W02411-Q55

Quanterra
Environmental Services

Quanterra Incorporated
13715 Rider Trail North
Earth City, Missouri 63045

314 298-8566 Telephone
314 298-8757 Fax

CASE NARRATIVE
(Addendum)

005089

Bechtel Hanford Incorporated
3350 George Washington Way
Richland, Washington 99352

October 2, 1998

Attention: Joan Kessner

OCT 1998
RECEIVED
Data
Log In

Project number	:	550.260
SDG	:	W02411
Number of Samples	:	Twenty (20)
Sample Type	:	Other Solid
Data Deliverable	:	Summary
Date SDG Closed	:	June 4, 1998

DEC 1998
RECEIVED
FDMC

II. Introduction

On June 3 and 4, 1998, a total of twenty (20) other solid samples were received by Quanterra Richland (806056 & 806080) and were transferred to Quanterra, St. Louis for chemical analysis. For samples with greater than 50% complete upon cancellation, a request was received on September 18, 1998 for the hard copy report. This included one sample and was given the following laboratory ID number to correspond with the specific client ID:

St. Louis ID	BHI ID	SAF #	Matrix	Date of Receipt
18070-014	B0NVR6	B98-087	Other Solid	04-JUN-98

III. Analytical Results/ Methodology

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

Analyses requested: Mercury by EPA method 7471.
ICP metals EPA method 6010 - Lead
PCBs EPA method 8080

Deviation from Request: No Deviation from requested method.

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REW 10/2/98

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IV. Definitions

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

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

V. Comments

General:

On June 30, 1998 the Metals and PCB analyses requested for B0NVR6 were canceled per Andy Kopriva. The analyses were over 50 % complete.

Priority metals results were provided by facsimile on 07/07/98.

Preliminary PCB data was provided by facsimile on 07/09/98.

On 07/13/98 a second set (W02411A) of metals results were provided by facsimile.

Inorganics:

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

Due to the late addition of samples to SDG W02411 two separate sets of data were submitted.

The Mercury analysis was requested after the hold time had expired. See the IRF issued on July 2, 1998.

PCBs:

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

RLW
10/2/98
~~00000~~

PCBs: The daily standard for Aroclor 1221 and the continuing/closing Aroclor 1260 standards are above quality control limits but were used to quantify PCB levels. The data is reported "as is" and the analysts have been retrained in method criteria.

For sample 18070-014 the surrogates were not within the QC advisory limits. Due to the initial cancellation no additional analysis was performed.

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

Reviewed and approved:

Robert E. White

Robert E. White
Project Manager

Sample Disposition Record

Control #: B98-067
Revision#: 0
Date Initiated: 7/14/98

Section 1 - BACKGROUND

SAF#: B98-087
OU: N/A
Project ID: 105-C Reactor
Task ID: 11
Sampling Event: 105-C Phase II - Verification Sampling
Laboratory: Quanterra Incorporated
Project Coordinator: TRENT, SJ
Task Manager: ARMATROUT, JF

Section 2 - SAMPLE INFORMATION

Number of Samples: 2
ID Numbers: B0NVR9, B0NVR7
MATRIX: Other Solid
Collection Date: 06/03/98

Section 3 - ISSUE

Class: Lab Direction
NCR Number: N/A
Type: Other - Analysis requested by customer.
Description: The project requested that Quanterra hold the bottles for Radiochemistry analyses and ICP Metals analyses until after the PCB results were reported.

N/A

NCR Validation (Print/Sign) **Date**

Section 4 - DISPOSITION

Type: Repair
Description: The project has determined that the Radiochemistry analyses and the ICP Metals analyses are not needed. Quanterra is directed to cancel these analyses for samples B0NVR7 and B0NVR9.

TRENT, SJ 7/27/98

Project Coordinator (Print/Sign) **Date**

ARMATROUT, JF

Task Manager (Print/Sign) **Date**

N/A

QA (Print/Sign) **Date**

Section 5 - INSPECTION (Issue Class: Nonconformance Only)

Inspection Number: N/A
Inspection Results: N/A

N/A

Inspector (Print/Sign) **Date**

Sample Disposition Record

Control #: B98-063
Revision#: 0
Date Initiated: 6/30/98

Section 1 - BACKGROUND

SAF#: B98-087
OU: N/A
Project ID: 105-C Reactor
Task ID: 11
Sampling Event: 105-C Phase II - Verification Sampling
Laboratory: Quanterra Incorporated
Project Coordinator: TRENT, SJ
Task Manager: ARMATROUT, JF

Section 2 - SAMPLE INFORMATION

Number of Samples: 18
ID Numbers: B0NVM6, B0NVN0, B0NVN1, B0NVN2, B0NVN3, B0NVN5, B0NVN7, B0NVP7, B0NVP8, B0NVP9, B0NVR0, B0NVR1, B0NVR3, B0NVX8, B0NVX9, B0NVR2, B0NVN6, B0NVM9
MATRIX: Other Solid
Collection Date: 05/28/98 - 06/04/98

Section 3 - ISSUE

Class: Lab Direction
NCR Number: N/A
Type: Other - Insufficient Documentation on COC
Description: COC documentation incorrectly instructed the laboraory to hold all analyses except for PCBs

N/A

NCR Validation (Print/Sign) Date

Section 4 - DISPOSITION

Type: Use As Is
Description: Perform all analyses identified on the COCs.

