date : 11/09/95
Receipt Date : 11/28/95
Report Date : 01/10/96

Client ID: BOGL71

Quanterra ID : 9901-001MSD

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Cadmium	7440-43-9	QCBLK87564-1	01/04/96	01/04/95	101	%REC			4
Chromium	7440-47-3	QCBLK87564-1	01/04/96	01/04/96	79	%REC			4
Nickel	7440-02-0	QCBLK87564-1	01/04/96	01/04/96	89	%REC			1

9613477.1980

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.111

Category: ICP Metals; Cr, Cd, Pb, Ni EPA
Method: EPA 6010
Matrix: SOLID

Sample Date : 11/10/95
Receipt Date : 11/28/95
Report Date : 01/10/96

Client ID: BOGL73

Quanterra ID : 9901-002

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Cadmium	7440-43-9	QCBLK87564-1	01/04/96	01/04/95	0.36	MG/KG	U	2.1	4
Chromium	7440-47-3	QCBLK87564-1	01/04/96	01/04/96	18.5	MG/KG		2.1	4
Nickel	7440-02-0	QCBLK87564-1	01/04/96	01/04/96	9.3	MG/KG		1.1	1

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.111

Category: ICP Metals; Cr, Cd, Pb, Ni EPA
Method: EPA 6010
Matrix: SOLID

Client ID: BOGL75

Sample Date : 11/10/95
Receipt Date : 11/28/95
Report Date : 01/10/96

Quanterra ID : 9901-003

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Cadmium	7440-43-9	QCBLK87564-1	01/04/96	01/04/95	0.36	MG/KG	U	2.1	4
Chromium	7440-47-3	QCBLK87564-1	01/04/96	01/04/96	20.4	MG/KG		2.1	4
Nickel	7440-02-0	QCBLK87564-1	01/04/96	01/04/96	9.8	MG/KG		1.1	1

9613477.1982

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.111

Category: ICP Metals; Cr, Cd, Pb, Ni EPA
Method: EPA 6010
Matrix: SOLID

Sample Date : 11/15/95
Receipt Date : 11/28/95
Report Date : 01/10/96

Client ID: BOGL79

Quanterra ID : 9901-004

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Cadmium	7440-43-9	QCBLK87564-1	01/04/96	01/04/95	0.08	MG/KG	U	0.50	1
Chromium	7440-47-3	QCBLK87564-1	01/04/96	01/04/96	0.12	MG/KG	B	0.50	1
Nickel	7440-02-0	QCBLK87564-1	01/04/96	01/04/96	0.40	MG/KG	U	1.0	1

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.111

Category: ICP Metals; Cr, Cd, Pb, Ni EPA
Method: EPA 6010
Matrix: SOLID

Client ID: BOGL81

Sample Date : 11/15/95
Receipt Date : 11/28/95
Report Date : 01/10/96

Quanterra ID : 9901-005

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Cadmium	7440-43-9	QCBLK87564-1	01/04/96	01/04/95	0.35	MG/KG	U	2.1	4
Chromium	7440-47-3	QCBLK87564-1	01/04/96	01/04/96	27.3	MG/KG		2.1	4
Nickel	7440-02-0	QCBLK87564-1	01/04/96	01/04/96	14.5	MG/KG		1.0	1

9615977.1984

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.111

Category: ICP Metals; Cr, Cd, Pb, Ni EPA
Method: EPA 6010
Matrix: SOLID

Sample Date : 11/16/95
Receipt Date : 11/28/95
Report Date : 01/10/96

Client ID: BOGL86

Quanterra ID : 9901-006

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Cadmium	7440-43-9	QCBLK87564-1	01/04/96	01/04/95	0.09	MG/KG	U	0.51	1
Chromium	7440-47-3	QCBLK87564-1	01/04/96	01/04/96	13.0	MG/KG		0.51	1
Nickel	7440-02-0	QCBLK87564-1	01/04/96	01/04/96	12.5	MG/KG		1.0	1

Quanterra-Richland
P.O. Box 1970
Richland, WA 99352

Project: 550.111

Category: Lead
Method: EPA 7421
Matrix: SOLID

Sample Date : 11/09/95
Receipt Date : 11/28/95
Report Date : 01/10/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
BOGL71	9901-001	Lead	7439-92-1	QCBLK87652-1	01/04/96	01/04/96	0.57	MG/KG		0.31	1
BOGL71	9901-001MS	Lead	7439-92-1	QCBLK87652-1	01/04/96	01/04/96	6	%REC			1
BOGL71	9901-001MSD	Lead	7439-92-1	QCBLK87652-1	01/04/96	01/04/96	28	%REC			1
BOGL73	9901-002	Lead	7439-92-1	QCBLK87652-1	01/04/96	01/04/96	0.69	MG/KG		0.32	1
BOGL75	9901-003	Lead	7439-92-1	QCBLK87652-1	01/04/96	01/04/96	0.76	MG/KG		0.32	1
BOGL79	9901-004	Lead	7439-92-1	QCBLK87652-1	01/04/96	01/04/96	0.10	MG/KG	U	0.30	1
BOGL81	9901-005	Lead	7439-92-1	QCBLK87652-1	01/04/96	01/04/96	0.21	MG/KG	B	0.31	1
BOGL86	9901-006	Lead	7439-92-1	QCBLK87652-1	01/04/96	01/04/96	0.63	MG/KG		0.31	1
NA	QCBLK87652-1	Lead	7439-92-1	QCBLK87652-1	01/04/96	01/04/96	0.10	MG/KG	U	0.30	1
NA	QCLCS87652-1	Lead	7439-92-1	QCBLK87652-1	01/04/96	01/04/96	62	%REC			20

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0GL71

Lab Name: QUANTERRA_MO
Lab Code: ITMO Case No.:
Matrix (soil/water): SOIL
Level (low/med): LOW
% Solids: 96.1

Contract: 550.111
SAS No.:
SDG No.: W0823
Lab Sample ID: 9901-001
Date Received: 11/28/95

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

CAS No.	Analyte	Concentration	C	Q	M
7440-43-9	Cadmium	0.35	U		P
7440-47-3	Chromium	22.2			P
7439-92-1	Lead	0.57		N	F
7440-02-0	Nickel	13.1		N	P

Color Before:
Color After:
Clarity Before:
Clarity After:
Texture:
Artifacts:

Comments:

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U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0GL75

Lab Name: QUANTERRA MO Contract: 550.111
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0823
Matrix (soil/water): SOIL Lab Sample ID: 9901-003
Level (low/med): LOW Date Received: 11/28/95
% Solids: 93.7

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

CAS No.	Analyte	Concentration	C	Q	M
7440-43-9	Cadmium	0.36	U		P
7440-47-3	Chromium	20.4			P
7439-92-1	Lead	0.76		N	F
7440-02-0	Nickel	9.8		N	P

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

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9613472.1988

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0GL79

Lab Name: QUANTERRA_MO Contract: 550.111
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0823
Matrix (soil/water): SOIL Lab Sample ID: 9901-004
Level (low/med): LOW Date Received: 11/28/95
% Solids: 100.0

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

CAS No.	Analyte	Concentration	C	Q	M
7440-43-9	Cadmium	0.08	U		P
7440-47-3	Chromium	0.12	B		P
7439-92-1	Lead	0.10	U	N	F
7440-02-0	Nickel	0.40	U	N	P

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

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U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0GL81

Lab Name: QUANTERRA MO
Lab Code: ITMO Case No.:
Matrix (soil/water): SOIL
Level (low/med): LOW
% Solids: 96.2

Contract: 550.111
SAS No.:
SDG No.: W0823
Lab Sample ID: 9901-005
Date Received: 11/28/95

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

CAS No.	Analyte	Concentration	C	Q	M
7440-43-9	Cadmium	0.35	U		P
7440-47-3	Chromium	27.3			P
7439-92-1	Lead	0.21	B	N	F
7440-02-0	Nickel	14.5		N	P

Color Before:
Color After:
Clarity Before:
Clarity After:
Texture:
Artifacts:

Comments:

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9613477.1990

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0GL73

Lab Name: QUANTERRA_MO Contract: 550.111
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0823
Matrix (soil/water): SOIL Lab Sample ID: 9901-002
Level (low/med): LOW Date Received: 11/28/95
% Solids: 93.8

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

CAS No.	Analyte	Concentration	C	Q	M
7440-43-9	Cadmium	0.36	U		P
7440-47-3	Chromium	18.5			P
7439-92-1	Lead	0.69		N	F
7440-02-0	Nickel	9.3		N	P

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

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U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0GL79

Lab Name: QUANTERRA_MO Contract: 550.111
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0823
Matrix (soil/water): SOIL Lab Sample ID: 9901-004
Level (low/med): LOW Date Received: 11/28/95
% Solids: 100.0

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

CAS No.	Analyte	Concentration	C	Q	M
7440-43-9	Cadmium	0.08	U		P
7440-47-3	Chromium	0.12	B		P
7439-92-1	Lead	0.10	U	N	F
7440-02-0	Nickel	0.40	U	N	P

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

SW-846

9613477.1992

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0GL86

Lab Name: QUANTERRA MO Contract: 550.111
Lab Code: ITMO Case No.: SAS No.: SDG No.: W0823
Matrix (soil/water): SOIL Lab Sample ID: 9901-006
Level (low/med): LOW Date Received: 11/28/95
% Solids: 97.6

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

CAS No.	Analyte	Concentration	C	Q	M
7440-43-9	Cadmium	0.09	U		P
7440-47-3	Chromium	13.0			P
7439-92-1	Lead	0.63		N	F
7440-02-0	Nickel	12.5		N	P

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

SW-846

9613477.1993

Quanterra
Environmental Services

Quanterra Incorporated
2800 George Washington Way
Richland, Washington 99352

509 375-3131 Telephone
509 375-5590 Fax

Analytical Data Package Prepared For

Westinghouse/Bechtel Hanford

Radiochemical Analysis By

Quanterra Environmental Services
Richland Laboratory

JAN 1996
RECEIVED
Data
Log In

Sample Delivery Group Number: W0823

CLIENT ID NUMBER	QUANTERRA ID NUMBER
B0GL71	51131101
B0GL73	51131102
B0GL75	51131103
B0GL79	51131104
B0GL81	51131105
B0GL86	51131106

9613477.1994

Quanterra
Environmental Services

Quanterra Incorporated
2800 George Washington Way
Richland, Washington 99352

509 375-3131 Telephone
509 375-5590 Fax

CERTIFICATE OF ANALYSIS

JAN 1996
RECEIVED
Data
Log In

Bechtel Hanford, Inc.
345 Hills
Richland, WA 99352

January 12, 1996

Attention: Joan Kessner

SAF Number	:	B95-089
Date SDG Closed	:	November 28, 1995
Number of Samples	:	Six (6)
Sample Type	:	Soil
SDG Number	:	W0823
Data Deliverable	:	Summary

I. Introduction

On November 28, 1995, six soil samples were received by the Quanterra Environmental Services Richland Laboratory (QTESRL) for radiochemical analysis. Upon receipt, the samples were assigned the following laboratory ID numbers to correspond with the Bechtel Hanford, Inc. (BHI) specific IDs:

QTESRL ID	BHI ID	Matrix	Date of Receipt
51131101	B0GL71	Soil	11/28/95
51131102	B0GL73	Soil	11/28/95
51131103	B0GL75	Soil	11/28/95
51131104	B0GL79	Soil	11/28/95
51131105	B0GL81	Soil	11/28/95
51131106	B0GL86	Soil	11/28/95

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.

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The requested analyses were:

Alpha Spectroscopy
Plutonium-238, -239/40 by method ITAS-RD-3209
Uranium-234, -235, -238 by method ITAS-RD-3234
Gamma Spectroscopy
Gamma Scan by method ITAS-RD-3219
Gas Proportional Counting
Gross Alpha by method ITAS-RD-3222
Gross Beta by method ITAS-RD-3222
Strontium-90 by method ITAS-RD-3204

III. Quality Control

The analytical results for each analysis performed under SDG W0823 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, with the exception of Gross Alpha and Gross Beta QC sample results which are reported in pCi/sample.

IV. Comments

Modified detection limits were required for this SAF.

Alpha Spectroscopy

Plutonium-238, -239/40 by method ITAS-RD-3209
The batch sample sizes were reduced for all samples except sample B0GL79 due to high screening activity. As a result, three samples did not meet the RDL on the initial count, samples B0GL71, B0GL73, and B0GL75. The samples were recounted for 1000 minutes to improve the achieved MDAs. The recount results are accepted and reported with all achieved MDAs less than the RDL or results greater than the MDAs except for the Pu-238 MDA for sample B0GL71. The Pu-239 result for that sample was more than 10 times higher than the requested RDL, therefore, the results are accepted and the elevated MDA is attributed to a matrix effect (high beta sample activity). The LCS, batch blank, sample and sample duplicate (B0GL86) results are within contractual requirements.

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Uranium-234, -235, -238 by method ITAS-RD-3234
The batch sample sizes were reduced for all samples except sample B0GL79 due to high beta screening activity. As a result, three samples did not meet the RDL on the initial count, samples B0GL71, B0GL73, and B0GL75. The samples were recounted for 1000 minutes to improve the achieved MDAs. On the recount, sample B0GL71 did not meet the RDL for U-234, however, the U-238 result is greater than the achieved MDA. Sample B0GL73 did not meet the RDL for U-234, but the U-238 RDL is achieved. Sample B0GL75 has results over the achieved MDAs. The recount results are accepted and reported with the achieved MDAs and the elevated MDAs are attributed to a matrix effect (high beta sample activity). The LCS, batch blank, sample and sample duplicate (B0GL86) results are within contractual requirements.

Gamma Spectroscopy

Gamma Scan by method ITAS-RD-3219
The high activity of the samples required a reduction of sample mass analyzed. As a result of the smaller sample sizes and the high Compton background, the samples do not meet the contractual RDLs for some isotopes, however, the samples do meet the modified RDLs specified for this SAF. The contractual and modified RDLs are met by the Ottawa sand blank. The data are accepted with the MDAs achieved. Th-232 is requested by the modified SAF detection limit list, however, the Th-232 key line was not found for sample B0GL73, therefore, a Th-232 result could not be reported for that sample. The K-40 result for the duplicate of sample B0GL79 was outside of the 3 sigma control limit because K-40 was detected in the duplicate, but was not detected in the sample. U-238DLP is detected and reported in the blank, however, it is not considered to be an indication of batch contamination as it is a natural constituent of the blank matrix material. The LCS, batch blank, sample and sample duplicate (B0GL79) results are within contractual requirements, except as noted.

Gas Proportional Counting

Gross Alpha by method ITAS-RD-3222
Samples B0GL73, B0GL75, B0GL79 and B0GL86 were recounted for 100 minutes to improve the achieved MDAs. The recount results are within limits and reported. The LCS, batch blank, sample and sample duplicate (B0GL86) results are within contractual requirements.

Gross Beta by method ITAS-RD-3222
The count time and aliquot size was reduced for sample B0GL71 due to high screening activity. The LCS, batch blank, sample and sample duplicate (B0GL86) results are within contractual requirements.

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Strontium-90 by method ITAS-RD-3204
The duplicate was lost in analysis. All other aspects of the data are within requirements and the batch is accepted. The LCS, batch blank, and sample results are within contractual requirements.

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

Reviewed and approved:

Suzanne Gaines

Suzanne Gaines
Project Manager

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SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0823
LAB SAMPLE ID:	51131101	MATRIX:	SOIL
CLIENT ID:	B0GL71	DATE RECEIVED:	11/28/95 11:10:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
RA-226.	1.54E+00	N/A	9.6E-01	1.56E+00	pCi/g	N/A	RD3219
PU-238	1.17E+00	1.3E+00	1.3E+00	2.26E+00	pCi/g	67.20%	RD3209
PU-238	4.96E+00	4.4E+00	4.5E+00	2.69E+00	pCi/g	68.90%	RD3209
PU239/40	1.26E+01	3.2E+00	3.5E+00	1.50E+00	pCi/g	67.20%	RD3209
PU239/40	1.38E+01	7.4E+00	7.8E+00	4.14E+00	pCi/g	68.90%	RD3209
U-234	1.11E-01	9.6E-01	9.6E-01	2.30E+00	pCi/g	74.50%	RD3234
U-234	1.14E+00	2.5E+00	2.6E+00	5.91E+00	pCi/g	77.60%	RD3234
U-235	-1.11E-01	4.7E-01	4.7E-01	1.59E+00	pCi/g	74.50%	RD3234
U-235	6.75E-01	1.8E+00	1.8E+00	4.43E+00	pCi/g	77.60%	RD3234
U-238	1.74E+00	1.3E+00	1.3E+00	1.59E+00	pCi/g	74.50%	RD3234
U-238	2.31E+00	3.1E+00	3.1E+00	5.01E+00	pCi/g	77.60%	RD3234
AM-241.	6.55E+00	1.4E+00	1.5E+00	N/A	pCi/g	N/A	RD3219
CE-144.	-6.38E-01	2.2E+00	2.2E+00	3.51E+00	pCi/g	N/A	RD3219
CO-58.	-5.59E-01	7.3E-01	7.4E-01	1.20E+00	pCi/g	N/A	RD3219
CO-60.	1.20E+03	2.2E+00	1.2E+02	N/A	pCi/g	N/A	RD3219
CS-134.	5.28E+00	6.2E-01	8.1E-01	N/A	pCi/g	N/A	RD3219
CS-137DA.	6.77E+03	1.2E+01	6.8E+02	N/A	pCi/g	N/A	RD3219
EU-152.	8.33E-01	1.8E+00	1.8E+00	2.85E+00	pCi/g	N/A	RD3219
EU-154.	8.17E+00	9.3E-01	1.2E+00	1.60E+00	pCi/g	N/A	RD3219
EU-155.	2.36E+00	1.1E+00	1.1E+00	1.66E+00	pCi/g	N/A	RD3219
FE-59.	2.21E-01	2.4E+00	2.4E+00	3.76E+00	pCi/g	N/A	RD3219
K-40.	1.37E+01	3.6E+00	3.8E+00	N/A	pCi/g	N/A	RD3219
MN-54.	9.36E-01	5.6E-01	5.7E-01	9.25E-01	pCi/g	N/A	RD3219
RU-106DA.	3.78E-01	4.9E+00	4.9E+00	8.12E+00	pCi/g	N/A	RD3219
TH-228DA.	7.44E-01	1.5E+00	1.5E+00	2.45E+00	pCi/g	N/A	RD3219

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SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0823
LAB SAMPLE ID:	51131101	MATRIX:	SOIL
CLIENT ID:	B0GL71	DATE RECEIVED:	11/28/95 11:10:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
TH-232DA.	-1.13E+00	4.1E+00	4.1E+00	6.43E+00	pCi/g	N/A	RD3219
ALPHA	3.01E+01	1.1E+01	1.1E+01	5.97E+00	pCi/g	100.00%	RD3222
BETA	5.75E+03	1.0E+02	4.0E+02	1.68E+01	pCi/g	100.00%	RD3222
SR-90	7.68E+02	8.0E+01	1.6E+02	4.64E+01	pCi/g	82.00%	RD3204

Number of Results: 29

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SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0823
LAB SAMPLE ID:	51131102	MATRIX:	SOIL
CLIENT ID:	B0GL73	DATE RECEIVED:	11/28/95 11:10:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
RA-226.	5.99E-01	N/A	1.3E-01	2.06E-01	pCi/g	N/A	RD3219
PU-238	1.05E-01	2.5E-01	2.5E-01	5.68E-01	pCi/g	58.10%	RD3209
PU-238	-1.98E-02	4.0E-02	4.0E-02	1.48E+00	pCi/g	61.90%	RD3209
PU239/40	3.95E-01	7.9E-01	7.9E-01	1.07E+00	pCi/g	61.90%	RD3209
PU239/40	2.11E-02	1.8E-01	1.8E-01	5.67E-01	pCi/g	58.10%	RD3209
U-234	9.29E-01	1.2E+00	1.2E+00	1.68E+00	pCi/g	73.00%	RD3234
U-234	4.07E-01	4.3E-01	4.3E-01	7.33E-01	pCi/g	77.40%	RD3234
U-235	-2.69E-02	5.4E-02	5.4E-02	1.35E+00	pCi/g	73.00%	RD3234
U-235	7.62E-02	1.9E-01	1.9E-01	4.36E-01	pCi/g	77.40%	RD3234
U-238	-5.39E-02	7.6E-02	7.7E-02	1.54E+00	pCi/g	73.00%	RD3234
U-238	3.43E-01	3.5E-01	3.5E-01	5.46E-01	pCi/g	77.40%	RD3234
CE-144.	1.63E-01	4.0E-01	4.0E-01	6.27E-01	pCi/g	N/A	RD3219
CO-58.	-3.41E-03	7.4E-02	7.4E-02	1.21E-01	pCi/g	N/A	RD3219
CO-60.	7.10E+00	1.8E-01	7.3E-01	N/A	pCi/g	N/A	RD3219
CS-134.	-5.78E-02	5.2E-02	5.2E-02	8.39E-02	pCi/g	N/A	RD3219
CS-137DA.	4.43E+01	3.3E-01	4.4E+00	N/A	pCi/g	N/A	RD3219
EU-152.	9.37E-03	1.7E-01	1.7E-01	2.81E-01	pCi/g	N/A	RD3219
EU-154.	1.78E-01	1.2E-01	1.2E-01	2.09E-01	pCi/g	N/A	RD3219
EU-155.	1.30E-02	2.1E-01	2.1E-01	3.24E-01	pCi/g	N/A	RD3219
FE-59.	-1.27E-01	2.0E-01	2.0E-01	3.11E-01	pCi/g	N/A	RD3219
K-40.	1.61E+01	1.2E+00	2.0E+00	N/A	pCi/g	N/A	RD3219
MN-54.	5.65E-02	5.5E-02	5.6E-02	9.28E-02	pCi/g	N/A	RD3219
RA-224DA.	7.72E-01	1.5E-01	1.7E-01	N/A	pCi/g	N/A	RD3219
RU-106DA.	-2.71E-01	5.2E-01	5.2E-01	8.54E-01	pCi/g	N/A	RD3219
TH-228DA.	8.83E-01	2.4E-01	2.5E-01	N/A	pCi/g	N/A	RD3219

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SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0823
LAB SAMPLE ID:	51131102	MATRIX:	SOIL
CLIENT ID:	B0GL73	DATE RECEIVED:	11/28/95 11:10:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
ALPHA	7.69E+00	4.0E+00	4.1E+00	4.20E+00	pCi/g	100.00%	RD3222
BETA	3.79E+03	4.0E+01	2.5E+02	3.53E+00	pCi/g	100.00%	RD3222
SR-90	1.43E+03	6.1E+01	2.6E+02	1.40E+01	pCi/g	82.10%	RD3204

Number of Results: 28

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SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0823
LAB SAMPLE ID:	51131103	MATRIX:	SOIL
CLIENT ID:	B0GL75	DATE RECEIVED:	11/28/95 11:10:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
RA-226.	8.08E-01	N/A	2.5E-01	N/A	pCi/g	N/A	RD3219
PU-238	8.62E-02	1.7E-01	1.7E-01	2.33E-01	pCi/g	53.70%	RD3209
PU-238	-1.52E-01	1.5E-01	1.5E-01	2.54E+00	pCi/g	48.70%	RD3209
PU239/40	1.39E+00	1.6E+00	1.7E+00	1.91E+00	pCi/g	48.70%	RD3209
PU239/40	3.01E-01	3.5E-01	3.5E-01	5.16E-01	pCi/g	53.70%	RD3209
U-234	1.63E+00	1.5E+00	1.5E+00	1.54E+00	pCi/g	68.60%	RD3234
U-234	1.00E+00	5.5E-01	5.6E-01	6.65E-01	pCi/g	80.00%	RD3234
U-235	1.04E-01	2.2E-01	2.2E-01	4.50E-01	pCi/g	80.00%	RD3234
U-235	-2.69E-02	5.4E-02	5.4E-02	1.35E+00	pCi/g	68.60%	RD3234
U-238	1.26E+00	1.3E+00	1.4E+00	1.68E+00	pCi/g	68.60%	RD3234
U-238	8.42E-01	4.9E-01	5.0E-01	5.72E-01	pCi/g	80.00%	RD3234
CE-144.	2.59E-01	4.4E-01	4.4E-01	7.21E-01	pCi/g	N/A	RD3219
CO-58.	-1.23E-02	7.7E-02	7.7E-02	1.24E-01	pCi/g	N/A	RD3219
CO-60.	9.20E+00	2.3E-01	9.5E-01	N/A	pCi/g	N/A	RD3219
CS-134.	-2.52E-02	5.7E-02	5.7E-02	8.97E-02	pCi/g	N/A	RD3219
CS-137DA.	6.58E+01	4.4E-01	6.6E+00	N/A	pCi/g	N/A	RD3219
EU-152.	6.32E-02	2.0E-01	2.0E-01	3.30E-01	pCi/g	N/A	RD3219
EU-154.	2.32E-01	1.2E-01	1.3E-01	2.26E-01	pCi/g	N/A	RD3219
EU-155.	1.12E-01	2.5E-01	2.6E-01	4.08E-01	pCi/g	N/A	RD3219
FE-59.	7.66E-02	2.3E-01	2.3E-01	3.71E-01	pCi/g	N/A	RD3219
K-40.	1.58E+01	1.4E+00	2.1E+00	N/A	pCi/g	N/A	RD3219
MN-54.	4.93E-02	6.0E-02	6.0E-02	9.86E-02	pCi/g	N/A	RD3219
RA-224DA.	9.03E-01	1.7E-01	1.9E-01	N/A	pCi/g	N/A	RD3219
RA-228DA.	5.90E-01	3.5E-01	3.5E-01	N/A	pCi/g	N/A	RD3219
RU-106DA.	-1.59E-01	5.8E-01	5.8E-01	9.14E-01	pCi/g	N/A	RD3219

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SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	**SDG:**	W0823
LAB SAMPLE ID:	51131103	**MATRIX:**	SOIL
CLIENT ID:	B0GL75	**DATE RECEIVED:**	11/28/95 11:10:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
TH-228DA.	1.08E+00	2.7E-01	2.9E-01	N/A	pCi/g	N/A	RD3219
TH-232DA.	1.12E+00	5.9E-01	6.1E-01	N/A	pCi/g	N/A	RD3219
ALPHA	7.60E+00	4.1E+00	4.2E+00	4.99E+00	pCi/g	100.00%	RD3222
BETA	2.74E+03	2.4E+01	1.8E+02	2.57E+00	pCi/g	100.00%	RD3222
SR-90	1.74E+03	6.7E+01	3.1E+02	1.42E+01	pCi/g	84.90%	RD3204

Number of Results: 30

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Environmental Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0823
LAB SAMPLE ID:	51131104	MATRIX:	SOIL
CLIENT ID:	B0GL79	DATE RECEIVED:	11/28/95 11:10:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
RA-226.	2.58E-01	N/A	6.0E-02	1.03E-01	pCi/g	N/A	RD3219
PU-238	-6.08E-03	3.4E-03	3.6E-03	6.04E-02	pCi/g	44.60%	RD3209
PU239/40	-1.87E-03	1.9E-03	1.9E-03	4.47E-02	pCi/g	44.60%	RD3209
U-234	4.33E-02	3.5E-02	3.5E-02	4.30E-02	pCi/g	68.60%	RD3234
U-235	-1.46E-03	1.7E-03	1.7E-03	3.03E-02	pCi/g	68.60%	RD3234
U-238	8.92E-02	4.7E-02	4.9E-02	3.24E-02	pCi/g	68.60%	RD3234
CE-144.	5.65E-02	9.2E-02	9.2E-02	1.53E-01	pCi/g	N/A	RD3219
CO-58.	-1.18E-02	3.5E-02	3.5E-02	5.60E-02	pCi/g	N/A	RD3219
CO-60.	-2.78E-02	3.1E-02	3.1E-02	4.82E-02	pCi/g	N/A	RD3219
CS-134.	-1.88E-02	2.5E-02	2.5E-02	3.89E-02	pCi/g	N/A	RD3219
CS-137DA.	1.35E-02	2.5E-02	2.5E-02	4.14E-02	pCi/g	N/A	RD3219
EU-152.	-3.86E-02	6.0E-02	6.0E-02	9.52E-02	pCi/g	N/A	RD3219
EU-154.	8.75E-03	8.1E-02	8.1E-02	1.36E-01	pCi/g	N/A	RD3219
EU-155.	-3.16E-02	4.6E-02	4.6E-02	7.00E-02	pCi/g	N/A	RD3219
FE-59.	-1.21E-02	9.0E-02	9.0E-02	1.50E-01	pCi/g	N/A	RD3219
K-40.	5.68E+00	5.4E-01	7.8E-01	1.19E+00	pCi/g	N/A	RD3219
MN-54.	9.63E-03	2.8E-02	2.8E-02	4.75E-02	pCi/g	N/A	RD3219
RA-224DA.	1.15E-01	5.9E-02	6.0E-02	N/A	pCi/g	N/A	RD3219
RU-106DA.	-1.45E-01	2.2E-01	2.2E-01	3.50E-01	pCi/g	N/A	RD3219
TH-228DA.	1.85E-01	1.1E-01	1.1E-01	N/A	pCi/g	N/A	RD3219
TH-232DA.	2.70E-01	1.4E-01	1.4E-01	2.46E-01	pCi/g	N/A	RD3219
ALPHA	2.99E+00	2.8E+00	2.8E+00	4.49E+00	pCi/g	100.00%	RD3222
BETA	2.14E+00	1.3E+00	1.3E+00	2.60E+00	pCi/g	100.00%	RD3222
SR-90	2.74E-01	6.5E-02	8.1E-02	7.04E-02	pCi/g	85.20%	RD3204

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SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0823
LAB SAMPLE ID:	51131104	MATRIX:	SOIL
CLIENT ID:	B0GL79	DATE RECEIVED:	11/28/95 11:10:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER

Number of Results: 24

9613477.2006

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Environmental Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0823
LAB SAMPLE ID:	51131105	MATRIX:	SOIL
CLIENT ID:	B0GL81	DATE RECEIVED:	11/28/95 11:10:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
RA-226.	5.00E-01	N/A	1.0E-01	N/A	pCi/g	N/A	RD3219
PU-238	-3.76E-03	4.3E-03	4.4E-03	1.13E-01	pCi/g	54.50%	RD3209
PU239/40	-3.76E-03	4.3E-03	4.4E-03	1.13E-01	pCi/g	54.50%	RD3209
U-234	5.34E-01	2.0E-01	2.1E-01	1.13E-01	pCi/g	77.50%	RD3234
U-235	3.24E-02	5.0E-02	5.0E-02	8.04E-02	pCi/g	77.50%	RD3234
U-238	4.87E-01	1.9E-01	2.0E-01	9.40E-02	pCi/g	77.50%	RD3234
CE-144.	-5.52E-02	1.3E-01	1.3E-01	2.07E-01	pCi/g	N/A	RD3219
CO-58.	4.25E-02	4.1E-02	4.1E-02	7.21E-02	pCi/g	N/A	RD3219
CO-60.	5.47E-01	7.8E-02	9.5E-02	N/A	pCi/g	N/A	RD3219
CS-134.	2.37E-02	2.8E-02	2.8E-02	4.69E-02	pCi/g	N/A	RD3219
CS-137DA.	7.04E-03	3.0E-02	3.0E-02	5.05E-02	pCi/g	N/A	RD3219
EU-152.	-6.82E-02	7.1E-02	7.2E-02	1.15E-01	pCi/g	N/A	RD3219
EU-154.	9.79E-02	9.5E-02	9.5E-02	1.68E-01	pCi/g	N/A	RD3219
EU-155.	-8.06E-03	6.5E-02	6.5E-02	1.02E-01	pCi/g	N/A	RD3219
FE-59.	-2.19E-01	1.2E-01	1.2E-01	1.81E-01	pCi/g	N/A	RD3219
K-40.	1.09E+01	1.1E+00	1.6E+00	N/A	pCi/g	N/A	RD3219
MN-54.	-1.79E-02	3.5E-02	3.5E-02	5.83E-02	pCi/g	N/A	RD3219
RA-224DA.	4.62E-01	8.4E-02	9.6E-02	N/A	pCi/g	N/A	RD3219
RA-228DA.	8.14E-01	2.3E-01	2.4E-01	N/A	pCi/g	N/A	RD3219
RU-106DA.	1.26E-02	2.9E-01	2.9E-01	4.65E-01	pCi/g	N/A	RD3219
TH-228DA.	7.48E-01	1.6E-01	1.8E-01	N/A	pCi/g	N/A	RD3219
TH-232DA.	5.96E-01	2.6E-01	2.6E-01	N/A	pCi/g	N/A	RD3219
ALPHA	9.33E+00	6.0E+00	6.1E+00	5.98E+00	pCi/g	100.00%	RD3222
BETA	1.32E+02	5.4E+00	1.0E+01	2.58E+00	pCi/g	100.00%	RD3222
SR-90	5.79E+01	9.9E-01	1.1E+01	9.26E-02	pCi/g	60.30%	RD3204

0014

Quanterra
Environmental Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0823
LAB SAMPLE ID:	51131105	MATRIX:	SOIL
CLIENT ID:	B0GL81	DATE RECEIVED:	11/28/95 11:10:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER

Number of Results: 25

Quanterra
Environmental Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0823
LAB SAMPLE ID:	51131106	MATRIX:	SOIL
CLIENT ID:	B0GL86	DATE RECEIVED:	11/28/95 11:10:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
RA-226.	5.24E-01	N/A	1.2E-01	N/A	pCi/g	N/A	RD3219
PU-238	0.00E+00	0.0E+00	1.2E-01	1.13E-01	pCi/g	69.20%	RD3209
PU239/40	-4.16E-03	5.9E-03	5.9E-03	1.74E-01	pCi/g	69.20%	RD3209
U-234	3.98E-01	2.5E-01	2.5E-01	2.35E-01	pCi/g	81.30%	RD3234
U-235	2.68E-02	7.1E-02	7.1E-02	1.76E-01	pCi/g	81.30%	RD3234
U-238	4.80E-01	2.6E-01	2.8E-01	1.99E-01	pCi/g	81.30%	RD3234
CE-144.	-8.79E-02	1.5E-01	1.5E-01	2.27E-01	pCi/g	N/A	RD3219
CO-58.	1.58E-02	3.4E-02	3.4E-02	5.87E-02	pCi/g	N/A	RD3219
CO-60.	5.35E-01	6.8E-02	8.6E-02	N/A	pCi/g	N/A	RD3219
CS-134.	-3.70E-02	2.5E-02	2.5E-02	3.93E-02	pCi/g	N/A	RD3219
CS-137DA.	-2.05E-02	2.8E-02	2.8E-02	4.39E-02	pCi/g	N/A	RD3219
EU-152.	-8.33E-03	6.9E-02	6.9E-02	1.13E-01	pCi/g	N/A	RD3219
EU-154.	-2.25E-02	8.2E-02	8.2E-02	1.33E-01	pCi/g	N/A	RD3219
EU-155.	1.09E-01	7.7E-02	7.8E-02	1.22E-01	pCi/g	N/A	RD3219
FE-59.	3.56E-02	9.4E-02	9.4E-02	1.62E-01	pCi/g	N/A	RD3219
K-40.	1.86E+01	1.1E+00	2.1E+00	N/A	pCi/g	N/A	RD3219
MN-54.	-8.07E-03	3.0E-02	3.0E-02	4.96E-02	pCi/g	N/A	RD3219
RA-224DA.	4.15E-01	7.3E-02	8.4E-02	N/A	pCi/g	N/A	RD3219
RU-106DA.	-1.30E-01	2.5E-01	2.5E-01	4.10E-01	pCi/g	N/A	RD3219
TH-228DA.	6.35E-01	1.5E-01	1.7E-01	N/A	pCi/g	N/A	RD3219
TH-232DA.	8.22E-01	2.4E-01	2.6E-01	N/A	pCi/g	N/A	RD3219
ALPHA	2.90E+00	3.0E+00	3.0E+00	5.22E+00	pCi/g	100.00%	RD3222
BETA	3.28E+02	8.4E+00	2.3E+01	2.59E+00	pCi/g	100.00%	RD3222
SR-90	1.44E+02	6.1E+00	2.6E+01	1.45E+00	pCi/g	82.60%	RD3204

9613477.2009

Quanterra
Environmental Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0823
LAB SAMPLE ID:	51131106	MATRIX:	SOIL
CLIENT ID:	B0GL86	DATE RECEIVED:	11/28/95 11:10:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER

Number of Results: 24

9615977.2010

12
1-86 TR 1-9-96

Quanterra
Environmental Services

Data Review Checklist
RADIOCHEMISTRY

Work Order No(s): 511311 BH1 SOIL

Lab Sample Numbers or SDG: W0823

Method/Test/Parameter: PJ-150

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?	✓			✓
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 ≤ the Contract Detection Limit?	✓			✓
4. Is the Blank result greater than the Contract Detection Limit but the Sample result less than the Contract Detection Limit?			✓	✓
5. Is the LCS result within acceptance criteria?	✓			✓
6. Is the LCS yield within acceptance criteria?	✓			✓
7. Is the LCS Minimum Detectable Activity less than or equal to the Contract Detection Limit?	✓			✓
8. MS/MSD results and yield meet acceptance criteria?			✓	✓
9. Duplicate sample results and yield meet acceptance criteria?	✓			✓
D. Other 1. Are all nonconformances included and noted?	✓			✓
2. Are all required forms filled out?	✓			✓
3. Correct methodology used?	✓			✓
4. Transcription checked?	SK			TR
5. Were all calculations checked at a minimum frequency?	✓			✓
6. Units checked?	✓			✓

Comments on any "No" response:

Analyst: [signature] Date: 1-10-96

Second Level Review: [signature] Date: 1/12/96

Form No: LS-038, 3/94, Rev 2

Report recount results for 5113101, 02 & 03. TR 1-11-96

QUANTERRA LABORATORY NONCONFORMANCE MEMO (NCM)

LOG #: RD-95-_____

Project ID: BHI
Sample Numbers: S11311.01, 02, 03
Tests: Pu 30
Matrix: Soil

NCM Initiated by: Joel T Kempenia

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):*** Samples recounted for 1000 minutes to improve MDA

Comments/Explanation: Sample #01 has Pu activity > MDA

Notification (check appropriate area):

Client notified by (name and date): _____

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

Client's name and response: _____

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

Project Manager (signature and date): Sang J Haines 1/19/96

9613477.2012

QUANTERRA LABORATORY NONCONFORMANCE MEMO (NCM)

LOG#: RD-95-

Corrective Action

Root Cause Initial and date: JK 1-10-96

Sample volume analyzed reduced due to high screening activity in Beta

Corrective Action Initial and Date: JK 1-10-96

Data accepted with MDAs Achieved

Sample #01 Pu239 Activity > MDA Pu238 MDA > CL
Sample #02 + 03 MDAs < CL after recount, recount data accepted for all 3 samples JK 1-11-96

Responsibility for performing CA assigned to:

Actions to prevent recurrence Initial and Date:

First Level Supervisor: Joel Kempema Date: 1-10-96

Responsible Manager: M. Mockbee Date: 1/12/96

Quality Assurance Review

☐ Anomaly ☐ Deficiency ☑ Rerun

☐ Further action required:

Assigned to:

QA signature: Beverly A. Thomas Date: 1/12/96

Corrective Action Verification

☑ Verified

☐ Cannot Verify (specify reason):

Nonconformance Memo Closure

QA signature/date: Beverly A. Thomas 1/12/96

9613477.2013

1-12

Quanterra
Environmental Services

Data Review Checklist
RADIOCHEMISTRY

Work Order No(s): 511311 BH1
SOIL

Lab Sample Numbers or SDG: W0823

Method/Test/Parameter: U-150

Review Item	Yes (✓)	No (✓)	N/A (✓)	2nd Level review (✓)
A. 1. **Calibration** Is the calibration documentation included where applicable?			✓	✓
B. 1. **Sample Analysis** Are the sample Yields within acceptance criteria?	✓			✓
2. Were all sample holding times met?	✓			✓
C. 1. **QC Samples** 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 ≤ the Contract Detection Limit?	✓			✓
4. Is the Blank result greater than the Contract Detection Limit but the Sample result less than the Contract Detection Limit?			✓	✓
5. Is the LCS result within acceptance criteria?	✓			✓
6. Is the LCS yield within acceptance criteria?	✓			✓
7. Is the LCS Minimum Detectable Activity less than or equal to the Contract Detection Limit?	✓			✓
8. MS/MSD results and yield meet acceptance criteria?			✓	✓
9. Duplicate sample results and yield meet acceptance criteria?	✓			✓
D. 1. **Other** Are all nonconformances included and noted?	✓			✓
2. Are all required forms filled out?	✓			✓
3. Correct methodology used?	✓			✓
4. Transcription checked?	SK			JTC
5. Were all calculations checked at a minimum frequency?	✓			✓
6. Units checked?	✓			✓

Comments on any "No" response:

Analyst: Joel Kemplerer Date: 1-10-96

Second Level Review: Sue Williams Date: 1/12/96

Form No: LS-038, 3/94, Rev 2

Report recount results for 01, 02, 03. JTC 1-11-96

03

QUANTERRA LABORATORY NONCONFORMANCE MEMO (NCM)

LOG #: RD-95-

Project ID: BHI

NCM Initiated by: Joel Klengenia 1-10-96

Sample Numbers: 5113 1101, 02, 03

Tests: U130

Matrix: Soil

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):*** Samples recounted 1000 minutes to improve MDAs

Comments/Explanation:

Notification (check appropriate area):

Client notified by (name and date):

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

Client's name and response:

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

Project Manager (signature and date): Suzy Haines 1/10/96

9613477.2015

QUANTERRA LABORATORY NONCONFORMANCE MEMO (NCM)

LOG#: RD-95-

Corrective Action

Root Cause Initial and date: TTC 1-10-96

High screening activity for beta requiring reduction of sample volume analyzed

Corrective Action Initial and Date: TTC 1-10-96 / TTC 1-11-96

Data accepted with MDA's Achieved
Recount Results - recount data accepted to report, MDA's ignored.
Sample 01 MDAs > CL, Sample 02 U234 MDA > CL U235 U238 MDAs < CL
Sample #03 Activity > MDA MDAs ≤ CL

Responsibility for performing CA assigned to:

Actions to prevent recurrence Initial and Date:

First Level Supervisor: Joel Thengerman TTC 1-11-96 Date: 1-10-96

Responsible Manager: W. McKellar Date: 1/12/96

Quality Assurance Review

☐ Anomaly ☐ Deficiency ☐ ~~Rerun~~

☐ Further action required:

Assigned to:

QA signature: Beverly Stone Date: 1/12/96

Corrective Action Verification

☑ Verified

☐ Cannot Verify (specify reason):

Nonconformance Memo Closure

QA signature/date: Beverly Stone 1/12/96

9615477.2016

12
1-26 TR
1-9-96

Quanterra
Environmental Services

Data Review Checklist
RADIOCHEMISTRY

Work Order No(s): S11311 BH1 SOIL

Lab Sample Numbers or SDG: WO823

Method/Test/Parameter: GAMMA

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?	✓			✓
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 ≤ the Contract Detection Limit?	✓			✓
4. Is the Blank result greater than the Contract Detection Limit but the Sample result less than the Contract Detection Limit?			✓	✓
5. Is the LCS result within acceptance criteria?	✓			✓
6. Is the LCS yield within acceptance criteria?			✓	✓
7. Is the LCS Minimum Detectable Activity less than or equal to the Contract Detection Limit?			✓	✓
8. MS/MSD results and yield meet acceptance criteria?			✓	✓
9. Duplicate sample results and yield meet acceptance criteria?	✓			✓
D. **Other** 1. Are all nonconformances included and noted?	✓			✓
2. Are all required forms filled out?	✓			✓
3. Correct methodology used?	✓			✓
4. Transcription checked?	GK			TR
5. Were all calculations checked at a minimum frequency?	✓			✓
6. Units checked?	✓			✓

Comments on any "No" response: 2 NCMS included

Analyst: Jel Kempema Date: 1-10-96

Second Level Review: Sergy Gavrilov Date: 1/12/96

Form No: LS-038, 3/94, Rev 2

Report isotopes listed on bottom page summary.

9613477.2017

QUANTERRA LABORATORY NONCONFORMANCE MEMO (NCM)

LOG #: RD-96-96 1/12/96

Project ID: BHI NCM Initiated by: Joel Thompson

Sample Numbers: 5113101-06 - G1131104

Tests: Gamma

Matrix: Soil

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):* MDAs for 1 or more Rotope listed below are > CL

Comments/Explanation:

#01 = Mn54, Co58, Fe59, Ru106, Eu152 Eu154, Eu155, Ra226, Th228, Th232

#02-06 + G04 = Co58, Fe59

Notification (check appropriate area):

Client notified by (name and date): _____

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

Client's name and response: _____

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

Project Manager (signature and date): Suzy Davies 1/12/96

QUANTERRA LABORATORY NONCONFORMANCE MEMO (NCM)

LOG#: RD-96-96

1/12/96

Corrective Action

Root Cause Initial and date: MC 1-10-96

#01 - high compton background of sample
#02 - Ok due to small sample aliquant analyzed

Corrective Action Initial and Date: MC 1-10-96

Data accepted with MDA's Achieved. Ottawa sand blank matrix material in same geometry with same count time does meet MDA for all isotopes.

Responsibility for performing CA assigned to:

Actions to prevent recurrence Initial and Date:

First Level Supervisor: Joel Dongema Date: 1-10-96

Responsible Manager: W. Markell Date: 1/12/96

Quality Assurance Review

☑ Anomaly ☐ Deficiency ☐ Rerun

☐ Further action required:

Assigned to:

QA signature: Beverly A. Green Date: 1/12/96

Corrective Action Verification

☑ Verified

☐ Cannot Verify (specify reason):

Nonconformance Memo Closure

QA signature/date: Beverly A. Green 1/12/96

9613477.2019

QUANTERRA LABORATORY NONCONFORMANCE MEMO (NCM)

LOG #: RD-95-

Project ID: BHI NCM Initiated by: Joel T Kingsmore 1-10-96

Sample Numbers: M113111B, 5113101, 5113102, 5113104, 5113105, 5113106

Tests: Gamma

Matrix: Soil

Analytical Area (check appropriate area):

- ☐ Sample control
- ☐ GC
- ☐ Wet chemistry
- ☒ Data review
- ☐ Organic preparation
- ☐ HPLC
- ☐ Metals
- ☒ Radiochemistry
- ☐ Inorganic preparation
- ☐ GC/MS
- ☐ Reporting
- ☐ 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):*** _____

Comments/Explanation: 1B - Cd109 not reported
U238 DLP reported
#01 Cd109
#02 Th232 not reported - Keyline not found
G04 - K40 > 3σ error
#05 - Cd109 #06 - Cd109

Notification (check appropriate area):

Client notified by (name and date): _____

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

Client's name and response: _____

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

Project Manager (signature and date): Sey Davies 1/12/96

9613477.2020

QUANTERRA LABORATORY NONCONFORMANCE MEMO (NCM)

LOG#: RD-95-

Corrective Action

Root Cause IB: Initial and date: MRT-10-96

#01 - U238DLP reported detected >2σ error as it is a natural constituent of the a sta

IBCd109 - false detect caused by Xray interaction with core liners

#02 - passed abundance test for Th232 to be detected but NID didn't find the Keyline therefore error message "Keyline not found"

#04 K40 not detected therefore the background not subtracted before calculating

Corrective Action Initial and Date: MC 1-10-96

Data accepted with these exclusions

Responsibility for performing CA assigned to:

Actions to prevent recurrence Initial and Date:

First Level Supervisor: MK - Joel Mengeno Date: 1-10-96

Responsible Manager: W. Mackellar Date: 1/12/96

Quality Assurance Review

☑ Anomaly ☐ Deficiency ☐ Rerun

☐ Further action required:

Assigned to:

QA signature: Beverly Ottman Date: 1/12/96

Corrective Action Verification

☑ Verified

☐ Cannot Verify (specify reason):

Nonconformance Memo Closure

QA signature/date: Beverly Ottman 1/12/96

1-26

Quanterra

Environmental Services

Data Review Checklist
RADIOCHEMISTRY

Work Order No(s): 511311 BH1 SOIL

Lab Sample Numbers or SDG: W0823

Method/Test/Parameter: ALPHA

Review Item	Yes (✓)	No (✓)	N/A (✓)	2nd Level review (✓)
A. Calibration 1. Is the calibration documentation included where applicable?			X	
B. Sample Analysis 1. Are the sample Yields within acceptance criteria?			X	
2. Were all sample holding times met?			X	
C. QC Samples 1. Is the Blank Yield within acceptance criteria?			X	
2. Is the Minimum Detectable Activity for the Blank result ≤ the Contract Detection Limit?	X			
3. Is the Blank result ≤ the Contract Detection Limit?	X			
4. Is the Blank result greater than the Contract Detection Limit but the Sample result less than the Contract Detection Limit?			X	
5. Is the LCS result within acceptance criteria?	X			
6. Is the LCS yield within acceptance criteria?	X			
7. Is the LCS Minimum Detectable Activity less than or equal to the Contract Detection Limit?	X			
8. MS/MSD results and yield meet acceptance criteria?			X	
9. Duplicate sample results and yield meet acceptance criteria?	X			
D. Other 1. Are all nonconformances included and noted?	X			
2. Are all required forms filled out?	X			
3. Correct mathodology used?	X			
4. Transcription checked?	SK			
5. Were all calculations checked at a minimum frequency?	X			
6. Units checked?	X			

Comments on any "No" response:

Need to recount 02, 03, 04, & 06 SCG 1/4/96

Analyst: [signature] JK Date: 12/19/95 1-10-96

Second Level Review: [signature] Date: 1/10/96

Form No: LS-038, 3/94, Rev 2

Report recount results for 02, 03, 04, 06. JK 1-10-96

9613477.2022

1-26

Quanterra

Environmental Services

Data Review Checklist
RADIOCHEMISTRY

Work Order No(s): 511311 BH1 SOIL

Lab Sample Numbers or SDG: WO823

Method/Test/Parameter: BETA

	Review Item	Yes (✓)	No (✓)	N/A (✓)	2nd Level review (✓)
A. 1.	**Calibration** Is the calibration documentation included where applicable?			X	✓
B. 1.	**Sample Analysis** Are the sample Yields within acceptance criteria?			X	✓
2.	Were all sample holding times met?			X	✓
C. 1.	**QC Samples** Is the Blank Yield within acceptance criteria?			X	✓
2.	Is the Minimum Detectable Activity for the Blank result ≤ the Contract Detection Limit?	X			✓
3.	Is the Blank result ≤ the Contract Detection Limit?	X			✓
4.	Is the Blank result greater than the Contract Detection Limit but the Sample result less than the Contract Detection Limit?			X	✓
5.	Is the LCS result within acceptance criteria?	X			✓
6.	Is the LCS yield within acceptance criteria?	X			✓
7.	Is the LCS Minimum Detectable Activity less than or equal to the Contract Detection Limit?	X			✓
8.	MS/MSD results and yield meet acceptance criteria?			X	✓
9.	Duplicate sample results and yield meet acceptance criteria?	X			✓
D. 1.	**Other** Are all nonconformences included and noted?	X			✓
2.	Are all required forms filled out?	X			✓
3.	Correct methodology used?	X			✓
4.	Transcription checked?	S/K			✓
5.	Were all calculations checked at a minimum frequency?	X			✓
6.	Units checked?	X			✓

Comments on any "No" response:

Analyst: [signature] Date: 12/14/95

Second Level Review: [signature] Date: 1/12/96

Form No: LS-038, 3/94, Rev 2

1-12-96

Quanterra
Environmental Services

ITAS Data Review Checklist
RADIOCHEMISTRY

BHI - Soil

Work Order No(s): 511311

Lab Sample Numbers or SDG: W0823

Method/Test/Parameter: Sr-90

	Review Item	Yes (✓)	No (✓)	N/A (✓)	2nd Level review (✓)
A. 1.	**Calibration** Is the calibration documentation included where applicable?			X	✓
B. 1.	**Sample Analysis** Are the sample Yields within acceptance criteria?	X			✓
2.	Were all sample holding times met?			Y	✓
C. 1.	**QC Samples** Is the Blank Yield within acceptance criteria?	X			✓
2.	Is the Minimum Detectable Activity for the Blank result ≤ the Contract Detection Limit?	X			✓
3.	Is the Blank result ≤ the Contract Detection Limit?	X			✓
4.	Is the Blank result greater than the Contract Detection Limit but the Sample result less than the Contract Detection Limit?			X	✓
5.	Is the LCS result within acceptance criteria?	X			✓
6.	Is the LCS yield within acceptance criteria?	X			✓
7.	Is the LCS Minimum Detectable Activity less than or equal to the Contract Detection Limit?	X			✓
8.	MS/MSD results and yield meet acceptance criteria?			X	✓
9.	Duplicate sample results and yield meet acceptance criteria?		X		✓
D. 1.	**Other** Are all nonconformances included and noted?	X			✓
2.	Are all required forms filled out?	X			✓
3.	Correct methodology used?	X			✓
4.	Transcription checked?	X			✓
5.	Were all calculations checked at a minimum frequency?	X			✓
6.	Units checked?	X			✓

Comments on any "No" response:

NCM VIZ dupe.

Analyst: [signature] Date: 1/8/96

Second Level Review: [signature] Date: 1/12/96

Form No: LS-038, 3/94, Rev 2

5613477.2024

QUANTERRA LABORATORY NONCONFORMANCE MEMO (NCM)

LOG #: RD-~~95~~ 96 004 Rev 1/12/96

Project ID: BHI NCM Initiated by: SB 1/8/96.

Sample Numbers: Batch 511311 Dupc G1131106

Tests: SvOD

Matrix: soil

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):*** Dupc lost.

Comments/Explanation: _____

Notification (check appropriate area):

Client notified by (name and date): _____

- ☐ in writing
- ☐ 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): Suzy Haines 1/12/96

9613477.2025

QUANTERRA LABORATORY NONCONFORMANCE MEMO (NCM)

LOG#: RD-96 004
1/12/96

Corrective Action

Root Cause Initial and date: GEW 1/8/96

Uncertain as to cause. Sample gave a combined yield of 82.6%

Corrective Action Initial and Date: GEW 1/8/96

Report Results without reanalyzing dups as per PM + client. other QC OK.

Responsibility for performing CA assigned to:

Actions to prevent recurrence Initial and Date: GEW 1/8/96.

Monitor for reoccurance.

First Level Supervisor: [signature] Date: 1/8/96.

Responsible Manager: W. MacKellar Date: 1/12/96

Quality Assurance Review

☐ Anomaly ☑ Deficiency ☐ Rerun

☐ Further action required:

Assigned to:

QA signature: [signature] Date: 1/12/96

Corrective Action Verification

☑ Verified

☐ Cannot Verify (specify reason):

Nonconformance Memo Closure

QA signature/date: [signature]

9613477.2006

CHAIN OF

CUSTODY FORMS

Bechtel Hanford, Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	Page ____ of ____
		Data Turnaround ☐ Priority ■ Normal

Collector: W. S. Thompson	Company Contact: K. L. Sykes / W. S. Thompson	Telephone: (509) 376-8031
Project Designation: 1301N/1325N SI (Limited Field Investigation)	Sampling Location: 1301-N/1325-N Cribs 100N	SAF No.: B95-089
Ice Chest No.: ER-210	Field Logbook No.: EL-1275	Method of Shipment: Hand Carry in DOE vehicle.
Shipped To: QUANTERRA	Offsite Property No.: N/A	Bill of Lading/Air Bill No.: N/A

Possible Sample Hazards/Remarks: Radioactive

Special Handling and/or Storage

SAMPLE ANALYSIS: 511310

SDG-2 W0813 11/20/95

			Preservation	NONE	NONE	NONE								
			Type of Container	Glass	Glass	Plastic								
			No. of Container(s)	1	1	1								
			Volume	~~40 ml~~ 60 ml 11/19/95	60 ml.	20 ml.								
				ICP Metals Cadmium Chromium Lead Nickel	Radio-nuclides (see note #1) 11/15/95	Activity Scan								
	Sample No.	Matrix*	Date Sampled	Time Sampled										
1	BOGL71	Soil	11/09/95	0918	X	X	X							
2	BOGL73	SOIL	11/10/95	0826	X	X	X							
3	BOGL75	SOIL	11/10/95	0826	X	X	X							
4	BOGL79	SOIL	11/15/95	0745	X	X	X							
5	BOGL81	Soil	11/15/95	0907	X	X	X							
6	BOGL86	Soil	11/16/95	0750	X	X	X							

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By: W.S. Thompson	Date/Time: 11/28/95 0907	Received By: Bill Butler	Date/Time: 11-28-95 0907
Relinquished By: Bill Butler	Date/Time: 11-28-95 1110	Received By: Barry Dahl Lukes	Date/Time: 11-28-95 1110
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

Note #1: Radionuclides - Gross alpha; gross beta; Sr-90; U-233,U-234; U-238; Pu-238; Pu-239/240; Gamma Spec (to include) - K-40, Mn-54, C0-60, Ru-106, Cs-134, Cs-137, Ce-144, Eu-154, Eu-155, Ra-226, Th-228, Th-232.