TRENT, SJ 7/1/98
Project Coordinator (Print/Sign) Date

ARMATROUT, JF Jeffrey F. Armatrout 7/6/98
Task Manager (Print/Sign) Date

N/A

QA (Print/Sign) Date

Section 5 - INSPECTION (Issue Class: Nonconformance Only)

Inspection Number: N/A
Inspection Results: N/A

N/A

Inspector (Print/Sign) Date

Sample Disposition Record

Control #: B98-064
Revision#: 0
Date Initiated: 6/30/98

Section 1 - BACKGROUND

SAF#: B98-087
OU: N/A
Project ID: 105-C Reactor
Task ID: 11
Sampling Event: 105-C Phase II - Verification Sampling
Laboratory: Quanterra Incorporated
Project Coordinator: TRENT, SJ
Task Manager: ARMATROUT, JF

Section 2 - SAMPLE INFORMATION

Number of Samples: 2
ID Numbers: B0NVN7, B0NVR6
MATRIX: Other Solid
Collection Date: 06/03/98 - 06/04/98

Section 3 - ISSUE

Class: Lab Direction
NCR Number: N/A
Type: Revision of Direction - Cancellation of Analyses
Description: The client has detemined that analysis is not needed on 2 samples

N/A

NCR Validation (Print/Sign) Date

Section 4 - DISPOSITION

Type: Use As Is
Description: The lab shall terminate any ongoing analysis less than 50% complete. Complete and report any analyses greater than 50% complete

TRENT, SJ 7/1/98

Project Coordinator (Print/Sign) Date

ARMATROUT, JF

Task Manager (Print/Sign) Date

N/A 7/6/98

QA (Print/Sign) Date

Section 5 - INSPECTION (Issue Class: Nonconformance Only)

Inspection Number: N/A
Inspection Results: N/A

N/A

Inspector (Print/Sign) Date

Sample Disposition Record

Control #: B98-059
Revision#: 0
Date Initiated: 6/5/98

Section 1 - BACKGROUND

SAF#: B98-087
OU: N/A
Project ID: 105-C Reactor
Task ID: 11
Sampling Event: 105-C Phase II - Verification Sampling
Laboratory: Quanterra Incorporated
Project Coordinator: TRENT, SJ
Task Manager: ARMATROUT, JF

Section 2 - SAMPLE INFORMATION

Number of Samples: 6
ID Numbers: B0NVR4, B0NVR5, B0NVR6, B0NVR8, B0NVX6, B0NVX7
MATRIX:
Collection Date:

Section 3 - ISSUE

Class: Lab Direction
NCR Number: N/A
Type: Clarification of Direction
Description: COC included potentially conflicting printed and hand written statements regarding holding of certain analyses until notification by ERC.

N/A
NCR Validation (Print/Sign) Date

Section 4 - DISPOSITION

Type: Use As Is
Description: Laboratory should run all indicated analyses for samples listed in this SDR

TRENT, SJ 6/5/98
Project Coordinator (Print/Sign) Date

ARMATROUT, JF 6/18/98
Task Manager (Print/Sign) Date

N/A
QA (Print/Sign) Date

Section 5 - INSPECTION (Issue Class: Nonconformance Only)

Inspection Number: N/A
Inspection Results: N/A

N/A
Inspector (Print/Sign) Date

W02411

added ICAP, Hg, PCB on -014

Quanterra September 22, 1998 03:40 pm

Account: 10722 Project: 550.260 Quanterra-Richland QAS No. 550.26 Rev. 3

Master Sample Login: 18070

Project Manager: R. White

Draft: (Final:) Entered and Reviewed by: [signature] PM Review: Robert E. White

Sample Header Template:

Sample No. / Comments / # / Data:	Client ID / Container Type	C-Matrix / Analysis	Date: Collected	Received	Due	Shipper	Rad Category	Rad Sample No. (Container Numbers:% Filled)
18070-001	BONVR0	Solid	02-JUN-98 09:40	04-JUN-98 08:40	19-JUN-98	AIRBORNE	1	Screening not Required
RICHLAND ID 80608006/ ICAP=PB								
1	AN - Amber Glass-60ML	HG/7471/Q4	S COLD	16-JUN-98	30-JUN-98	R13F		(384184:99)
1		HOLD//Q4	S COLD	16-JUN-98	14-JUN-98	R13F		(384185:98)
1		ICAP/6010/Q4	S COLD	16-JUN-98	29-NOV-98	R13F		(384184:99)
1		PCB/8080/Q4	S COLD	16-JUN-98	16-JUN-98	R13F		(384184:99)
18070-002	BONVR1	Solid	02-JUN-98 10:00	04-JUN-98 08:40	19-JUN-98	AIRBORNE	1	Screening not Required
RICHLAND ID 80608007 ICAP=PB								
1	AN - Amber Glass-60ML	HG/7471/Q4	S COLD	16-JUN-98	30-JUN-98	R13F		(384187:99)
1		HOLD//Q4	S COLD	16-JUN-98	14-JUN-98	R13F		(384188:98)
1		ICAP/6010/Q4	S COLD	16-JUN-98	29-NOV-98	R13F		(384187:99)
1		PCB/8080/Q4	S COLD	16-JUN-98	16-JUN-98	R13F		(384187:99)
18070-003	BONVR2	Solid	02-JUN-98 10:17	04-JUN-98 08:40	19-JUN-98	AIRBORNE	1	Screening not Required
RICHLAND ID 80608008 ICAP=PB								
1	AN - Amber Glass-60ML	HG/7471/Q4	S COLD	16-JUN-98	30-JUN-98	R13F		(384189:99)
1		HOLD//Q4	S COLD	16-JUN-98	14-JUN-98	R13F		(384190:98)
1		ICAP/6010/Q4	S COLD	16-JUN-98	29-NOV-98	R13F		(384189:99)
1		PCB/8080/Q4	S COLD	16-JUN-98	16-JUN-98	R13F		(384189:99)
18070-004	BONVR3	Solid	02-JUN-98 12:50	04-JUN-98 08:40	19-JUN-98	AIRBORNE	1	Screening not Required
RICHLAND ID 80608009 ICAP=PB								
1	AN - Amber Glass-60ML	HG/7471/Q4	S COLD	16-JUN-98	30-JUN-98	R13F		(384191:99)
1		HOLD//Q4	S COLD	16-JUN-98	14-JUN-98	R13F		(384192:98)
1		ICAP/6010/Q4	S COLD	16-JUN-98	29-NOV-98	R13F		(384191:99)
1		PCB/8080/Q4	S COLD	16-JUN-98	16-JUN-98	R13F		(384191:99)
18070-005	BONVN5	Solid	02-JUN-98 08:35	04-JUN-98 08:40	19-JUN-98	AIRBORNE	1	Screening not Required
RICHLAND ID 80608001 ICAP=PB								
1	AN - Amber Glass-60ML	HG/7471/Q4	S COLD	16-JUN-98	30-JUN-98	R13F		(384194:99)
1		HOLD//Q4	S COLD	16-JUN-98	14-JUN-98	R13F		(384195:98)
1		ICAP/6010/Q4	S COLD	16-JUN-98	29-NOV-98	R13F		(384194:99)
1		PCB/8080/Q4	S COLD	16-JUN-98	16-JUN-98	R13F		(384194:99)
18070-006	BONVP7	Solid	02-JUN-98 09:02	04-JUN-98 08:40	19-JUN-98	AIRBORNE	1	Screening not Required
RICHLAND ID 80608003 ICAP=PB								

3*=Sample has not been rad screened.

C1

Quanterra September 22, 1998 03:40 pm
Account: 10722 Project: 550.260 Quanterra-Richland QAS No. 550.26 Rev. 3
Master Sample Login: 18070

oject Manager: R. White

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

mple Header Template: _____

mple No. / #	Client ID / Comments	C-Matrix	Date: Collected	Received	Due	Shipper	Rad Category	Rad Sample No.
ita:								

Container Type	Analysis	Class	Preservative	Anal. Due Date	Hold Date	Site	(Container Numbers:% Filled)
1 AN - Amber Glass-60ML	HG/7471/Q4	S	COLD	16-JUN-98	30-JUN-98	R13F	(384196:99)
1	HOLD//Q4	S	COLD	16-JUN-98	14-JUN-98	R13F	(384197:98)
1	ICAP/6010/Q4	S	COLD	16-JUN-98	29-NOV-98	R13F	(384196:99)
1	PCB/8080/Q4	S	COLD	16-JUN-98	16-JUN-98	R13F	(384196:99)

8070-007 BONVN6 Solid 02-JUN-98 08:45 04-JUN-98 08:40 19-JUN-98 AIRBORNE 1 Screening not Required
RICHLAND ID 80608002 ICAP=PB

Container Type	Analysis	Class	Preservative	Anal. Due Date	Hold Date	Site	(Container Numbers:% Filled)
1 AN - Amber Glass-60ML	HG/7471/Q4	S	COLD	16-JUN-98	30-JUN-98	R13F	(384198:99)
1	HOLD//Q4	S	COLD	16-JUN-98	14-JUN-98	R13F	(384199:98)
1	ICAP/6010/Q4	S	COLD	16-JUN-98	29-NOV-98	R13F	(384198:99)
1	PCB/8080/Q4	S	COLD	16-JUN-98	16-JUN-98	R13F	(384198:99)

8070-008 BONVP8 Solid 02-JUN-98 09:10 04-JUN-98 08:40 19-JUN-98 AIRBORNE 1 Screening not Required
RICHLAND ID 80608004 ICAP=PB

Container Type	Analysis	Class	Preservative	Anal. Due Date	Hold Date	Site	(Container Numbers:% Filled)
1 AN - Amber Glass-60ML	HG/7471/Q4	S	COLD	16-JUN-98	30-JUN-98	R13F	(384200:99)
1	HOLD//Q4	S	COLD	16-JUN-98	14-JUN-98	R13F	(384201:98)
1	ICAP/6010/Q4	S	COLD	16-JUN-98	29-NOV-98	R13F	(384200:99)
1	PCB/8080/Q4	S	COLD	16-JUN-98	16-JUN-98	R13F	(384200:99)

8070-008RD1 BONVP8 Solid 02-JUN-98 09:10 04-JUN-98 08:40 19-JUN-98 AIRBORNE 1 Screening not Required
RICHLAND ID 80608004 ICAP=PB

8070-009 BONVP9 Solid 02-JUN-98 09:30 04-JUN-98 08:40 19-JUN-98 AIRBORNE 1 Screening not Required
RICHLAND ID 80608005 ICAP=PB