SUMMARY DATA DELIVERABLES

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

0039

Environmental Restoration Contractor **ERC Team**

Interoffice Memorandum

Job No. 22192
Written Response Required? NO
Closes CCN: N/A
OU: 100-NR-1
TSD: N/A
ERA: N/A
Subject Code: 8610

TO: RC Smith B1-35

DATE: November 27, 1995

COPIES: See Below

FROM: WS Thompson WST 11/27/95
ER Field Sampling
N1-28 / 6-8031

SUBJECT: **ESTIMATE OF CURIE CONTENT FOR SOIL SAMPLES SHIPPED ON NOVEMBER 28, 1995, TO QUANTERRA FROM THE 1301N/1325N CRIB DRILLING PROJECT**

This memo provides estimated curie content information for 6 soil samples (B0GL71, B0GL73, B0GL75, B0GL79, B0GL81, B0GL86) to be shipped to Quanterra on November 28, 1995. The information is provided in order for Quanterra to evaluate acceptance of the samples in accordance with their NRC license. A Radioactive Shipment Record (RSR) will accompany the samples stating the isotopes and the curie content of the shipment. An onsite lab provided detailed analytical data which was used to prepare the RSR, however, this isotopic specific data will not be provided to Quanterra as it could be viewed as compromising the independence of the requested analysis to be performed by Quanterra. Therefore, in lieu of a laboratory total activity report, the following Curie data is provided:

- Five of the soil samples have detectable radioactivity.

- For the five samples, an approximate total soil sample weight it 1120 grams. This is determined using the formula, 140 ml x 1.6 gm/ml, for Hanford soil. The samples were not weighed and 1.6 gms/ml is a Hanford site specific soil weight.

- Using available data, the approximate curie content for the five radioactive samples is:
  Total alpha - 690 picocuries
  Total beta - 1.81 microcuries
  Total Co60 - 0.13 microcuries
  Total Cs137 - 0.82 microcuries
  Total Sr90 - I still need data to complete-will have later today - about 0.7 microcuries

Additionally, each soil sample has an accompanying activity scan aliquot for Quanterra to conduct radiological screening to evaluate acceptance criteria.

If you have any questions, please give me a call.

WST:wst

Copies
BHI Document Control H4-79
KL Sykes X0-37
JH Kessner B1-35
JA Lerch B1-35
RL Weiss B1-35

9615177.3029

RADIOACTIVE SHIPMENT RECORD

3. Page 1 of 1 — 34764

1. SHIP TO
Company: Quanterra
Address: 2800 GEORGE WASH. WAY
City, State, Zip: Richland, WA 99352
Attention: Karen Ackenburgh
Phone: 375-3131 EXT 135

2. SHIP FROM U.S. DEPT. OF ENERGY C/O
Company: Bechtel Hanford Co
Address: 100N/300-1325 CRIBS
City, State, Zip: Richland, WA 99352
Contact: Wendy Thompson
Phone: 376-8031

4. Ship: [X] Prepaid [ ] Collect

Via: [X] Motor ~~Rail~~ [ ] Air Psgr [ ] Excl. Use [ ] Air Cargo [ ] UPS Surface [ ] Mail [X] Site Carrier

SHIPMENT AUTHORIZATION NUMBER

5. HM Proper Shipping Name: _____ Radioactive Material,

	excepted package - empty packaging	7	UN2910
	excepted package - instruments or articles	7	UN2910
X	excepted package - limited quantity of material	7	UN2910
	excepted package - articles manufactured from natural or depleted uranium or natural thorium	7	UN2910
	Special Form, n.o.s.	7	UN2974
	Low Specific Activity, n.o.s.	7	UN2912
	n.o.s.	7	UN2982
	Fissile, n.o.s.	7	UN2918
	(other) _____		

6. Markings Applied
Package Orientation [ ]
Gross Weight [X]
Radioactive - LSA [ ]
Type A [ ]
Type B [ ]

7. For Normal Form
Identify
Physical Form: [ ] Liquid [ ] Gas [X] Solid
Chemical Form: [ ] Metal [ ] Oxide [X] Elemental [ ] Nitrate [ ] Mixture
Other _____

8. Additional RAM Desc.
Limited Quantity Radioactive Material [X]
Highway Route Controlled Quantity [ ]

9. Placards Applied [ ] Yes [X] No
If Rail Specify Placards _____
Route Plan [ ] Yes [X] No

10. EMERGENCY RESPONSE
Telephone (509) 373-3800
Emergency Response Guide(s): #61

11a. TYPE PACKAGE
Strong Tight [X]
Type A [ ]
Type B [ ]
Type B(U) [ ]
Type B(M) [ ]

11b. CONSTRUCTION
[ ] Box, FB
[ ] Wood
[ ] Steel
[ ] Drum
[ ] Cask
Other Polycooler

11c. FISSILE CLASS
Non-Fissile [X]
Fissile Exempt [ ]
Fissile I [ ]
Fissile II [ ]
Fissile III [ ]
Gms Fissile _____

11d. Labels Applied
Empty [ ]
Radioactive White I [ ]
Radioactive Yellow II [ ]
Radioactive Yellow III [ ]
Subsidiary Hazard N/A [ ]

Warning -- Fissile Class III Shipment. Do Not Load More Than ____ Packages Per Vehicle. In Loading and Storage Areas, Keep at Least 20 Feet From Other Packages Bearing Radioactive Labels.

12.

No. Pkgs.	Model Package	COC/Spec	Serial No.	Seal No.	Isotopes	T.I.	Curies/Pkg	Gr. Wt.
1	Strong tight	N/A	N/A	N/A	Co_{60}, Cs_{137}, Sr_{90}	N/A	1.63 µCi	55 lb
Polycooler #EK210 contains soil samples in glass jars.								
Samples are double-bagged.								
BOGL71, BOGL73, BOGL75, BOGL79, BOGL81, BOGL86								
(Shipper may describe package in detail on one of the unused lines above)					TOTALS	N/A	1.63 µCi	55 lb

13. This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable federal, state, local and international regulations for the transportation of hazardous materials.
Certifier's Signature On behalf of DOE-RL: Wendy Thompson | Date: 11/28/95 | Organization: ER Field Sampling | Complete Cost Code (Inc. End Function): X60037

14. Surface Dose Rate of Package: [✓] <0.5 or NA mrem/hr (N + β γ)
Dose Rate at 1 Meter from Surface of Package: [✓] <0.5 or NA mrem/hr (N + β γ)
Smears of Outer Container: [✓] <22 dpm β γ/cm² [✓] <2.2 dpm α/cm² [ ] <Tbl. 2-2 HSRCM Onsite Limits
TRUCK LOAD OR EXCLUSIVE USE: Surface [✓] <200 mrem/hr (N + β γ); @ 6 feet [✓] <10 mrem/hr (N + β γ); @ Cab or sleeper [✓] <2 mrem/hr (N + β γ)
Additional Data and Instructions (inc. Readings on Internal Packaging): NA
Signature - Radiation Monitoring: [illegible] | Bldg. 1301N | Survey No. RS-1301-159 | Date 11/28/95

15. PICKUP OF SHIPMENT — Vehicle HJ2598 | Driver Bill Whitten
RECEIPT — Signature Karen Ackenburgh | Date 11/28/95

16. Shipment has been inspected and verified to be in compliance with DOT regulations
Authorized Signature: M A Sams | Printed Name: M.A. SAMS | Date 11-28-95

17. AIR TRANSPORT CERTIFICATION
CARGO AIRCRAFT: [ ] Cargo Aircraft Only Labels Applied
PASSENGER AIRCRAFT: [ ] 1. Ltd Qty [ ] 2. <3 T.I. [ ] 3. Research/Medical Diagnosis [ ] 4. Human Medical Research
Pkg. Dimensions: NA

18. OFFSITE AUTHORIZATION
B/L RMW 9707 | Date Shipped 11-28-95 | Routing SITE | ETA 11-28-95
Surveyed By _____ | Date _____ | Approved for Shipment Offsite: M A Sams | Date 11-28-95

Receipt: _____ Date: _____

☆ U.S. GOVERNMENT PRINTING OFFICE: 1995—693-181/21013 54-6000-088 (07/95)

0041

4613477.2030

POTENTIAL HAZARDS

HEALTH HAZARDS

Low-level radioactive material; little personal radiation hazard.
Many packages are not required to have radioactive materials labels or markings.
Some radioactive materials cannot be detected by commonly available instruments.

FIRE OR EXPLOSION

Some of these materials may burn, but none of them ignites readily.
Radioactivity does not change flammability or other properties of the material

EMERGENCY ACTION

Keep unnecessary people away; isolate hazard area and deny entry.
Response actions may be performed prior to any radiation measurements.
Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection.
Notify Radiation Authority of accident conditions.
Detain uninjured persons, isolate equipment with suspected contamination, and delay cleanup until instruction of Radiation Authority.

FIRE

Do not move damaged containers; move undamaged containers out of fire zone.
Small Fires: Dry chemical, CO2, water spray or regular foam.
Large Fires: Water spray, fog (flooding amounts).

SPILL OR LEAK

Do not touch damaged containers or spilled material.
Small Liquid Spills: Take up with sand, earth or other noncombustible absorbent material.
Cover powder spill with plastic sheet or tarp to minimize spreading.

FIRST AID

Use first aid treatment according to the nature of the injury.
Advise medical personnel that victim may be contaminated with low-level radioactive material.

Radioactive Material, excepted package - limited quantity of material, 7, UN2910

9613477.2031

THIS PACKAGE CONFORMS TO THE CONDITIONS AND LIMITATIONS SPECIFIED IN 49 CFR 173.421 FOR RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, UN2910

BECHTEL HANFORD COMPANY

CAUTION

"Internal Contamination - Soil Samples"

Handle sample containers in a hood designated as Radiological Materials Area (RMA).

The outside of the sample containers may have potential smearable radioactive contamination because they were packaged inside of a glovebox. The outside of the plastic bag surrounding the containers was surveyed with no detectable smearable radioactive contamination. Remove the plastic bag in a hood.

Figure 1

SAMPLE CHECK-IN LIST

(1 Per Shipping Container)

Date/Time Received 11/20/95 11:10 Client Name BHI

Project/Client # B95-089 Batch or Case # _____

Cooler ID (if noted on outside of cooler) ER-210

1. Condition of shipping container? OK.
2. Custody Seals on cooler intact? Yes [X] No [ ]
3. Custody Seals dated and signed? Yes [X] No [ ]
4. Chain of Custody record is taped on inside of cooler lid? Yes [ ] No [X]
5. Vermiculite/packing material is: Wet [ ] Dry [X] _____
6. Each sample is in a plastic bag? Yes [X] No [ ] _____
7. Number of sample containers in cooler: 18
8. Samples have:
   - ✓ tape
   - ✓ custody seals
   - ____ hazard labels
   - ____ appropriate sample labels
9. Samples are:
   - ✓ in good condition
   - ____ broken
   - ____ other
   - ____ leaking
   - ____ have air bubbles
10. Coolant Present? Yes [X] No [ ] Sample Temperature 6°C
11. The following paperwork should be accounted for (N/A if not applicable):
    Chain of Custody #(s) n/a
    Request for Analysis #(s) ✓
    Airbill # ✓ Carrier n/a
12. Have any anomalies been identified above? Yes [ ] No [X]
13. Memos have been initiated for all anomalies identified above? Yes [X]

Printed Name/Signature Karen Dettmeling Date/Time 11/21/95

511310 Chem
511311 Rad

SDG W0843 2
24 11/30/95

Client Sample Screening Results

28-Nov-95

CLIENT CODE ID	MATRIX	RECEIVED	DETECTOR	ACQ DATE	SAMPLE	MINUTES	CNTS A	NET CPM A	CNTS B	NET CPM B
WHC B0GL71		11/28/95 11:00:00 AM	QUAD22D	11/28/95 2:15:38 PM	B0GL71	30	312	10.335	16672	554.785
01	SOLID		Bkg:	11/28/95 1:32:58 AM	BKG	600	39	0.065	569	0.9483333
Anl Date: 11/28/95	Tot Sa, Alq: 3.28E+02	, 6.32E+01	Alp;	(Dpm/ 2.17E+01	(uCi/ 5.08E-02	(pCi/ 1.55E+02	± 1.4E+01	CAT III	3.2E-01	Lab Alq
Ppt mg: 63.2	Units: g	, mg	Bet;	Alq): 1.17E+03	Sa): 2.73E+00	L/g): 8.33E+03	± 6.4E+01		1.2E-02	L/g
WHC B0GL73		11/28/95 11:00:00 AM	QUAD23A	11/28/95 2:15:42 PM	B0GL73	30	31	0.965	3371	111.41
02	SOLID		Bkg:	11/28/95 1:33:06 AM	BKG	600	41	0.06833333	574	0.9566667
Anl Date: 11/28/95	Tot Sa, Alq: 2.72E+02	, 3.45E+01	Alp;	(Dpm/ 1.94E-01	(uCi/ 6.90E-04	(pCi/ 2.54E+00	± 8.7E+00	CAT II	2.0E+01	Lab Alq
Ppt mg: 34.5	Units: g	, mg	Bet;	Alq): 2.25E+02	Sa): 8.00E-01	L/g): 2.94E+03	± 5.1E+01		3.4E-02	L/g
WHC B0GL75		11/28/95 11:00:00 AM	QUAD23B	11/28/95 2:15:42 PM	B0GL75	30	19	0.57	1816	59.623333
03	SOLID		Bkg:	11/28/95 1:33:06 AM	BKG	600	38	0.06333333	546	0.91
Anl Date: 11/28/95	Tot Sa, Alq: 2.76E+02	, 1.92E+01	Alp;	(Dpm/ 3.10E-01	(uCi/ 2.01E-03	(pCi/ 7.27E+00	± 1.3E+01	CAT II	6.9E+00	Lab Alq
Ppt mg: 19.2	Units: g	, mg	Bet;	Alq): 1.18E+02	Sa): 7.65E-01	L/g): 2.77E+03	± 6.6E+01		3.6E-02	L/g
WHC B0GL79		11/28/95 11:00:00 AM	QUAD23C	11/28/95 2:15:42 PM	B0GL79	30	11	0.30333333	48	0.6033333
04	SOLID		Bkg:	11/28/95 1:33:06 AM	BKG	600	38	0.06333333	598	0.9966667
Anl Date: 11/28/95	Tot Sa, Alq: 3.36E+02	, 7.39E+01	Alp;	(Dpm/ 1.79E+00	(uCi/ 3.66E-03	(pCi/ 1.09E+01	± 6.4E+00	CAT I	4.6E+00	Lab Alq
Ppt mg: 73.9	Units: g	, mg	Bet;	Alq): 1.10E+00	Sa): 2.26E-03	L/g): 6.73E+00	± 3.0E+00		1.5E+01	L/g
WHC B0GL81		11/28/95 11:00:00 AM	QUAD23D	11/28/95 2:15:42 PM	B0GL81	30	16	0.48	206	5.9133333
05	SOLID		Bkg:	11/28/95 1:33:06 AM	BKG	600	32	0.05333333	572	0.9533333
Anl Date: 11/28/95	Tot Sa, Alq: 3.47E+02	, 3.18E+01	Alp;	(Dpm/ 1.82E+00	(uCi/ 8.95E-03	(pCi/ 2.58E+01	± 1.1E+01	CAT I	1.9E+00	Lab Alq
Ppt mg: 31.8	Units: g	, mg	Bet;	Alq): 1.16E+01	Sa): 5.72E-02	L/g): 1.65E+02	± 1.4E+01		6.1E-01	L/g

Reviewed 11/28/95

0046

CLIENT CODE ID	MATRIX	RECEIVED	DETECTOR	ACQ DATE	SAMPLE	MINUTES	CNTS A	NET CPM A	CNTS B	NET CPM B
WHC B0GL86		11/28/95 11:00:00 AM	QUAD24A	11/28/95 2:15:34 PM	B0GL86	30	11	0.295	407	12.643333
06	SOLID		Bkg:	11/28/95 1:32:54 AM	BKG	600	43	0.07166667	554	0.9233333

Anl Date: 11/28/95	Tot Sa, Alq: 3.45E+02	, 3.42E+01	Alp;	(Dpm/ 7.80E-01	(uCi/ 3.54E-03	(pCi/ 1.03E+01	± 9.9E+00	CAT II	4.9E+00	Lab Alq L|g
Ppt mg: 34.2	Units: g	, mg	Bet;	Alq): 2.61E+01	Sa): 1.19E-01	L|g): 3.44E+02	± 1.8E+01		2.9E-01	

CLIENT CODE ID	MATRIX	RECEIVED	DETECTOR	ACQ DATE	SAMPLE	MINUTES	CNTS A	NET CPM A	CNTS B	NET CPM B
WHC B0GRM9		11/28/95 11:00:00 AM	QUAD24B	11/28/95 2:15:34 PM	B0GRM9	30	34	1.04166667	91	2.01
	LIQUID		Bkg:	11/28/95 1:32:54 AM	BKG	600	55	0.09166667	614	1.0233333

Anl Date: 11/28/95	Tot Sa, Alq: 1.00E+00	, 1.00E+01	Alp;	(Dpm/ 3.24E+00	(uCi/ 1.46E-04	(pCi/ 1.46E+02	± 3.2E+01	CAT I	1.7E-01	Lab Alq L|g
Ppt mg: 4.4	Units: L	, ml	Bet;	Alq): 3.32E+00	Sa): 1.50E-04	L|g): 1.50E+02	± 2.7E+01		3.3E-01	

CLIENT CODE ID	MATRIX	RECEIVED	DETECTOR	ACQ DATE	SAMPLE	MINUTES	CNTS A	NET CPM A	CNTS B	NET CPM B
WHC B0GRN0		11/28/95 11:00:00 AM	QUAD24C	11/28/95 2:15:34 PM	B0GRN0	30	23	0.68833333	101	2.37
	LIQUID		Bkg:	11/28/95 1:32:54 AM	BKG	600	47	0.07833333	598	0.9966667

Anl Date: 11/28/95	Tot Sa, Alq: 1.00E+00	, 1.00E+01	Alp;	(Dpm/ 2.10E+00	(uCi/ 9.44E-05	(pCi/ 9.44E+01	± 2.8E+01	CAT I	2.6E-01	Lab Alq L|g
Ppt mg: 4.7	Units: L	, ml	Bet;	Alq): 4.11E+00	Sa): 1.85E-04	L|g): 1.85E+02	± 2.8E+01		2.7E-01	

Reviewed 11/28/95

9613477.2036 *** SR-90 ***

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

30-Nov-1995
Page 1

1-12-96

CUSTOMER: BHI SAF

SAMPLE DELIVERY GROUP W0823

MATRIX : SOIL B95-089

BATCH NUMBER 11-311

	ITAS ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
	M11311B IS		EQGI 190	30,384 ± 0.42857	
1)	51131101		BHI	BOGL71	
2)	51131102		BHI	BOGL73	
3)	51131103		BHI	BOGL75	
4)	51131104		BHI	BOGL79	
5)	51131105		BHI	BOGL81	
6)	51131106 G1131106		BHI	BOGL86	SEG 1/12/96 Duplicate ~~Blank~~ was lost in analysis ~~NCA~~

ACTIONS (Initial & Date)

NCHRD0003

1) INITIATED JH 11/30/95

2) PREP LAB RECEIVED 12-12-95

3) SAMPLE REMAINDER STORED _____

4) SEPARATION LAB RECEIVED 1-3-96

5) COUNTING/MEASUREMENT LAB AS 1-4-96

6) DATA REVIEWED AND ANALYTICAL PREP STORED 1/8/96

RD2203.