Container Type	Analysis	Class	Preservative	Anal. Due Date	Hold Date	Site	(Container Numbers:% Filled)
1 AN - Amber Glass-60ML	HG/7471/Q4	S	COLD	16-JUN-98	30-JUN-98	R13F	(384202:99)
1	HOLD//Q4	S	COLD	16-JUN-98	14-JUN-98	R13F	(384203:98)
1	ICAP/6010/Q4	S	COLD	16-JUN-98	29-NOV-98	R13F	(384202:99)
1	PCB/8080/Q4	S	COLD	16-JUN-98	16-JUN-98	R13F	(384202:99)

8070-010 BONVR7 Solid 03-JUN-98 13:05 04-JUN-98 14:15 19-JUN-98 AIRBORNE 1 Screening not Required
RICHLAND ID 80608013 ICAP=PB

Container Type	Analysis	Class	Preservative	Anal. Due Date	Hold Date	Site	(Container Numbers:% Filled)
2 AN - Amber Glass-60ML	HOLD//Q4	S	COLD	16-JUN-98	14-JUN-98	R13F	(384204:99 384205:98)
1	PCB/8080/Q4	S	COLD	16-JUN-98	17-JUN-98	R13F	(384204:99)

8070-011 BONVR9 Solid 03-JUN-98 13:25 04-JUN-98 14:20 19-JUN-98 AIRBORNE 1 Screening not Required
RICHLAND ID 80608015 ICAP=PB

Container Type	Analysis	Class	Preservative	Anal. Due Date	Hold Date	Site	(Container Numbers:% Filled)
1 AN - Amber Glass-60ML	HOLD//Q4	S	COLD	16-JUN-98	14-JUN-98	R13F	(384207:98)
1	PCB/8080/Q4	S	COLD	16-JUN-98	17-JUN-98	R13F	(384206:99)

*=Sample has not been rad screened.

000006

Quanterra September 22, 1998 03:40 pm
Account: 10722 Project: 550.260 Quanterra-Richland QAS No. 550.26 Rev. 3
Master Sample Login: 18070

Project Manager: R. White

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

Sample Header Template: _____

Sample No. / #	Client ID / Container Type	C-Matrix / Analysis	Date: Collected / Class	Received / Preservative	Due / Anal. Due Date	Shipper / Hold Date	Site	Rad Category / (Container Numbers:% Filled)	Rad Sample No.
18070-012	BONVR4	Solid	03-JUN-98 12:30	04-JUN-98 14:15	19-JUN-98	AIRBORNE		1	Screening not Required
RICHLAND ID 80608010 / ICAP = PB ONLY									
1	AN - Amber Glass-60ML	HG/7471/Q4	S	COLD	16-JUN-98	01-JUL-98	R13F	(384208:99)	
1		HOLD//Q4	S	COLD	16-JUN-98	14-JUN-98	R13F	(384209:98)	
1		ICAP/6010/Q4	S	COLD	16-JUN-98	30-NOV-98	R13F	(384208:99)	
1		PCB/8080/Q4	S	COLD	16-JUN-98	17-JUN-98	R13F	(384208:99)	
18070-013	BONVR5	Solid	03-JUN-98 12:40	04-JUN-98 14:15	19-JUN-98	AIRBORNE		1	Screening not Required
RICHLAND ID 80608011 / ICAP = PB ONLY									
1	AN - Amber Glass-60ML	HG/7471/Q4	S	COLD	16-JUN-98	01-JUL-98	R13F	(384210:99)	
1		HOLD//Q4	S	COLD	16-JUN-98	14-JUN-98	R13F	(384211:98)	
1		ICAP/6010/Q4	S	COLD	16-JUN-98	30-NOV-98	R13F	(384210:99)	
1		PCB/8080/Q4	S	COLD	16-JUN-98	17-JUN-98	R13F	(384210:99)	
18070-014	BONVR6	Solid	03-JUN-98 12:50	04-JUN-98 14:15	19-JUN-98	AIRBORNE		1	Screening not Required
RICHLAND ID 80608012 / ICAP = PB ONLY									
1	AN - Amber Glass-60ML	HG/7471/Q4	S	COLD	16-JUN-98	01-JUL-98	R13F	(384213:98)	
1		ICAP/6010/Q4	S	COLD	16-JUN-98	30-NOV-98	R13F	(384213:98)	
1		PCB/8080/Q4	S	COLD	16-JUN-98	17-JUN-98	R13F	(384212:99)	
18070-015	BONVR8	Solid	03-JUN-98 13:15	04-JUN-98 14:15	19-JUN-98	AIRBORNE		1	Screening not Required
RICHLAND ID 80608014 / ICAP = PB ONLY									
1	AN - Amber Glass-60ML	HG/7471/Q4	S	COLD	16-JUN-98	01-JUL-98	R13F	(384214:99)	
1		HOLD//Q4	S	COLD	16-JUN-98	14-JUN-98	R13F	(384215:98)	
1		ICAP/6010/Q4	S	COLD	16-JUN-98	30-NOV-98	R13F	(384214:99)	
1		PCB/8080/Q4	S	COLD	16-JUN-98	17-JUN-98	R13F	(384214:99)	
18070-016	BONVX6	Solid	03-JUN-98 13:45	04-JUN-98 14:20	19-JUN-98	AIRBORNE		1	Screening not Required
RICHLAND ID 80608016 / ICAP = PB ONLY									
1	AN - Amber Glass-60ML	HG/7471/Q4	S	COLD	16-JUN-98	01-JUL-98	R13F	(384216:99)	
1		HOLD//Q4	S	COLD	16-JUN-98	14-JUN-98	R13F	(384217:98)	
1		ICAP/6010/Q4	S	COLD	16-JUN-98	30-NOV-98	R13F	(384216:99)	
1		PCB/8080/Q4	S	COLD	16-JUN-98	17-JUN-98	R13F	(384216:99)	
18070-017	BONVX7	Solid	03-JUN-98 13:56	04-JUN-98 14:20	19-JUN-98	AIRBORNE		1	Screening not Required
RICHLAND ID 80608017 / ICAP = PB ONLY									
1	AN - Amber Glass-60ML	HG/7471/Q4	S	COLD	16-JUN-98	01-JUL-98	R13F	(384218:99)	