RichRc 5006

1-86

9613477.2037 *** BETA ***

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD 28-Nov-1995

Page 1

CUSTOMER: BHI SAF SAMPLE DELIVERY GROUP ~~W0813~~ W0823 PIC 11-30-95

MATRIX : SOIL B95-089 BATCH NUMBER 11-311

	ITAS ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
	M113111B				
	M113111S EQAU 442 30.076 ± .37534 DPM				
1)	51131101		BHI	BOGL71	COUNT TIME AND ALOQUOT SIZE REDUCED DUE TO HIGH ACTIVITY
2)	51131102		BHI	BOGL73	
3)	51131103		BHI	BOGL75	
4)	51131104		BHI	BOGL79	
5)	51131105		BHI	BOGL81	
6)	51131106		BHI	BOGL86	
	G113 1106	DUP			

ACTIONS (Initial & Date)

1) INITIATED JH 11/28/95

2) PREP LAB RECEIVED ~~JH 11/29/95~~ JH 12-12-95 JH 12-12-95

3) SAMPLE REMAINDER STORED JH 12-15-95

4) SEPARATION LAB RECEIVED _____

5) COUNTING/MEASUREMENT LAB AS 12-15-95

6) DATA REVIEWED AND ANALYTICAL PREP STORED SB 12/19/95.

9613477.2030 *** ALPHA ***

1-26

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD RK 11-30-95 28-Nov-1995

CUSTOMER: BHI SAF

SAMPLE DELIVERY GROUP ~~W0813~~ W0823

MATRIX : SOIL B95-089

BATCH NUMBER 11-311

	ITAS ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
	M113111B				
	M113115	EQEG 1019	10.075 ±	.086675 DPM	
1)	51131101		BHI	BOGL71	
2)	51131102		BHI	BOGL73	
3)	51131103		BHI	BOGL75	
4)	51131104		BHI	BOGL79	
5)	51131105		BHI	BOGL81	
6)	51131106		BHI	BOGL86	
	G113106	DUP			

ACTIONS (Initial & Date)

1) INITIATED JH 11/28/95

2) PREP LAB RECEIVED ~~JH 11-29-95~~ GN 12-12-95 GN 12-12-95

3) SAMPLE REMAINDER STORED GN 12-15-95

4) SEPARATION LAB RECEIVED NA

5) COUNTING/MEASUREMENT LAB AS 12-15-95

6) DATA REVIEWED AND ANALYTICAL PREP STORED SDL 12/19/95.

9613477.2039 *** GAMMA ***

1-26 TTKI-9-96

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD 28-Nov-1995

PK 11-30-95 Page 1

CUSTOMER: BHI SAF SAMPLE DELIVERY GROUP ~~W0812~~ W0823

MATRIX : SOIL B95-089 BATCH NUMBER 11-311

	ITAS ID	DUP	ACCOUNT	CUSTOMER ID		COMMENTS
	M113111B "OTTAWA FINE SAND"					
	M113111S CAL 790					
1)	51131101		BHI	BOGL71	CAT III	COUNT FOR 1000 min CHECK ON IT FREQUENTLY
2)	51131102		BHI	BOGL73		
3)	51131103		BHI	BOGL75		
4)	51131104		BHI	BOGL79		
	G113110G4	DUP				
5)	51131105		BHI	BOGL81		
6)	51131106		BHI	BOGL86		

ACTIONS (Initial & Date)

1) INITIATED JH 11/28/95

2) PREP LAB RECEIVED ~~JN 11 29 95~~ JN 12-12-95 JN 12-12-95

3) SAMPLE REMAINDER STORED JN 12-15-95

4) SEPARATION LAB RECEIVED NA

5) COUNTING/MEASUREMENT LAB AS 12-15-

6) DATA REVIEWED AND ANALYTICAL PREP STORED TTKI-10-96 RICHRC0002

9613477.2040 *** VISO ***

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD 28-Nov-1995
Page 1

CUSTOMER: BHI SAF SAMPLE DELIVERY GROUP ~~W0812~~ W0823 PK 11-30-95

MATRIX : SOIL B95-089 BATCH NUMBER 11-311

	ITAS ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
	M113118				
	M113115	EQIE179			
1)	51131101		BHI	BOGL71	ALIQUOT SIZE REDUCED DUE TO SCREENING
2)	51131102		BHI	BOGL73	" " "
3)	51131103		BHI	BOGL75	" " "
4)	51131104		BHI	BOGL79	
5)	51131105		BHI	BOGL81	" " "
6)	51131106		BHI	BOGL86	" " "
	G113110 6	DUP			" " "

ACTIONS (Initial & Date)

1) INITIATED JK 11/28/95

2) PREP LAB RECEIVED ~~JK 11-29-95~~ SN 12-12-95 SN 12-12-95

3) SAMPLE REMAINDER STORED _____

4) SEPARATION LAB RECEIVED _____ 1-2-96 MV

~~RD3239~~ 1-2-96 MV Extraction 1/2/96 M.V. ~~RD 3246~~ E.D. 1/3/96 M.V.
Rich RC5030 Rich RC5039

5) COUNTING/MEASUREMENT LAB 1-3-96 RD 4610

6) DATA REVIEWED AND ANALYTICAL PREP STORED 1-10-96
RICH RC0002

0052

12
1-26
JK 1-9-96

961547.2041 *** PUISO ***

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

28-Nov-1995
Page 1

CUSTOMER: BHI SAF

SAMPLE DELIVERY GROUP ~~W0813~~ W0823 PK 11-30-95

MATRIX : SOIL B95089

BATCH NUMBER 11-311

	ITAS ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
	M11311B				
	M1131115	IQHI 195			
1)	51131101		BHI	BOGL71	ALIQUOT SIZE REDUCED DUE TO SCREEN
2)	51131102		BHI	BOGL73	" " "
3)	51131103		BHI	BOGL75	" " "
4)	51131104		BHI	BOGL79	
5)	51131105		BHI	BOGL81	" " "
6)	51131106		BHI	BOGL86	" " "
	G1131106	DUP			" " "

ACTIONS (Initial & Date)

1) INITIATED JH 11/28/95

2) PREP LAB RECEIVED ~~JH 11/29/95~~ gw 12-12-95 gw 12-12-95

3) SAMPLE REMAINDER STORED _____

4) SEPARATION LAB RECEIVED 12-21-95 CM
E.D. M.U. 12/22/95 RD3246

5) COUNTING/MEASUREMENT LAB P 12/22/95

6) DATA REVIEWED AND ANALYTICAL PREP STORED JK 1-10-96 RICHRC0002

9615477.2042

Golder Associates Inc.

4104-148th Avenue, NE
Redmond, WA 98052
Telephone (206) 883-0777
Fax (206) 882-5498

Golder Associates

FEB 1996
RECEIVED
Validation
Log In

February 16, 1996

Our ref: 943-1610.119.0400
94-1610/O/463

CH2M Hill
1022 Lee Blvd.
Richland, Washington 99352

ATTENTION: Ms. Jeanette Duncan

RE: TRANSMITTAL OF DATA VALIDATION PACKAGE,
CONTRACT NO. MSH-SWV-315905

Dear Ms. Duncan:

This letter is to transmit the following data validation package:

SAF#	Project	Data Package	Analyses
B95-089	1301N/1325N LWDF Vadose Zone Characterization	W0823-QES	Inorganics and Radiochemistry

Please call if you have any questions.

Sincerely,

GOLDER ASSOCIATES INC.

Thomas M. Stapp
Project Manager

Enclosures

p:\enviros\whc\dv\dptran.ltr

9613477.2043

MEMORANDUM

TO: 1301N/1325N LWDF Vadose Zone Characterization Project QA Record — February 15, 1996

FR: Heidi Gregerson, Golder Associates Inc. HRG

RE: INORGANIC DATA VALIDATION SUMMARY FOR DATA PACKAGE W0823-QES (943-1610.119 823INO.NR1)

INTRODUCTION

This memo presents the results of data validation on data package W0823-QES prepared by Quanterra Environmental Services. Sample information is provided in the following table.

SAMPLE ID	COMMENTS	ANALYSIS	MEDIA
B0GL71		INORGANICS	SOIL
B0GL73			SOIL
B0GL75	FIELD DUPLICATE	SEE ATTACHMENT 4	SOIL
B0GL79	EQUIPMENT BLANK		SOIL
B0GL81			SOIL
B0GL86			SOIL

Data validation was conducted to level C in accordance with the WHC statement of work (WHC 1994) and validation procedures (WHC 1993). Attachments 1 through 5 provide the following information as indicated below:

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

DATA QUALITY OBJECTIVES

This section presents a summary of the data quality in terms of the referenced validation criteria.

Precision. Goals for precision were met, with the exception of those deficiencies listed below.

Accuracy. Goals for accuracy were met, with the exception of those deficiencies listed below.

Detection Limits. Detection limit goals were met for all sample results.

Completeness. The data package was complete for all requested analyses. A total of six samples were validated in this data package with a total of 24 determinations reported, 23 of which were deemed valid. This results in a completeness of 96%, which meets the 90% objective of the work plan.

MAJOR DEFICIENCIES

The following major deficiencies were identified during data validation which required qualification of data as unusable:

Spike Sample

- The percent recovery for lead was less than 30% and associated samples were qualified. Attachments 2 and 5 provide a summary of samples affected, data qualifications applied and supporting documentation.

MINOR DEFICIENCIES

The following minor deficiencies were identified during data validation which required qualification of data:

Spike Sample

- The percent recovery for lead and nickel was outside the control limit and associated samples were qualified. Attachments 2 and 5 provide a summary of samples affected, data qualifications applied and supporting documentation.

Duplicate

- The RPDs for chromium, lead, and nickel were outside the control and associated samples were qualified. Attachments 2 and 5 provide a summary of samples affected, data qualifications applied and supporting documentation.

FIELD QC

- Sample B0GL79 was identified as an equipment blank with chromium detected. Qualification of data is not required based on field QC.

- Sample B0GL75 was identified as a field duplicate of sample B0GL73. The RPDs were evaluated and determined to be within control limits.

REFERENCES

WHC 1993, Data Validation Procedures for Chemical Analyses, WHC-SD-EN-SPP-002, Rev. 2, 1993. Westinghouse Hanford Company, Richland, Washington.

WHC 1994, Environmental and Waste Characterization Analytical Data Validation, Purchase Order MSH-SWV-315905; Validation Statement of Work, Revision 1.0, September 7, 1994; Westinghouse Hanford Company, Richland, Washington.

9613477.2046

ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

Glossary of Inorganic Data Reporting Qualifiers.

B - Indicates the constituent was analyzed for and detected. The concentration reported is less than the contract required detection limit (CRDL) but greater than the instrument detection limit (IDL). The associated data should be considered usable for decision making purposes.

U - Indicates the constituent was analyzed for and not detected. The concentration reported is the sample detection limit corrected for aliquot size, dilution and percent solids (in the case of solid matrices) by the laboratory. The associated data should be considered usable for decision making purposes.

UJ - Indicates the constituent was analyzed for and not detected. Due to a minor quality control deficiency identified during data validation the concentration may not accurately reflect the sample detection limit. The associated data have been qualified as estimated but should be considered usable for decision making purposes.

BJ - Indicates the constituent was analyzed for and detected at a concentration less than the contract required detection limit (CRDL) but greater than the instrument detection limit (IDL). Due to a minor quality control deficiency identified during data validation the associated data have been qualified as estimated, but should be considered usable for decision making purposes.

J - Indicates the constituent was analyzed for and detected. Due to a minor quality control deficiency identified during data validation the associated data have been qualified as estimated, but should be considered usable for decision making purposes.

UR - Indicates the constituent was analyzed for and not detected. Due to a major quality control deficiency identified during data validation, the associated data have been qualified as unusable for decision making purposes.

R - Indicates the constituent was analyzed for and detected. Due to a major quality control deficiency identified during data validation, the associated data have been qualified as unusable for decision making purposes.

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ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

WHC-SD-EN-SPP-002, REV.2

DATA QUALIFICATION SUMMARY - FORM B-7

SDG:W0823-QES	REVIEWER: H. Gregerson	DATE: 2-15-96	PAGE 1 OF 1
COMMENTS: INORGANICS			
COMPOUND/ANALYTE	QUALIFIER	SAMPLES AFFECTED	REASON
LEAD	J/UR	ALL	MS RECOVERY WAS LESS THAN 30%
LEAD	J/BJ	B0GL71 B0GL73 B0GL75 B0GL81 B0GL86	DUPLICATE RPD WAS OUTSIDE THE CONTROL LIMIT
NICKEL	J	B0GL71 B0GL73 B0GL75 B0GL81 B0GL86	MS RECOVERY WAS OUTSIDE THE CONTROL LIMIT
NICKEL	J	B0GL71 B0GL73 B0GL75 B0GL81 B0GL86	DUPLICATE RPD WAS OUTSIDE THE CONTROL LIMIT
CHROMIUM	J	ALL SAMPLES	DUPLICATE RPD WAS OUTSIDE THE CONTROL LIMIT

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ATTACHMENT 3

QUALIFIED DATA SUMMARY and ANNOTATED LABORATORY REPORTS

Validated Data Summary, Data Package: W0823-QES

	Sample #	B0GL71		B0GL73		B0GL75		B0GL79		B0GL81		B0GL86	
	Date	11/9/95		11/10/95		11/10/95		11/15/95		11/15/95		11/16/95	
	Location												
	Depth	14.5-16.5 ft		23.0-25.0 ft		23.0-25.0 ft				42.0-44.0 ft		62.0-63.8 ft	
	Type	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
	Comments					Field Duplicate		Equipment Blank					
Parameter	Units	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
CADMIUM	MG/KG	0.350	U	0.360	U	0.360	U	0.080	U	0.350	U	0.090	U
CHROMIUM	MG/KG	22.200	J	18.500	J	20.400	J	0.120	BJ	27.300	J	13.000	J
LEAD	MG/KG	0.570	J	0.690	J	0.760	J	0.100	UR	0.210	BJ	0.630	J
NICKEL	MG/KG	13.100	J	9.300	J	9.800	J	0.400	U	14.500	J	12.500	J

The decimal places shown do not reflect the precision reported by the laboratory.

Verified HRG
2/15/96

961347.2061

9613477.2052

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0GL71

Lab Name: QUANTERRA_MO Contract: 550.111

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0823

Matrix (soil/water): SOIL Lab Sample ID: 9901-001

Level (low/med): LOW Date Received: 11/28/95

% Solids: 96.1

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

CAS No.	Analyte	Concentration	C	Q	M	Q
7440-43-9	Cadmium	0.35	U		P	
7440-47-3	Chromium	22.2	/		P	
7439-92-1	Lead	0.57	/	N	F	4/4
7440-02-0	Nickel	13.1	/	N	P	

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

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HRG 2/15/96

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U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0GL73

Lab Name: QUANTERRA_MO Contract: 550.111

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0823

Matrix (soil/water): SOIL Lab Sample ID: 9901-002

Level (low/med): LOW Date Received: 11/28/95

% Solids: 93.8

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

CAS No.	Analyte	Concentration	C	Q	M	
7440-43-9	Cadmium	0.36	U		P	
7440-47-3	Chromium	18.5	/		P	
7439-92-1	Lead	0.69	/	N	F	
7440-02-0	Nickel	9.3	/	N	P	

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

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HRG 2/15/96

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U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0GL75

Lab Name: QUANTERRA_MO Contract: 550.111

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0823

Matrix (soil/water): SOIL Lab Sample ID: 9901-003

Level (low/med): LOW Date Received: 11/28/95

% Solids: 93.7

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

CAS No.	Analyte	Concentration	C	Q	M	Q
7440-43-9	Cadmium	0.36	U		P	
7440-47-3	Chromium	20.4			P	
7439-92-1	Lead	0.76		N	F	HGH
7440-02-0	Nickel	9.8		N	P	

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

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HRG 2/15/96

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U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0GL79

Lab Name: QUANTERRA_MO Contract: 550.111

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0823

Matrix (soil/water): SOIL Lab Sample ID: 9901-004

Level (low/med): LOW Date Received: 11/28/95

% Solids: 100.0

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

CAS No.	Analyte	Concentration	C	Q	M	Q
7440-43-9	Cadmium	0.08	U		P	
7440-47-3	Chromium	0.12	~~B~~		P	BJ
7439-92-1	Lead	0.10	~~U~~	N	F	UR
7440-02-0	Nickel	0.40	U	N	P	

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

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HRG 2/15/96

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U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0GL81

Lab Name: QUANTERRA MO Contract: 550.111

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0823

Matrix (soil/water): SOIL Lab Sample ID: 9901-005

Level (low/med): LOW Date Received: 11/28/95

% Solids: 96.2

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

CAS No.	Analyte	Concentration	C	Q	M	Q
7440-43-9	Cadmium	0.35	U		P	
7440-47-3	Chromium	27.3	/		P	
7439-92-1	Lead	0.21	~~B~~	N	F	UBJ
7440-02-0	Nickel	14.5	/	N	P	

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

SW-846

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HRG 2/15/96

~~00033~~

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U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B0GL86

Lab Name: QUANTERRA_MO Contract: 550.111

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0823

Matrix (soil/water): SOIL Lab Sample ID: 9901-006

Level (low/med): LOW Date Received: 11/28/95

% Solids: 97.6

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

CAS No.	Analyte	Concentration	C	Q	M	
7440-43-9	Cadmium	0.09	U		P	
7440-47-3	Chromium	13.0	/		P	
7439-92-1	Lead	0.63	/	N	F	
7440-02-0	Nickel	12.5	/	N	P	

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

SW-846

HRG 2/15/96

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ATTACHMENT 4

LABORATORY NARRATIVE and CHAIN-OF-CUSTODY DOCUMENTATION

9613477.2059

Quanterra
Environmental Services

Quanterra Incorporated
13715 Rider Trail North
Earth City, Missouri 63045

314 298-8566 Telephone
314 298-8757 Fax

REVISED
CERTIFICATE OF ANALYSIS

JAN 1996 RECEIVED Data Log In

Bechtel Hanford Incorporated
P.O. Box 1970
Richland, Washington 99352

January 11, 1996

Attention: Joan Kessner

Project number	:	550.111
Date Received by Lab	:	November 28, 1995
Number of Samples	:	Six (6)
Sample Type	:	Solid
SDG Number	:	W0823R
Data Deliverable	:	Summary

I. Introduction

On November 28, 1995, six (6) solid samples were received by Quanterra, Richland and transferred to Quanterra, St. Louis for chemical analysis. Upon receipt, the samples were given the following laboratory ID numbers to correspond with the specific client IDs:

St Louis ID	WHC ID	Richland ID	Matrix	Date of Receipt
9901-001	B0GL71	51131001	Solid	11/28/95
9901-002	B0GL73	51131002	Solid	11/28/95
9901-003	B0GL75	51131003	Solid	11/28/95
9901-004	B0GL79	51131004	Solid	11/28/95
9901-005	B0GL81	51131005	Solid	11/28/95
9901-006	B0GL86	51131006	Solid	11/28/95

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: Chromium, Lead, Cadmium, and Nickel by EPA method 6010.

HRG 2/15/96
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Quanterra
Environmental Services

III. Quality Control

A Laboratory Control Sample and Method Blank were analyzed with each preparation batch. Matrix Spike and Matrix Spike Duplicate or Sample Duplicate analyses were performed per the protocol for each analyte.

IV. Definitions

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

QCBLK- Quality Control Blank, Method Blank
QCLCS- Quality Control Laboratory Control Sample, Blank Spike

V. Comments

The samples were reanalyzed to meet the required detection limits. This report contains the results of the reanalysis.

Metals
Samples 9901-001, 9901-001S, 9901-001SD, 9901-002, 9901-003 and 9901-005 required dilution due to interelement interferences. The instrument software flagged the undiluted run with an error code indicating that an interferant, in this case Iron, was interfering with the analysis of Cadmium and Chromium. The samples were diluted by a factor of 4 and reanalyzed without interference errors.

The Matrix Spike recovery for Lead (5.8%) and Nickel (72.8%) and the Matrix Spike Duplicate recovery for Lead (27.9%) were less than 80%, therefore all associated data was flagged with an " N ". See NCM # SL-2335.

The ICP prep was 4.0 g to 100 mls.

HRG 2/15/96
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Quanterra
Environmental Services

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:

Wade H. Price
Project Manager
e:\\price$\abbydave\hanw0823.nar

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HRG 2/5/96
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Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page ____ of ____

Data Turnaround: ☐ Priority ■ Normal

Collector: W. S. Thompson	Company Contact: K. L. Sykes / W. S. Thompson	Telephone: (509) 376-8031
Project Designation: 1301N/1325N SI (Limited Field Investigation)	Sampling Location: 1301-N/1325-N Cribs 100N	SAF No.: 1395-089
Ice Chest No.: ER-210	Field Logbook No.: EL-1275	Method of Shipment: Hand Carry in DOE vehicle.
Shipped To: QUANTERRA	Offsite Property No.: N/A	Bill of Lading/Air Bill No.: N/A

Possible Sample Hazards/Remarks: Radioactive

Special Handling and/or Storage

SAMPLE ANALYSIS: 511310 SDG W0813

			Preservation	NONE	NONE	NONE							
			Type of Container	Glass	Glass	Plastic							
			No. of Container(s)	1	1	1							
			Volume	60 ml 40 ml	60 ml.	20 ml.							
				ICP Metals Cadmium Chromium Lead Nickel	Radio-nuclides (see note #1)	Activity Scan							
Sample No.	Matrix*	Date Sampled	Time Sampled										
1 BOGL71	Soil	11/09/95	0918	X	X	X		100%					
2 BOGL73	SOIL	11/10/95	0826	X	X	X							
3 BOGL75	SOIL	11/10/95	0826	X	X	X							
4 BOGL79	SOIL	11/15/95	0745	X	X	X							
5 BOGL81	Soil	11/15/95	0907	X	X	X							
6 BOGL86	Soil	11/16/95	0750	X	X	X							

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
W.S. Thompson	11/28/95 0907	Bukstra	11-28-95 0907
Bukstra	11-28-95 1110	Karen Dahl Luxa	11-28-95 1110

SPECIAL INSTRUCTIONS

Note #1: Radionuclides - Gross alpha; gross beta; Sr-90; U-233,U-234; U-238; Pu-238; Pu-239/240; Gamma Spec (to include) - K-40, Mn-54, C0-60, Ru-106, Cs-134, Cs-137, Ce-144, Eu-154, Eu-155, Ra-226, Th-228, Th-232.

SUMMARY DATA DELIVERABLES

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

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HDG 2/15/96

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ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 1301N/1325N LWDF			DATA PACKAGE: W0823-QES		
VALIDATOR: H. GREGERSON		LAB: QUANTERRA		DATE: 2/14/96	
CASE:			SDG:		
ANALYSES PERFORMED					
☐ CLP/ICP	☐ CLP/GFAA	☐ CLP/Hg	☐ CLP/Cyanide	☐	☐
☒ SW-846/ICP	☒ SW-846/GFAA	☐ SW-846/Hg	☐ SW-846 Cyanide	☐	☐
SAMPLES/MATRIX BOGL71 BOGL73 BOGL75 BOGL79					
BOGL81 BOGL86 / SOIL					

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . (Yes) No N/A

Is a case narrative present? . . . . . (Yes) No N/A

Comments:

2. HOLDING TIMES

Are sample holding times acceptable? . . . . . (Yes) No N/A

Comments:

022

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

Were initial calibrations performed on all instruments? . . . . Yes No N/A
Are initial calibrations acceptable? . . . . . Yes No N/A
Are ICP interference checks acceptable? . . . . . Yes No N/A
Were ICV and CCV checks performed on all instruments? . . . . . Yes No N/A
Are ICV and CCV checks acceptable? . . . . . Yes No N/A

Comments:

4. BLANKS

Were ICB and CCB checks performed for all applicable analyses? Yes No N/A
Are ICB and CCB results acceptable? . . . . . Yes No N/A
Were preparation blanks analyzed? . . . . . Yes No N/A
Are preparation blank results acceptable? . . . . . Yes No N/A
Were field/trip blanks analyzed? . . . . . Yes No 1. N/A
Are field/trip blank results acceptable? . . . . . Yes No N/A

Comments:
1. BOGL79 is an equipment blank with Cr detected. Qualification of data is not required based on field QC.

5. ACCURACY

Were spike samples analyzed? . . . . . Yes No 1. N/A
Are spike sample recoveries acceptable? . . . . . Yes No N/A
Were laboratory control samples (LCS) analyzed? . . . . . Yes No N/A
Are LCS recoveries acceptable? . . . . . Yes No N/A

Comments:
1. The %R for Pb and Ni were outside the control limit and associated samples were qualified. See supporting document.

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

6. PRECISION

Were laboratory duplicates analyzed? . . . . . Yes No 1. N/A

Are laboratory duplicate samples RPD values acceptable? . . . . Yes No N/A

Were ICP serial dilution samples analyzed? . . . . . Yes No N/A

Are ICP serial dilution %D values acceptable? . . . . . Yes No N/A

Are field duplicate RPD values acceptable? . . . . . 2. Yes No N/A

Are field split RPD values acceptable? . . . . . Yes No N/A

Comments:

1. The RPD for Cr, Pb, and Ni were outside the control limit and associated samples were qualified. See supporting documents.
2. B0GL75 is a field duplicate of B0GL73. RPDs acceptable.

7. FURNACE AA QUALITY CONTROL

Were duplicate injections performed as required? . . . . . Yes No N/A

Are duplicate injection %RSD values acceptable? . . . . . Yes No N/A

Were analytical spikes performed as required? . . . . . Yes No N/A

Are analytical spike recoveries acceptable? . . . . . Yes No N/A

Was MSA performed as required? . . . . . Yes No N/A

Are MSA results acceptable? . . . . . Yes No N/A

Comments: GFAA Raw Data Not Supplied.

8. REPORTED RESULTS AND DETECTION LIMITS

Are results reported for all requested analyses? . . . . . Yes No N/A

Are all results supported in the raw data? . . . . . Yes No N/A

Are results calculated properly? . . . . . Yes No N/A

Do results meet the CRDLs? . . . . . Yes No N/A

Comments:

HOLDING TIME SUMMARY

SDG: W0823-QES	VALIDATOR: HEIDI GREGERSON	DATE: 2/14/96	PAGE 1 OF 1
COMMENTS:			

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
BOGL71	ICP	11/9/95	1/4/96	1/4/96	56	56	none
↓	GFAA	↓	↓	↓	56	56	none
BOGL73	ICP	11/10/95	1/4/96	1/4/96	55	55	none
↓	GFAA		↓	↓	55	55	none
BOGL75	ICP		1/4/96	1/4/96	55	55	none
↓	GFAA	↓	↓	↓	55	55	none
BOGL79	ICP	11/15/95	1/4/96	1/4/96	50	50	none
↓	GFAA		↓	↓	50	50	none
BOGL81	ICP		1/4/96	1/4/96	50	50	none
↓	GFAA	↓	↓	↓	50	50	none
BOGL86	ICP	11/16/95	1/4/96	1/4/96	49	49	none
↓	GFAA	↓	↓	↓	49	49	none

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U.S. EPA - CLP

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

B0GL71S

Lab Name: QUANTERRA_MO Contract: 550.111

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W0823

Matrix (soil/water): SOIL Level (low/med): LOW

% Solids for Sample: 96.1

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

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Cadmium	80-120	1.2300	B	0.3538	U	1.30	94.6		P
Chromium		47.4807		22.2487		5.20	485.2		P
Lead	80-120	0.6857		0.5650		2.08	5.8	N	F
Nickel	80-120	32.0473		13.1038		13.01	145.6	N	P

Comments:

FORM V (Part 1) - IN SW-846

028 HRG 2/15/96

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9613477.2069

U.S. EPA - CLP

6A
MATRIX SPIKE DUPLICATES

EPA SAMPLE NO.

B0GL71S

Lab Name: QUANTERRA MO Contract: 550.111

Lab Code: ITMO Case No.: SAS No.: SDG No.: W0823

Matrix (soil/water): SOIL Level (low/med): LOW

% Solids: 96.1

Percent recoveries:

Analyte	Control Limit	Matrix Spike (S)		Matrix Spike Duplicate (SD)		RPD	Q	M
Cd	20%	94.60		100.90		6.4		P
Cr	20%	485.20		79.20		143.9		P
Pb	20%	5.80		27.90		131.2		F
Ni	20%	145.60		88.90		48.4		P

FORM VI - IN

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HRG 2/15/96

9613477.2070

MEMORANDUM

TO: 1301N/1325N LWDF Vadose Zone Characterization Project QA Record February 14, 1996

FR: Heidi Gregerson, Golder Associates Inc. HRG

RE: RADIOCHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE W0823-QES (943-1610.119 823RAD.NR1)

INTRODUCTION

This memo presents the results of data validation for the analysis specified below on data package W0823-QES prepared by Quanterra Environmental Services. Sample information is provided in the following table.

SAMPLE ID	COMMENTS	ANALYSIS	MEDIA
B0GL71		RADIOCHEMISTRY	SOIL
B0GL73	FIELD DUPLICATE		SOIL
B0GL75		SEE ATTACHMENT 4	SOIL
B0GL79	EQUIPMENT BLANK		SOIL
B0GL81			SOIL
B0GL86			SOIL

Data validation was conducted to level C in accordance with the WHC statement of work (WHC 1994) and validation procedures (WHC 1993). Attachments 1 through 5 provide the following information as indicated below:

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

DATA QUALITY OBJECTIVES

This section presents a summary of the data quality in terms of the referenced validation criteria.

Precision. Goals for precision were met.

Accuracy. Goals for accuracy were met.

Detection Limits. Detection limit goals were met for all sample results except for those listed below:

B0GL71: plutonium 238, plutonium 239/40, uranium 234, uranium 235, uranium 238, strontium 90, alpha, beta, manganese 54, ruthenium 106DA, europium 152, europium 154, thorium 228, thorium 232
B0GL73: uranium 234, strontium 90, alpha
B0GL75: strontium 90, alpha
B0GL79: alpha
B0GL81: alpha
B0GL86: alpha

Completeness. The data package was complete for all requested analyses. A total of six samples were validated in this data package with a total of 145 determinations reported, all of which were deemed valid. This results in a completeness of 100 percent, which meets the 90 percent objective of the work plan.

MAJOR DEFICIENCIES

No major deficiencies were identified during data validation which required qualification of data as unusable.

MINOR DEFICIENCIES

The following minor deficiencies were identified during data validation which required qualification of data:

Method Blank

- The following analytes were detected in method blank: potassium 40, radium 226, and thorium 228DA. Attachments 2 and 5 provide a summary of samples affected, data qualifications applied and supporting documentation.

FIELD QC

- Sample B0GL79 was identified as an equipment blank with the following analytes detected: uranium 234, uranium 238, potassium 40, radium 226, thorium 232DA, and strontium 90. Qualification of data is not required based on field QC.

- Sample B0GL75 was identified as a field duplicate of sample B0GL73. The RPDs were evaluated and determined to be acceptable with the exception of thorium 228DA which was outside the control limit. Qualification of data is not required based on field QC.

DATA REPORTING

- Reported sample results which are less than the minimum detectable activity (MDA) have been qualified as undetected (U) on the laboratory results form (see Attachment 3).

REFERENCES

WHC 1993, Data Validation Procedures for Radiochemical Analyses, WHC-SD-EN-SPP-001, Rev. 1, 1993. Westinghouse Hanford Company, Richland, Washington.

WHC 1994, Environmental and Waste Characterization Analytical Data Validation, Purchase Order MSH-SWV-315905; Validation Statement of Work, Revision 1.0, September 7, 1994; Westinghouse Hanford Company, Richland, Washington.

9613477.2073

ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

GLOSSARY OF RADIOCHEMISTRY DATA REPORTING QUALIFIERS

U- Indicates the constituent was analyzed for, but was not detected at a concentration above the minimum detectable activity (MDA). The concentration reported is the laboratory result corrected for sample aliquot size, dilution factors and percent solids (in the case of solid matrices) by the laboratory. The associated data should be considered usable for decision making purposes.

UJ- Indicates the constituent was analyzed for and was not detected at a concentration above the MDA. Due to a quality control deficiency identified during data validation, the concentration reported may not accurately reflect the sample quantitation limit. The associated data should be considered usable for decision making purposes.

J- Indicates the constituent was analyzed for and detected. The concentration reported is qualified as estimated due to a quality control deficiency identified during data validation. The associated data should be considered usable for decision making purposes.

UR- Indicates the constituent was analyzed for and detected. The concentration reported is qualified as unusable due to a quality control deficiency identified during data validation. The associated data should be considered unusable for decision making purposes.

R- Indicates the constituent was analyzed for and detected. The concentration reported is qualified as unusable due to a quality control deficiency identified during data validation. The associated data should be considered unusable for decision making purposes.

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ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

WHC-SD-EN-SPP-002, REV.2

DATA QUALIFICATION SUMMARY - FORM B-7

SDG: W0823-QES	REVIEWER: H. Gregerson	DATE: 2-14-96	PAGE 1 OF 1
COMMENTS: RADIOCHEMISTRY			
COMPOUND/ANALYTE	QUALIFIER	SAMPLES AFFECTED	REASON
Potassium 40	J	B0GL71 B0GL73 B0GL75 B0GL79 B0GL81	DETECTED IN METHOD BLANK
Radium 226	J	B0GL73 B0GL75 B0GL79 B0GL81 B0GL86	DETECTED IN METHOD BLANK
Thorium 228DA	J	B0GL79	DETECTED IN METHOD BLANK

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ATTACHMENT 3

QUALIFIED DATA SUMMARY and ANNOTATED LABORATORY REPORTS

Validated Data Summary, Data Package: W0823-QES

	Sample #	B0GL71		B0GL73		B0GL75		B0GL79		B0GL81		B0GL86	
	Date	11/9/95		11/10/95		11/10/95		11/15/95		11/15/95		11/16/95	
	Location												
	Depth	14.5-16.5 ft		23.0-25.0 ft		23.0-25.0 ft				42.0-44.0 ft		62.0-63.8 ft	
	Type	Soil		Soil		Soil		Soil		Soil		Soil	
	Comments					Field Duplicate		Equipment Blank					
Parameter	Units	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
PLUTONIUM-238	pCi/G	1.170	U	0.105	U	0.086	U	-0.006	U	-0.004	U	0.000	U
PLUTONIUM-239/40	pCi/G	12.600		0.021	U	0.301	U	-0.002	U	-0.004	U	-0.004	U
URANIUM-234	pCi/G	0.111	U	0.407	U	1.000		0.043		0.534		0.398	
URANIUM-235	pCi/G	-0.111	U	0.076	U	0.104	U	-0.001	U	0.032	U	0.027	U
URANIUM-238	pCi/G	1.740		0.343	U	0.842		0.089		0.487		0.480	
AMERICIUM-241	pCi/G	6.550											
CERIUM-144	pCi/G	-0.638	U	0.163	U	0.259	U	0.057	U	-0.055	U	-0.088	U
COBALT-58	pCi/G	-0.559	U	-0.003	U	-0.012	U	-0.012	U	0.043	U	0.016	U
COBALT-60	pCi/G	1200.000		7.100		9.200		-0.028	U	0.547		0.535	
CESIUM-134	pCi/G	5.280		-0.058	U	-0.025	U	-0.019	U	0.024	U	-0.037	U
CESIUM-137DA	pCi/G	6770.000		44.300		65.800		0.014	U	0.007	U	-0.021	U
EUROPIUM-152	pCi/G	0.833	U	0.009	U	0.063	U	-0.039	U	-0.088	U	-0.008	U
EUROPIUM-154	pCi/G	8.170		0.178	U	0.232		0.009	U	0.098	U	-0.023	U
EUROPIUM-155	pCi/G	2.360		0.013	U	0.112	U	-0.032	U	-0.008	U	0.109	U
IRON-59	pCi/G	0.221	U	-0.127	U	0.079	U	-0.012	U	-0.219	U	0.036	U
POTASSIUM-40	pCi/G	13.700	J	18.100	J	15.800	J	5.880	J	10.800	J	18.600	
MANGANESE-54	pCi/G	0.936		0.057	U	0.049	U	0.010	U	-0.018	U	-0.008	U
RADIUM-224DA	pCi/G			0.772		0.903		0.115		0.482		0.415	
RADIUM-226	pCi/G	1.540	U	0.599	J	0.808	J	0.258	J	0.500	J	0.524	J
RADIUM-228DA	pCi/G					0.590				0.814			
RUTHENIUM-106DA	pCi/G	0.378	U	-0.271	U	-0.159	U	-0.145	U	0.013	U	-0.130	U
THORIUM-228DA	pCi/G	0.744	U	0.883		1.080		0.185	J	0.748		0.835	
THORIUM-232DA	pCi/G	-1.130	U			1.120		0.270		0.596		0.822	
GROSS ALPHA	pCi/G	30.100		7.690		7.600		2.990	U	9.330		2.900	U
GROSS BETA	pCi/G	5750.000		3790.000		2740.000		2.140	U	132.000		328.000	
STRONTIUM-90	pCi/G	768.000		1430.000		1140.000		0.274		57.900		144.000	

The decimal places shown do not reflect the precision reported by the laboratory.