3*=Sample has not been rad screened.

600007

Quanterra September 22, 1998 03:40 pm
Account: 10722 Project: 550.260 Quanterra-Richland QAS No. 550.26 Rev. 3
Master Sample Login: 18070

oject Manager: R. White

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

mple Header Template: _____

mple No.	Client ID	C-Matrix	Date: Collected	Received	Due	Shipper	Rad Category	Rad Sample No.
Comments								

#	Container Type	Analysis	Class	Preservative	Anal. Due Date	Hold Date	Site	(Container Numbers:% Filled)
ta:								
1		HOLD//Q4	S	COLD	16-JUN-98	14-JUN-98	R13F	(384219:98)
1		ICAP/6010/Q4	S	COLD	16-JUN-98	30-NOV-98	R13F	(384218:99)
1		PCB/8080/Q4	S	COLD	16-JUN-98	17-JUN-98	R13F	(384218:99)

00003

3*=Sample has not been rad screened.

[redacted]

Chain of Custody Record

ST LOUIS

Quanterra

QUA-4124 0797

Client	Project Manager	Date	Chain of Custody Number
Bechtel	A. Koprucki	6-5-98	09704

Address	Telephone Number (Area Code)/Fax Number	Lab Number	Page 1 of 2

City	State	Zip Code	Site Contact	Lab Contact

Project Name: SAF B98-087

Carrier/Waybill Number:

Contract/Purchase Order/Quote No.:

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

Special Instructions/ Conditions of Receipt: *PCB anal. only 15 day TAT.

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Matrix: Sed	Matrix: Soil	Containers & Preservatives: Unpres.	H2SO4	HNOS	HCl	NaOH	ZnAc/NaOH
80608001 BONVN5*											
2 6*											
3 P7*											
4 8*											
5 9*											
6 RO*											
7 1*											
8 3*											
9 3*											
10 N4											
11 R5											
12 6											

Chemical Analysis Bottles

Run all analyses 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 Due 6-19-98

QC Requirements (Specify): SDG WO2411

Relinquished By	Date	Time	Received By	Date	Time
Heidelberg QES	6-5-98	1600	Joe Lemmin	6-6-98	0900

Comments:

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

Chain of Custody Record

Quanterra

QUA-4124 0797

Client	Project Manager	Date 6-5-98	Chain of Custody Number 09705
Address	Telephone Number (Area Code)/Fax Number	Lab Number	Page 2 of 2
City / State / Zip Code	Site Contact	Lab Contact	
Project Name	Carrier/Waybill Number		
Contract/Purchase Order/Quote No.			

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

Special Instructions/ Conditions of Receipt: *PCB Anal ONLY (run all anal. on CX) (Run all analysis on Chains

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
80608013 BONVR7*											
14 8											
15 9*											
16 X6											
17 7											

Change all analysis Bottles

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

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

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☒ Other Due 6-19-98

QC Requirements (Specify): SDG 24411

	Date	Time		Date	Time
1. Relinquished By: Heidelberg QES	6-5-98	16:00	1. Received By: Joe Tumain	6-6-98	0900
2. Relinquished By			2. Received By		
3. Relinquished By			3. Received By		

Comments

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

00013

temp 4°C uu# 015473

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B98-087-05	Page 1 of 1

Collector R Fahlberg	**Company Contact** S Marske	**Telephone No.** 373-4316	**Project Coordinator** TRENT, SJ	**Data Turnaround** 21 Days
Project Designation 105-C Phase II - Verification Sampling - Concrete	**Sampling Location** 100 C		**SAF No.** B98-087	
Ice Chest No. CL449	**Field Logbook No.** EL 1309-2		**Method of Shipment** HAND DELIVERED	
Shipped To Quanterra Incorporated	**Offsite Property No.** N/A		**Bill of Lading/Air Bill No.** N/A	
Waste Designation Client determined no waste codes associated with this project.			**COA**	

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	None	Cool 4C	None	None							
Type of Container	aG	aG	aG	aG							
No. of Container(s)	0	1	1	1							
Volume	60mL	60mL	60mL	60mL							
SAMPLE ANALYSIS	Activity Scan	PCBs - 8080	See item (1) in Special Instructions	ICP Metals - 6010A (Add-on) (Lead); Mercury - 7471 - (CV)							

	Sample No	Matrix *	Sample Date	Sample Time										
001	BONVN2 R0	Other Solid	6-2-98	0940	X	X	X	X					BON	VV2
002	BONVR1 X	other solid	6-2-98	1000	X	X	X	X					BON	VV3
003	BONVR2 X	other solid	6-2-98	1017	X	X	X	X					BON	VV4
004	BONVR3 X	other solid	6-2-98	1250	X	X	X	X					BON	VV5
						100%		100%						

CHAIN OF POSSESSION — **Sign/Print Names** 0840

Relinquished By	Date/Time	Received By	Date/Time
[illegible]	6-4-98 0840	[illegible]	6-4-98
[illegible]	6-4-98 1600	[illegible]	6-5-98 0900

SPECIAL INSTRUCTIONS

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

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

ICAP/6010/Q4
Hg/7471/Q4

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

U0001

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B98-087-04	Page 1 of 1

Collector R Fahlberg	**Company Contact** S Marske	**Telephone No.** 373-4316	**Project Coordinator** TRENT, SJ	**Data Turnaround** 21 Days
Project Designation 105-C Phase II - Verification Sampling - Concrete	**Sampling Location** 100 C		**SAF No.** B98-087	
Ice Chest No. CL449	**Field Logbook No.** EL 1309-2		**Method of Shipment** HAND DELIVERED	
Shipped To Quanterra Incorporated	**Offsite Property No.** N/A		**Bill of Lading/Air Bill No.** N/A	
Waste Designation Client determined no waste codes associated with this project.			**COA**	

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	None	Cool 4C	None	None							
Type of Container	aG	aG	aG	aG							
No. of Container(s)	0	1	1	1							
Volume	60mL	60mL	60mL	60mL							
SAMPLE ANALYSIS	Activity Scan	PCBs - 8080 100%	See item (1) in Special Instructions.	ICP Metals - 6010A (Add-on) (Lead); Mercury - 7471 - (CV) 100%							

	Sample No	Matrix *	Sample Date	Sample Time										
005	BONVN5	Other Solid	6-2-98	0835	X	X	X	X					BONV	T7
007	BONVN6	other solid	6-2-98	0845	X	X	X	X					BONV	T8
006	BONVP7	other solid	6-2-98	0902	X	X	X	X					BONV	T9
008	BONVP8	other solid	6-2-98	0910	X	X	X	X					BONV	V0
009	BONVP9	other solid	6-2-98	0930	X	X	X	X					BONV	V1

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

Relinquished By	Date/Time	Received By	Date/Time
Renee Nelson	6-4-98 0840	[illegible]	6-4-98 0840
[illegible]	6/4/98 [illegible]	Joe Turner	6-5-98 0900

SPECIAL INSTRUCTIONS

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

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

Matrix *

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

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

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B98-087-07	Page 1 of 1

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

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	None	Cool 4C	None	None						
Type of Container	aG	aG	aG	aG						
No. of Container(s)	0	1	1	1						
Volume	60mL	60mL	60mL	60mL						
SAMPLE ANALYSIS	Activity Scan	PCBs - 8080	See item (1) in Special Instructions.	ICP Metals - 6010A (Add-on) (Lead); Mercury - 7471 - (CV)						

	Sample No.	Matrix *	Sample Date	Sample Time										
011	BONV~~W4~~R9 *	Other Solid	6-3-98	1325	X	X	X	X					BONVW1	
016	BONVX6	↓	6-3-98	1345	X	X	X	X					BONVW2	
017	BONVX7	↓	6-3-98	1356	X	X	X	X					BONVW3	
						100%		100%						

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

Relinquished By	Date/Time	Received By	Date/Time
R. Fahlberg / R Fahlberg	6-4-98 1420	[illegible]	6-4-98 1420
[illegible]	6-4-98 1620	[illegible]	6-5-98 0900

SPECIAL INSTRUCTIONS

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

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

* BONVR9 Analysis of PCBs only until instructed by ERC

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

C00013

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B98-087-06	Page 1 of 1

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

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	None	Cool 4C	None	None							
Type of Container	aG	aG	aG	aG							
No. of Container(s)	0	1	1	1							
Volume	60mL	60mL	60mL	60mL							
SAMPLE ANALYSIS	Activity Scan	PCBs - 8080	See item (1) in Special Instructions.	ICP Metals - 6010A (Add-on) (Lead); Mercury - 7471 - (CV)							
		100%		100%							

	Sample No.	Matrix *	Sample Date	Sample Time									
012	BONVN~~8~~ 4	Other Solid	6-3-98	1230	X	X	X	X					BONV6
013	BONVR5	↓	6-3-98	1240	X	X	X	X					BONV7
014	BONVR6		6-3-98	1250	X	X	X	X					BONV8
010	BONVR7 *		6-3-98	1305	X	X	X	X					BONV9
015	BONVR8	↓	6-3-98	1315	X	X	X	X					BONW0

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

Relinquished By	Date/Time	Received By	Date/Time
R. Fahlberg / R. Fahlberg	6-4-98 1415	Karen Schlenburg	6-4-98 1415
Karen Schlenburg	6-4-98 1615	Joe Morin	6-5-98 0900

SPECIAL INSTRUCTIONS

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

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

BONVR7 Analysis of PCBs only until notified by ERC

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

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

BONVNS

Project	105 C-Phase II		
Customer ID	BONVT7	Other Solid	
RCF ID	RCF3449		
	Sample time, date	835	6/2/98
	Analysis date		6/3/98