Verified HRG
2/14/96

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009

Quanterra Environmental Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0823
LAB SAMPLE ID:	51131101	MATRIX:	SOIL
CLIENT ID:	BOGL71	DATE RECEIVED:	11/28/95 11:10:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
PU-238	1.17E+00 U	1.3E+00	1.3E+00	2.26E+00	pCi/g	67.20%	RD3209
PU239/40	1.28E+01	3.2E+00	3.5E+00	1.50E+00	pCi/g	67.20%	RD3209
U-234	1.11E-01 U	9.6E-01	9.6E-01	2.30E+00	pCi/g	74.50%	RICHRC5030
U-235	-1.11E-01 U	4.7E-01	4.7E-01	1.59E+00	pCi/g	74.50%	RICHRC5030
U-238	1.74E+00	1.3E+00	1.3E+00	1.59E+00	pCi/g	74.50%	RICHRC5030
AM-241.	6.55E+00	1.4E+00	1.5E+00	N/A	pCi/g	N/A	RD3219
CE-144.	-6.38E-01 U	2.2E+00	2.2E+00	3.51E+00	pCi/g	N/A	RD3219
CO-58.	-5.59E-01 U	7.3E-01	7.4E-01	1.20E+00	pCi/g	N/A	RD3219
CO-60.	1.20E+03	2.2E+00	1.2E+02	N/A	pCi/g	N/A	RD3219
CS-134.	5.28E+00	6.2E-01	8.1E-01	N/A	pCi/g	N/A	RD3219
CS-137DA.	6.77E+03	1.2E+01	6.8E+02	N/A	pCi/g	N/A	RD3219
EU-152.	8.33E-01 U	1.8E+00	1.8E+00	2.85E+00	pCi/g	N/A	RD3219
EU-154.	8.17E+00	9.3E-01	1.2E+00	1.50E+00	pCi/g	N/A	RD3219
EU-155.	2.36E+00	1.1E+00	1.1E+00	1.66E+00	pCi/g	N/A	RD3219
FE-59.	2.21E-01 U	2.4E+00	2.4E+00	3.76E+00	pCi/g	N/A	RD3219
K-40.	1.37E+01 J	3.6E+00	3.8E+00	N/A	pCi/g	N/A	RD3219
MN-54.	9.36E-01	5.6E-01	5.7E-01	9.25E-01	pCi/g	N/A	RD3219
RA-226.	1.54E+00 U	9.4E-01	9.6E-01	1.56E+00	pCi/g	N/A	RD3219
RU-106DA.	3.78E-01 U	4.9E+00	4.9E+00	8.12E+00	pCi/g	N/A	RD3219
TH-228DA.	7.44E-01 U	1.5E+00	1.5E+00	2.45E+00	pCi/g	N/A	RD3219
TH-232DA.	-1.13E+00 U	4.1E+00	4.1E+00	6.43E+00	pCi/g	N/A	RD3219
ALPHA	3.01E+01	1.1E+01	1.1E+01	5.97E+00	pCi/g	100.00%	RD3222
BETA	5.75E+03	1.0E+02	4.0E+02	1.68E+01	pCi/g	100.00%	RD3222
SR-90	7.68E+02	8.0E+01	1.6E+02	4.84E+01	pCi/g	82.00%	RICHRC5006

Quanterra Environmental Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0823
LAB SAMPLE ID:	51131102	MATRIX:	SOIL
CLIENT ID:	B0GL73	DATE RECEIVED:	11/28/95 11:10:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
PU-238	1.05E-01 U Q	2.5E-01	2.5E-01	5.68E-01	pCi/g	58.10%	RD3209
PU239/40	2.11E-02 U	1.8E-01	1.8E-01	5.67E-01	pCi/g	58.10%	RD3209
U-234	4.07E-01 U	4.3E-01	4.3E-01	7.33E-01	pCi/g	77.40%	RICHRC5030
U-235	7.62E-02 U	1.9E-01	1.9E-01	4.36E-01	pCi/g	77.40%	RICHRC5030
U-238	3.43E-01 U	3.5E-01	3.5E-01	5.46E-01	pCi/g	77.40%	RICHRC5030
CE-144.	1.63E-01 U	4.0E-01	4.0E-01	6.27E-01	pCi/g	N/A	RD3219
CO-58.	-3.41E-03 U	7.4E-02	7.4E-02	1.21E-01	pCi/g	N/A	RD3219
CO-60.	7.10E+00	1.8E-01	7.3E-01	N/A	pCi/g	N/A	RD3219
CS-134.	-5.78E-02 U	5.2E-02	5.2E-02	8.39E-02	pCi/g	N/A	RD3219
CS-137DA.	4.43E+01	3.3E-01	4.4E+00	N/A	pCi/g	N/A	RD3219
EU-152.	9.37E-03 U	1.7E-01	1.7E-01	2.61E-01	pCi/g	N/A	RD3219
EU-154.	1.78E-01 U	1.2E-01	1.2E-01	2.09E-01	pCi/g	N/A	RD3219
EU-155.	1.30E-02 U	2.1E-01	2.1E-01	3.24E-01	pCi/g	N/A	RD3219
FE-59.	-1.27E-01 U	2.0E-01	2.0E-01	3.11E-01	pCi/g	N/A	RD3219
K-40.	1.61E+01 J	1.2E+00	2.0E+00	N/A	pCi/g	N/A	RD3219
MN-54.	5.65E-02 U	5.5E-02	5.6E-02	9.28E-02	pCi/g	N/A	RD3219
RA-224DA.	7.72E-01	1.5E-01	1.7E-01	N/A	pCi/g	N/A	RD3219
RA-226.	5.99E-01 J	1.2E-01	1.3E-01	2.06E-01	pCi/g	N/A	RD3219
RU-106DA.	-2.71E-01 U	5.2E-01	5.2E-01	8.54E-01	pCi/g	N/A	RD3219
TH-228DA.	8.83E-01	2.4E-01	2.5E-01	N/A	pCi/g	N/A	RD3219
ALPHA	7.69E+00	4.0E+00	4.1E+00	4.20E+00	pCi/g	100.00%	RD3222
BETA	3.79E+03	4.0E+01	2.5E+02	3.53E+00	pCi/g	100.00%	RD3222
SR-90	1.43E+03	6.1E+01	2.6E+02	1.40E+01	pCi/g	82.10%	RICHRC5006

Number of Results: 23

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Quanterra Environmental Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0823
LAB SAMPLE ID:	51131103	MATRIX:	SOIL
CLIENT ID:	B0GL75	DATE RECEIVED:	11/28/95 11:10:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
PU-238	8.62E-02 U Q	1.7E-01	1.7E-01	2.33E-01	pCi/g	53.70%	RD3209
PU239/40	3.01E-01 U	3.5E-01	3.5E-01	5.16E-01	pCi/g	53.70%	RD3209
U-234	1.00E+00	5.5E-01	5.6E-01	6.65E-01	pCi/g	80.00%	RICHRC5030
U-235	1.04E-01 U	2.2E-01	2.2E-01	4.50E-01	pCi/g	80.00%	RICHRC5030
U-238	8.42E-01	4.9E-01	5.0E-01	5.72E-01	pCi/g	80.00%	RICHRC5030
CE-144.	2.59E-01 U	4.4E-01	4.4E-01	7.21E-01	pCi/g	N/A	RD3219
CO-58.	-1.23E-02 U	7.7E-02	7.7E-02	1.24E-01	pCi/g	N/A	RD3219
CO-60.	9.20E+00	2.3E-01	9.5E-01	N/A	pCi/g	N/A	RD3219
CS-134.	-2.52E-02 U	5.7E-02	5.7E-02	8.97E-02	pCi/g	N/A	RD3219
CS-137DA.	6.58E+01	4.4E-01	6.6E+00	N/A	pCi/g	N/A	RD3219
EU-152.	6.32E-02 U	2.0E-01	2.0E-01	3.30E-01	pCi/g	N/A	RD3219
EU-154.	2.32E-01	1.2E-01	1.3E-01	2.26E-01	pCi/g	N/A	RD3219
EU-155.	1.12E-01 U	2.5E-01	2.6E-01	4.08E-01	pCi/g	N/A	RD3219
FE-59.	7.85E-02 U	2.3E-01	2.3E-01	3.71E-01	pCi/g	N/A	RD3219
K-40.	1.56E+01 J	1.4E+00	2.1E+00	N/A	pCi/g	N/A	RD3219
MN-54.	4.93E-02 U	6.0E-02	6.0E-02	9.86E-02	pCi/g	N/A	RD3219
RA-224DA.	9.03E-01	1.7E-01	1.9E-01	N/A	pCi/g	N/A	RD3219
RA-226.	8.08E-01 J	2.4E-01	2.5E-01	N/A	pCi/g	N/A	RD3219
RA-228DA.	5.90E-01	3.5E-01	3.5E-01	N/A	pCi/g	N/A	RD3219
RU-106DA.	-1.59E-01 U	5.8E-01	5.8E-01	9.14E-01	pCi/g	N/A	RD3219
TH-228DA.	1.08E+00	2.7E-01	2.9E-01	N/A	pCi/g	N/A	RD3219
TH-232DA.	1.12E+00	5.9E-01	6.1E-01	N/A	pCi/g	N/A	RD3219
ALPHA	7.80E+00	4.1E+00	4.2E+00	4.99E+00	pCi/g	100.00%	RD3222
BETA	2.74E+03	2.4E+01	1.8E+02	2.57E+00	pCi/g	100.00%	RD3222
SR-90	1.74E+03	8.7E+01	3.1E+02	1.42E+01	pCi/g	84.90%	RICHRC5006

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Quanterra Environmental Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0823
LAB SAMPLE ID:	51131104	MATRIX:	SOIL
CLIENT ID:	B0GL79	DATE RECEIVED:	11/28/95 11:10:00 AM

ISOTOPE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
PU-238	-8.08E-03	U	3.4E-03	3.6E-03	6.04E-02	pCi/g	44.60%	RD3209
PU239/40	-1.67E-03	U	1.9E-03	1.9E-03	4.47E-02	pCi/g	44.60%	RD3209
U-234	4.33E-02		3.5E-02	3.5E-02	4.30E-02	pCi/g	68.60%	RICHRC5030
U-235	-1.46E-03	U	1.7E-03	1.7E-03	3.03E-02	pCi/g	68.60%	RICHRC5030
U-238	8.92E-02		4.7E-02	4.9E-02	3.24E-02	pCi/g	68.60%	RICHRC5030
CE-144.	5.65E-02	U	9.2E-02	9.2E-02	1.53E-01	pCi/g	N/A	RD3219
CO-58.	-1.18E-02	U	3.5E-02	3.5E-02	5.50E-02	pCi/g	N/A	RD3219
CO-60.	-2.78E-02	U	3.1E-02	3.1E-02	4.82E-02	pCi/g	N/A	RD3219
CS-134.	-1.88E-02	U	2.5E-02	2.5E-02	3.89E-02	pCi/g	N/A	RD3219
CS-137DA.	1.35E-02	U	2.5E-02	2.5E-02	4.14E-02	pCi/g	N/A	RD3219
EU-152.	-3.86E-02	U	6.0E-02	6.0E-02	9.52E-02	pCi/g	N/A	RD3219
EU-154.	8.75E-03	U	8.1E-02	8.1E-02	1.36E-01	pCi/g	N/A	RD3219
EU-155.	-3.16E-02	U	4.6E-02	4.6E-02	7.00E-02	pCi/g	N/A	RD3219
FE-59.	-1.21E-02	U	9.0E-02	9.0E-02	1.50E-01	pCi/g	N/A	RD3219
K-40.	5.68E+00	J	5.4E-01	7.8E-01	1.19E+00	pCi/g	N/A	RD3219
MN-54.	9.63E-03	U	2.8E-02	2.8E-02	4.75E-02	pCi/g	N/A	RD3219
RA-224DA.	1.15E-01		5.9E-02	6.0E-02	N/A	pCi/g	N/A	RD3219
RA-226.	2.58E-01	J	5.5E-02	6.0E-02	1.03E-01	pCi/g	N/A	RD3219
RU-106DA.	-1.45E-01	U	2.2E-01	2.2E-01	3.50E-01	pCi/g	N/A	RD3219
TH-228DA.	1.85E-01	J	1.1E-01	1.1E-01	N/A	pCi/g	N/A	RD3219
TH-232DA.	2.70E-01		1.4E-01	1.4E-01	2.46E-01	pCi/g	N/A	RD3219
ALPHA	2.99E+00	U	2.8E+00	2.8E+00	4.49E+00	pCi/g	100.00%	RD3222
BETA	2.14E+00	U	1.3E+00	1.3E+00	2.60E+00	pCi/g	100.00%	RD3222
SR-90	2.74E-01		8.5E-02	8.1E-02	7.04E-02	pCi/g	85.20%	RICHRC5006

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Quanterra Environmental Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0823
LAB SAMPLE ID:	51131105	MATRIX:	SOIL
CLIENT ID:	B0GL81	DATE RECEIVED:	11/28/95 11:10:00 AM

ISOTOPE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
PU-238	-3.76E-03	U	4.3E-03	4.4E-03	1.13E-01	pCi/g	54.50%	RD3209
PU239/40	-3.76E-03	U	4.3E-03	4.4E-03	1.13E-01	pCi/g	54.50%	RD3209
U-234	5.34E-01		2.0E-01	2.1E-01	1.13E-01	pCi/g	77.50%	RICHRC5030
U-235	3.24E-02	U	5.0E-02	5.0E-02	8.04E-02	pCi/g	77.50%	RICHRC5030
U-238	4.87E-01		1.9E-01	2.0E-01	9.40E-02	pCi/g	77.50%	RICHRC5030
CE-144.	-5.52E-02	U	1.3E-01	1.3E-01	2.07E-01	pCi/g	N/A	RD3219
CO-58.	4.25E-02	U	4.1E-02	4.1E-02	7.21E-02	pCi/g	N/A	RD3219
CO-60.	5.47E-01		7.8E-02	9.5E-02	N/A	pCi/g	N/A	RD3219
CS-134.	2.37E-02	U	2.8E-02	2.8E-02	4.69E-02	pCi/g	N/A	RD3219
CS-137DA.	7.04E-03	U	3.0E-02	3.0E-02	5.05E-02	pCi/g	N/A	RD3219
EU-152.	-8.82E-02	U	7.1E-02	7.2E-02	1.15E-01	pCi/g	N/A	RD3219
EU-154.	9.79E-02	U	9.5E-02	9.5E-02	1.68E-01	pCi/g	N/A	RD3219
EU-155.	-8.08E-03	U	6.5E-02	6.5E-02	1.02E-01	pCi/g	N/A	RD3219
FE-59.	-2.19E-01	U	1.2E-01	1.2E-01	1.81E-01	pCi/g	N/A	RD3219
K-40.	1.09E+01	J	1.1E+00	1.6E+00	N/A	pCi/g	N/A	RD3219
MN-54.	-1.79E-02	U	3.5E-02	3.5E-02	5.83E-02	pCi/g	N/A	RD3219
RA-224DA.	4.82E-01		8.4E-02	9.6E-02	N/A	pCi/g	N/A	RD3219
RA-226.	5.00E-01	J	9.1E-02	1.0E-01	N/A	pCi/g	N/A	RD3219
RA-228DA.	8.14E-01		2.3E-01	2.4E-01	N/A	pCi/g	N/A	RD3219
RU-106DA.	1.26E-02	U	2.9E-01	2.9E-01	4.65E-01	pCi/g	N/A	RD3219
TH-228DA.	7.48E-01		1.6E-01	1.8E-01	N/A	pCi/g	N/A	RD3219
TH-232DA.	5.96E-01		2.6E-01	2.6E-01	N/A	pCi/g	N/A	RD3219
ALPHA	9.33 ~~9.39E+00~~		6.0 ~~6.0E+00~~	6.1E+00	5.98 ~~5.98E+00~~	pCi/g	100.00%	RD3222
BETA	1.32E+02		5.4E+00	1.0E+01	2.58E+00	pCi/g	100.00%	RD3222
SR-90	5.79E+01		9.9E-01	1.1E+01	9.26E-02	pCi/g	60.30%	RICHRC5005

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Quanterra Environmental Services

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0823
LAB SAMPLE ID:	51131108	MATRIX:	SOIL
CLIENT ID:	BOGL86	DATE RECEIVED:	11/28/95 11:10:00 AM

ISOTOPE	RESULT	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
PU-238	0.00E+00 U	0.0E+00	1.2E-01	1.13E-01	pCi/g	69.20%	RD3209
PU239/40	-4.16E-03 U	5.9E-03	5.9E-03	1.74E-01	pCi/g	68.20%	RD3209
U-234	3.98E-01	2.5E-01	2.5E-01	2.35E-01	pCi/g	81.30%	RICHRC5030
U-235	2.68E-02 U	7.1E-02	7.1E-02	1.76E-01	pCi/g	81.30%	RICHRC5030
U-238	4.80E-01	2.6E-01	2.8E-01	1.98E-01	pCi/g	81.30%	RICHRC5030
CE-144.	-8.79E-02 U	1.5E-01	1.5E-01	2.27E-01	pCi/g	N/A	RD3219
CO-58.	1.58E-02 U	3.4E-02	3.4E-02	5.87E-02	pCi/g	N/A	RD3219
CO-60.	5.35E-01	6.8E-02	6.6E-02	N/A	pCi/g	N/A	RD3219
CS-134.	-3.70E-02 U	2.5E-02	2.5E-02	3.93E-02	pCi/g	N/A	RD3219
CS-137DA.	-2.05E-02 U	2.8E-02	2.8E-02	4.39E-02	pCi/g	N/A	RD3219
EU-152.	-8.33E-03 U	6.9E-02	6.9E-02	1.13E-01	pCi/g	N/A	RD3219
EU-154.	-2.25E-02 U	8.2E-02	8.2E-02	1.33E-01	pCi/g	N/A	RD3219
EU-155.	1.09E-01 U	7.7E-02	7.8E-02	1.22E-01	pCi/g	N/A	RD3219
FE-59.	3.56E-02 U	9.4E-02	9.4E-02	1.62E-01	pCi/g	N/A	RD3219
K-40.	1.86E+01	1.1E+00	2.1E+00	N/A	pCi/g	N/A	RD3219
MN-54.	-8.07E-03 U	3.0E-02	3.0E-02	4.96E-02	pCi/g	N/A	RD3219
RA-224DA.	4.15E-01	7.3E-02	8.4E-02	N/A	pCi/g	N/A	RD3219
RA-226.	5.24E-01 J	1.1E-01	1.2E-01	N/A	pCi/g	N/A	RD3219
RU-106DA.	-1.30E-01 U	2.5E-01	2.5E-01	4.10E-01	pCi/g	N/A	RD3219
TH-228DA.	8.35E-01	1.5E-01	1.7E-01	N/A	pCi/g	N/A	RD3219
TH-232DA.	8.22E-01	2.4E-01	2.6E-01	N/A	pCi/g	N/A	RD3219
ALPHA	2.90E+00 U	3.0E+00	3.0E+00	5.22E+00	pCi/g	100.00%	RD3222
BETA	3.28E+02	8.4E+00	2.3E+01	2.59E+00	pCi/g	100.00%	RD3222
SR-90	1.44E+02	6.1E+00	2.6E+01	1.45E+00	pCi/g	82.60%	RICHRC5006

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9613477.2085

ATTACHMENT 4

LABORATORY NARRATIVE and CHAIN-OF-CUSTODY DOCUMENTATION

9613477.2086

Quanterra Environmental Services

Quanterra Incorporated
2800 George Washington Way
Richland, Washington 99352

509 375-3131 Telephone
509 375-5590 Fax

CERTIFICATE OF ANALYSIS

JAN 1996 RECEIVED Data Log In

Bechtel Hanford, Inc.
345 Hills
Richland, WA 99352

January 12, 1996

Attention: Joan Kessner

SAF Number	:	B95-089
Date SDG Closed	:	November 28, 1995
Number of Samples	:	Six (6)
Sample Type	:	Soil
SDG Number	:	W0823
Data Deliverable	:	Summary

I. Introduction

On November 28, 1995, six soil samples were received by the Quanterra Environmental Services Richland Laboratory (QTESRL) for radiochemical analysis. Upon receipt, the samples were assigned the following laboratory ID numbers to correspond with the Bechtel Hanford, Inc. (BHI) specific IDs:

QTESRL ID	BHI ID	Matrix	Date of Receipt
51131101	B0GL71	Soil	11/28/95
51131102	B0GL73	Soil	11/28/95
51131103	B0GL75	Soil	11/28/95
51131104	B0GL79	Soil	11/28/95
51131105	B0GL81	Soil	11/28/95
51131106	B0GL86	Soil	11/28/95

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.