Isotope		Activity pCi/gm		2 s err	Ci/gm
K40	<	5.2e+00			5.2e-12
Co60	<	4.8e-01			4.8e-13
I129	<	1.1e+01			1.1e-11
Cs137		5.1e+00	+/-	9.5e-01	5.1e-12
Eu152	<	3.5e+00			3.5e-12
Eu154	<	2.4e+00			2.4e-12
Eu155	<	1.8e+00			1.8e-12
Th232dau	<	8.4e-01			8.4e-13
U235	<	6.8e-01			6.8e-13
U238	<	4.2e+01			4.2e-11
U238dau	<	1.7e+00			1.7e-12
Np237	<	1.4e+00			1.4e-12
Am241	<	1.6e+00			1.6e-12
Tot Act Gam (pCi/gm)		5.1e+00		Ci/gm	5.1e-12
Y/Sr-90	<	N/R			
Gross Alpha	<	8.6e-01			8.6e-13
Gross Beta		1.3e-01	+/-	6.5e+00	1.3e-11 Reported as 137-Cs Betas.
AEA total	<	N/R			

Total Activity (pCi/gm) 1.4e+01
(Ci/gm) 1.4e-11

Cat I

B 6/4/98

Definitions:

All errors reported at 2 standard deviations

A Assigned as residual beta from Gamma/Beta balance.

For soils and natural samples, the following applies:

The analysis of U238 is based on the activity of Pa234m

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

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

SEH-TLD 6/1/0 — Radiological analyst

6-4-98 — Date

Albert I. Davis
Radiological Manager

6/3/98 — Date

000013

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

Project: 105 C-Phase II
Customer ID: B0NVT6 Other Solid BONVN6
RCF ID: RCF3450
Sample time, date: 845 6/2/98
Analysis date: 6/3/98

Isotope		Activity pCi/gm		2 s err	Ci/gm
K40		8.9e+00	+/-	4.0e+00	8.9e-12
Co60	<	4.0e-01			4.0e-13
I129	<	4.5e+00			4.5e-12
Cs137		1.1e+01	+/-	1.3e+00	1.1e-11
Eu152	<	2.8e+00			2.8e-12
Eu154	<	1.4e+00			1.4e-12
Eu155	<	1.1e+00			1.1e-12
Th232dau	<	3.2e+00			3.2e-12
U235	<	3.2e+00			3.2e-12
U238	<	6.3e+01			6.3e-11
U238dau	<	3.6e+00			3.6e-12
Np237	<	5.4e-01			5.4e-13
Am241	<	7.8e-01			7.8e-13
Tot Act Gam (pCi/gm)		2.0e+01		Ci/gm	2.0e-11
Y/Sr-90	<	N/R			
Gross Alpha	<	1.5e+00			1.5e-12
Gross Beta		1.8e+01	+/-	5.8e+00	1.8e-11 Reported as 137-Cs Betas.
AEA total	<	N/R			

Total Activity (pCi/gm) 2.1e+01
(Ci/gm) 2.1e-11

Cat I
(B) 6/4/98

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

Definitions:

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested

Radiological analyst — Date 6-3-98

Albert I. Davis, Radiological Manager — Date 6/3/98

000013

JUN-08-1998 17:00 QUANTERRA,RICHLAND 509 375 3599

GAMMA-RAY ENERGY ANALYSIS REPORT
Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

Project 105 C-Phase II
Customer ID 80NVT9 Other Solid B0NVP7
RCF ID RCF3451
Sample time, date 902 6/2/98
Analysis date 6/3/98

Isotope		Activity pCi/gm		2 s err	Ci/gm
K40	<	7.8e+00			7.8e-12
Co60	<	5.3e-01			5.8e-13
I129	<	8.7e+00			8.7e-12
Cs137		3.2e+01	+/-	2.6e+00	3.2e-11
Eu152	<	2.9e+00			2.9e-12
Eu154	<	1.9e+00			1.9e-12
Eu155	<	1.5e+00			1.5e-12
Th232dau	<	8.5e-01			8.5e-13
U235	<	5.3e-01			5.3e-13
U238	<	5.9e+01			5.9e-11
U238dau	<	8.4e-01			8.4e-13
Np237	<	1.1e+00			1.1e-12
Am241	<	1.2e+00			1.2e-12
Tot Act Gam (pCi/gm)		3.2e+01		Ci/gm	3.2e-11
Y/Sr-90	<	N/R			
Gross Alpha	<	1.4e+00			1.4e-12
Gross Beta		2.6e+01	+/-	8.6e+00	2.6e-11 Reported as 137-Cs Betas.
AEA total	<	N/R			

Total Activity (pCi/gm) 3.3e+01
(Ci/gm) 3.3e-11

Cat I
6/4/98

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

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

Radiological analyst — Date 6/3/98

Albert I. Davis
Radiological Manager — Date 6/3/98

000017

GAMMA-RAY ENERGY ANALYSIS REPORT

Therme Hanford Inc.
Radiological Counting Facility THI - RCF

BONVP8

Project: 105 C-Phase II
Customer ID: BONVV0 Other Solid
RCF ID: RCF3452
Sample time, date 910 6/2/98
Analysis date 6/3/98