Quanterra Environmental Services

Bechtel Hanford, Inc.
February 6, 1996
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The requested analyses were:

Alpha Spectroscopy
Plutonium-238, -239/40 by method ITAS-RD-3209
Uranium-234, -235, -238 by method RICHRC-5030
Gamma Spectroscopy
Gamma Scan by method ITAS-RD-3219
Gas Proportional Counting
Gross Alpha by method ITAS-RD-3222
Gross Beta by method ITAS-RD-3222
Strontium-90 by method RICHRC-5006

III. Quality Control

The analytical results for each analysis performed under SDG W0823 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, with the exception of Gross Alpha and Gross Beta QC sample results which are reported in pCi/sample.

IV. Comments

Modified detection limits were required for this SAF.

DFA 2-9-96

PRIORITY

Alpha Spectroscopy

Plutonium-238, -239/40 by method ITAS-RD-3209
The batch sample sizes were reduced for all samples except sample B0GL79 due to high screening activity. As a result, three samples did not meet the RDL on the initial count, samples B0GL71, B0GL73, and B0GL75. The samples were recounted for 1000 minutes to improve the achieved MDAs. The recount results are accepted and reported with all achieved MDAs less than the RDL or results greater than the MDAs except for the Pu-238 MDA for sample B0GL71. The Pu-239 result for that sample was more than 10 times higher than the requested RDL, therefore, the results are accepted and the elevated MDA is attributed to a matrix effect (high beta sample activity). The LCS, batch blank, sample and sample duplicate (B0GL86) results are within contractual requirements.

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Quanterra Environmental Services

Uranium-234, -235, -238 by method RICHRC-5030
The batch sample sizes were reduced for all samples except sample B0GL79 due to high beta screening activity. As a result, three samples did not meet the RDL on the initial count, samples B0GL71, B0GL73, and B0GL75. The samples were recounted for 1000 minutes to improve the achieved MDAs. On the recount, sample B0GL71 did not meet the RDL for U-234, however, the U-238 result is greater than the achieved MDA. Sample B0GL73 did not meet the RDL for U-234, but the U-238 RDL is achieved. Sample B0GL75 has results over the achieved MDAs. The recount results are accepted and reported with the achieved MDAs and the elevated MDAs are attributed to a matrix effect (high beta sample activity). The LCS, batch blank, sample and sample duplicate (B0GL86) results are within contractual requirements.

Gamma Spectroscopy

Gamma Scan by method ITAS-RD-3219
The high activity of the samples required a reduction of sample mass analyzed. As a result of the smaller sample sizes and the high Compton background, the samples do not meet the contractual RDLs for some isotopes, however, the samples do meet the modified RDLs specified for this SAF. The contractual and modified RDLs are met by the Ottawa sand blank. The data are accepted with the MDAs achieved. Th-232 is requested by the modified SAF detection limit list, however, the Th-232 key line was not found for sample B0GL73, therefore, a Th-232 result could not be reported for that sample. The K-40 result for the duplicate of sample B0GL79 was outside of the 3 sigma control limit because K-40 was detected in the duplicate, but was not detected in the sample. U-238DLP is detected and reported in the blank, however, it is not considered to be an indication of batch contamination as it is a natural constituent of the blank matrix material. The LCS, batch blank, sample and sample duplicate (B0GL79) results are within contractual requirements, except as noted.

Gas Proportional Counting

Gross Alpha by method ITAS-RD-3222
Samples B0GL73, B0GL75, B0GL79 and B0GL86 were recounted for 100 minutes to improve the achieved MDAs. The recount results are within limits and reported. The LCS, batch blank, sample and sample duplicate (B0GL86) results are within contractual requirements.

Gross Beta by method ITAS-RD-3222
The count time and aliquot size was reduced for sample B0GL71 due to high screening activity. The LCS, batch blank, sample and sample duplicate (B0GL86) results are within contractual requirements.

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Strontium-90 by method RICHRC-5006
The duplicate was lost in analysis. All other aspects of the data are within requirements and the batch is accepted. The LCS, batch blank, and sample results are within contractual requirements.

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

Reviewed and approved:

Suzanne Gaines
Project Manager

For S.G. 2-6-96

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~~000005~~

Bechtel Hanford, Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	Page ___ of ___
		Data Turnaround ☐ Priority ■ Normal

Collector: W. S. Thompson	Company Contact: K. L. Sykes / W. S. Thompson	Telephone: (509) 376-8031
Project Designation: 1301N/1325N SI (Limited Field Investigation)	Sampling Location: 1301-N/1325-N Cribs 100N	SAF No.: B95-089
Ice Chest No.: ER-210	Field Logbook No.: EL-1275	Method of Shipment: Hand Carry in DOE vehicle.
Shipped To: QUANTERRA	Offsite Property No.: N/A	Bill of Lading/Air Bill No.: N/A

Possible Sample Hazards/Remarks: Radioactive

Special Handling and/or Storage

SAMPLE ANALYSIS: 511310 SDG-2 W0813 JH 11/30/95

	Preservation	NONE	NONE	NONE
	Type of Container	Glass	Glass	Plastic
	No. of Container(s)	1	1	1
	Volume	~~40 ml.~~ 60 ml. 11/9/95	60 ml.	20 ml.
		ICP Metals Cadmium Chromium Lead Nickel	Radio-nuclides (see note #1)	Activity Scan

	Sample No.	Matrix*	Date Sampled	Time Sampled	ICP Metals	Radio-nuclides	Activity Scan
1	BOGL71	Soil	11/09/95	0918	X	X	X
2	BOGL73	SOIL	11/10/95	0826	X	X	X
3	BOGL75	SOIL	11/10/95	0826	X	X	X
4	BOGL79	SOIL	11/15/95	0745	X	X	X
5	BOGL81	Soil	11/15/95	0907	X	X	X
6	BOGL86	Soil	11/16/95	0750	X	X	X

CHAIN OF POSSESSION	Sign/Print Names	Date/Time	Received By	Date/Time
Relinquished By	W S Thompson	11/28/95 0907	Received By: ER Bushtrey	11-28-95 0907
Relinquished By	ER Bushtrey	11-28-95 1110	Received By: Karen Dahlinburg	11-28-95 1110 Thur 100
Relinquished By			Received By	
Relinquished By			Received By	

SPECIAL INSTRUCTIONS

Note #1: Radionuclides - Gross alpha; gross beta; Sr-90; U-233,U-234; U-238; Pu-238; Pu-239/240; Gamma Spec (to include) - K-40, Mn-54, C0-60, Ru-106, Cs-134, Cs-137, Ce-144, Eu-154, Eu-155, Ra-226, Th-228, Th-232.

SUMMARY DATA DELIVERABLES

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

021

0039

HCG 2/14/96

9612172.2090

9613477.2091

ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

9613477.2092

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E

PROJECT: 100NR1 1301N/1325N		DATA PACKAGE: W0823-QES
VALIDATOR: H. GREGERSON	LAB: QUANTERRA	DATE: 2/14/96
CASE:		SDG:

ANALYSES PERFORMED

☒ Gross Alpha/Beta	☒ Strontium-90	☐ Technetium-99	☒ Alpha Spectroscopy	☒ Gamma Spectroscopy	
☐ Total Uranium	☐ Radium-22	☐ Tritium	☐		

SAMPLES/MATRIX B0GL71 B0GL73 B0GL75 B0GL79
B0GL81 B0GL86 / SOIL

1. Completeness . . . . . ☐ N/A

Technical verification forms present? . . . . . Yes No N/A

Comments:

2. Initial Calibration . . . . . ☒ N/A

Instruments/detectors calibrated within one year of sample analysis? . . . . . Yes No N/A

Initial calibration acceptable? . . . . . Yes No N/A

Standards NIST traceable? . . . . . Yes No N/A

Standards Expired? . . . . . Yes No N/A

Comments:

3. Continuing Calibration . . . . . ☒ N/A

Calibration checked within one week of sample analysis? . . . Yes No N/A
Calibration check acceptable? . . . . . Yes No N/A
Calibration check standards NIST traceable? . . . . . Yes No N/A
Calibration check standards expired? . . . . . Yes No N/A

Comments:

4. Blanks . . . . . ☐ N/A

Method blank analyzed? . . . . . Yes No N/A
Method blank results acceptable? . . . . . Yes No N/A
Analytes detected in method blank? . . . . . 1. Yes No N/A
Field blank(s) analyzed? . . . . . Yes No N/A
Field blank results acceptable? . . . . . Yes No N/A
Analytes detected in field blank(s)? . . . . . 2. Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments:
1. K-40, Ra-226, and Th-228DA were detected in the method blank and associated samples were qualified.
2. BOGL79 is an equipment blank with U-234, U-238, K-40, Ra-226, Th-232DA, and Sr-90 detected. Qualification not required.

5. Matrix Spikes . . . . . ☐ N/A

Matrix spike analyzed? . . . . . Yes No N/A
Spike recoveries acceptable? . . . . . Yes No N/A
Spike source traceable? . . . . . Yes No N/A
Spike source expired? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments:

6. Laboratory Control Samples . . . . . ☐ N/A

LCS analyzed? . . . . . Yes No N/A
LCS recoveries acceptable? . . . . . Yes No N/A
LCS traceable? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments:_____

7. Chemical Recovery . . . . . ☐ N/A

Chemical carrier added? . . . . . Yes No N/A
Chemical recovery acceptable? . . . . . Yes No N/A
Chemical carrier traceable? . . . . . Yes No N/A
Chemical carrier expired? . . . . . Yes No N/A
Transcription/Calculation errors? . . . . . Yes No N/A

Comments:_____

8. Duplicates . . . . . ☐ N/A

Duplicates Analyzed? . . . . . Yes No N/A
RPD Values Acceptable? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments:_____

9. Field QC Samples . . . . . ☐ N/A

Field duplicate sample(s) analyzed? . . . . . Yes No 1. N/A
Field duplicate RPD values acceptable? . . . . . Yes No N/A
Field split sample(s) analyzed? . . . . . Yes No ~~N/A~~ HRG 2/14/96
Field split RPD values acceptable? . . . . . Yes No N/A
Performance audit sample(s) analyzed? . . . . . Yes No ~~N/A~~
Performance audit sample results acceptable? . . . . . Yes No N/A

Comments:
1. BOGL75 is a field duplicate of BOGL73. The RPD for Th-228DA was outside the control limit, however, qualification is not required based on field QC.

10. Holding Times

Are sample holding times acceptable? . . . . . Yes No N/A

Comments:

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

Results reported for all required sample analyses? . . . . . Yes No N/A
Results supported in raw data? . . . . . Yes No N/A
Results Acceptable? . . . . . Yes No N/A
Transcription/Calculation errors? . . . . . Yes No N/A
MDA's meet required detection limits? . . . . . Yes 1. No N/A
Transcription/calculation errors? . . . . . Yes No N/A

Comments:
BOGL71: Pu-238, Pu-239/40, U-234, U-235, U238, Sr-90, Alpha, Beta, Mn-54, Ru-106DA, Eu-152, Eu-154, Th-228, Th-232
BOGL73: U-234, Sr-90, Alpha,
BOGL75: Sr-90, Alpha,
BOGL79: Alpha
BOGL81: Alpha
BOGL86: Alpha

HOLDING TIME SUMMARY

SDG: W0823-QES | VALIDATOR: HEIDI GREGERSON | DATE: 2/14/96 | PAGE 1 OF 2

COMMENTS:

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
BOGL71	Sr 90	11/9/95	12/12/95	1/4/96	33	56	none
	Gross α β			12/15/95	33	HG ~~56~~ 36	none
	Gamma			12/15/95	33	HG ~~56~~ 36	none
	U			1/3/96	33	HG ~~56~~ 55	none
	Pu			12/22/95	33	HG ~~56~~ 43	none
BOGL73	Sr 90	11/10/95		1/4/96	32	55	none
	Gross α β			12/15/95	32	35	none
	Gamma			12/15/95	32	35	none
	U			1/3/96	32	54	none
	Pu			12/22/95	32	42	none
BOGL75	Sr 90			1/4/96	32	55	none
	Gross α β			12/15/95	32	35	none
	Gamma			12/15/95	32	35	none
	U			1/3/96	32	54	none
	Pu			12/22/95	32	42	none

HOLDING TIME SUMMARY

SDG: W0823-QES | VALIDATOR: HEIDI GREGERSON | DATE: 2/14/96 | PAGE 2 OF 2

COMMENTS:

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
BOGL79	Sr 90	11/15/95	12/12/95	1/4/96	27	50	none
	Gross α β			12/15/95	27	30	none
	Gamma			12/15/95	27	30	none
	U			1/3/96	27	49	none
	Pu			12/22/95	27	37	none
BOGL81	Sr 90	11/15/95		1/4/96	27	50	none
	Gross α β			12/15/95	27	30	none
	Gamma			12/15/95	27	30	none
	U			1/3/96	27	49	none
	Pu			12/22/95	27	37	none
BOGL86	Sr 90	11/16/95		1/4/96	26	49	none
	Gross α β			12/15/95	26	29	none
	Gamma			12/15/95	26	29	none
	U			1/3/96	26	48	none
	Pu			12/22/95	26	36	none

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BLANK RESULTS

LAB NAME: ITAS-RICHLAND SDG: W0823
LAB SAMPLE ID: M113111B MATRIX: SOIL

ISOTOPE	RESULT	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
PU-238	-5.94E-03	3.3E-03	3.5E-03	5.90E-02	pCi/g	45.60%	RD3209
PU239/40	-1.83E-03	1.8E-03	1.9E-03	4.37E-02	pCi/g	45.60%	RD3209
U-234	-5.12E-03	3.1E-03	3.2E-03	4.11E-02	pCi/g	71.60%	RICHRC5030
U-235	1.02E-02	1.7E-02	1.7E-02	2.90E-02	pCi/g	71.60%	RICHRC5030
U-238	3.96E-03	1.2E-02	1.2E-02	3.11E-02	pCi/g	71.60%	RICHRC5030
CE-144.	-2.48E-02	5.8E-02	5.8E-02	9.24E-02	pCi/g	N/A	RD3219
CO-58.	-8.25E-03	1.7E-02	1.7E-02	2.73E-02	pCi/g	N/A	RD3219
CO-60.	3.76E-03	1.6E-02	1.6E-02	2.87E-02	pCi/g	N/A	RD3219
CS-134.	3.01E-04	1.5E-02	1.5E-02	2.49E-02	pCi/g	N/A	RD3219
CS-137DA.	-1.42E-02	1.7E-02	1.7E-02	2.76E-02	pCi/g	N/A	RD3219
EU-152.	5.63E-04	4.1E-02	4.1E-02	6.59E-02	pCi/g	N/A	RD3219
EU-154.	2.38E-02	4.7E-02	4.7E-02	8.36E-02	pCi/g	N/A	RD3219
EU-155.	5.78E-03	2.8E-02	2.8E-02	4.72E-02	pCi/g	N/A	RD3219
FE-59.	-2.06E-02	3.5E-02	3.5E-02	5.71E-02	pCi/g	N/A	RD3219
K-40.	3.56E+00	3.4E-01	5.0E-01	7.63E-01	pCi/g	N/A	RD3219
MN-54.	-4.49E-03	1.8E-02	1.8E-02	2.91E-02	pCi/g	N/A	RD3219
RA-226.	1.62E-01	3.8E-02	4.1E-02	7.11E-02	pCi/g	N/A	RD3219
RU-106DA.	-1.20E-01	1.4E-01	1.4E-01	2.27E-01	pCi/g	N/A	RD3219
TH-228DA.	1.27E-01	4.3E-02	4.5E-02	8.28E-02	pCi/g	N/A	RD3219
TH-232DA.	1.47E-01	9.8E-02	1.0E-01	1.67E-01	pCi/g	N/A	RD3219
U-238DLP.	9.53E-01	5.2E-01	5.3E-01	N/A	pCi/g	N/A	RD3219
ALPHA	-1.41E-02	1.1E-02	1.1E-02	1.33E-01	pCi/sa	100.00%	RD3222
BETA	2.21E-03	2.4E-01	2.4E-01	5.45E-01	pCi/sa	100.00%	RD3222
SR-90	3.36E-02	3.2E-02	3.3E-02	6.18E-02	pCi/g	93.00%	RICHRC5000

Number of Results: 24

029

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