Isotope		Activity pCi/gm		2 s err	Ci/gm
K40	<	1.4e+01			1.4e-11
Co60		2.1e+00	+/-	5.0e-01	2.1e-12
I129	<	3.7e+00			3.7e-12
Cs137		7.0e+01	+/-	3.3e+00	7.0e-11
Eu152	<	2.5e+00			2.5e-12
Eu154	<	1.0e+00			1.0e-12
Eu155	<	9.7e-01			9.7e-13
Th232dau	<	2.7e+00			2.7e-12
U235	<	2.2e+00			2.2e-12
U238	<	4.7e+01			4.7e-11
U238dau	<	1.3e+00			1.3e-12
Np237	<	1.0e+00			1.0e-12
Am241	<	5.2e-01			5.2e-13
Tot Act Gam (pCi/gm)		7.2e+01		Ci/gm	7.2e-11
Y/Sr-90	<	N/R			
Gross Alpha	<	4.0e+00			4.0e-12
Gross Beta		5.2e+01	+/-	1.3e+01	5.2e-11 Reported as 137-Cs Betas.
AEA total	<	N/R			

Total Activity (pCi/gm) 7.6e+01
(Ci/gm) 7.6e-11

Cat I

6/2/98.

Definitions:

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

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

SLH/JLD [illegible] 6-3-98
Radiological analyst Date

Albert L. Davis 6/3/98
Albert L. Davis Date
Radiological Manager

000013

GAMMA-RAY ENERGY ANALYSIS REPORT
Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

Project: 105 C-Phase II
Customer ID: BONVV1 Other Solid
RCF ID: RCF3453
Sample time, date 930 6/2/98
Analysis date 6/3/98

BONVP9

Isotope		Activity pCi/gm		2 s err	Ci/gm
K40	<	5.9e+01			5.9e-11
Co60	<	8.8e+00			8.8e-12
I129	<	6.4e+02			6.4e-10
Cs137		1.9e+01	+/-	8.1e+00	1.9e-11
Eu152	<	3.8e+01			3.8e-11
Eu154	<	1.6e+01			1.6e-11
Eu155	<	2.0e+01			2.0e-11
Th232dau	<	2.3e+01			2.3e-11
U235	<	8.2e+00			8.2e-12
U238	<	8.9e+02			8.9e-10
U238dau	<	1.3e+01			1.3e-11
Np237	<	1.4e+01			1.4e-11
Am241	<	2.3e+01			2.3e-11
Tot Act Gam (pCi/gm)		1.9e+01		Ci/gm	1.9e-11
Y/Sr-90	<	N/R			
Gross Alpha	<	2.4e+00			2.4e-12
Gross Beta		3.8e+01	+/-	1.1e+01	3.8e-11 Reported as 137-Cs Betas.
AEA total	<	N/R			

Total Activity (pCi/gm) 4.1e+01
(Ci/gm) 4.1e-11

Cat I

B 6/4/98

Definitions.

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

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

SEH + TLD [illegible] 6-3-98
Radiological analyst Date

Albert L. Davis
Radiological Manager
6/3/98
Date

000013

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

BONVRO

Project:	105 C-Phase II		
Customer ID	BONVV2	Other Solid	
RCF ID	RCF3454		
	Sample time, date	940	5/2/98
	Analysis date		6/3/98

Isotope		Activity pCi/gm	2 s err	Ci/gm	
K40	<	5.8e+01		5.8e-11	
Co60	<	8.8e+00		8.8e-12	
I129	<	2.2e+01		2.2e-11	
Cs137	<	3.4e+00		3.4e-12	
Eu152	<	1.8e+01		1.8e-11	
Eu154	<	7.5e+00		7.5e-12	
Eu155	<	5.9e+00		5.9e-12	
Th232dau	<	1.8e+01		1.8e-11	
U235	<	1.6e+01		1.6e-11	
U238	<	3.8e+02		3.8e-10	
U238dau	<	5.9e+00		5.9e-12	
Np237	<	4.8e+00		4.8e-12	
Am241	<	4.5e+00		4.5e-12	
Tot Act Gam (pCi/gm)		0.0e+00	Ci/gm	0.0e+00	
Y/Sr-90	<	N/R			
Gross Alpha	<	9.1e-01		9.1e-13	
Gross Beta		1.0e+01	+/- 5.6e+00	1.0e-11	Reported as 137-Cs Betas.
AEA total	<	N/R			

Total Activity (pCi/gm) 1.1e+01
(Ci/gm) 1.1e-11

Cat I

6/4/98

Definitions:

All errors reported at 2 standard deviations

A Assigned as residual beta from Gamma/Beta balance.

For soils and natural samples, the following applies:

The analysis of U238 is based on the activity of Pa234m

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

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

CEH JLD 6/1/98
Radiological analyst Date

Albert I. Davis
Radiological Manager

6/3/98
Date

000020

GAMMA-RAY ENERGY ANALYSIS REPORT

Therma Hanford Inc.
Radiological Counting Facility THI - RCF

Project: 105 C-Phase II
Customer ID: B0NVV3 Other Solid
RCF ID: RCF3455
Sample time, date 1000 6/2/98
Analysis date 6/3/98

BONVR1

Isotope		Activity pCi/gm	2 s err	Ci/gm
K40	<	6.9e+01		6.9e-11
Co60	<	7.5e+00		7.5e-12
I129	<	6.8e+02		6.8e-10
Cs137	<	8.9e+00		8.9e-12
Eu152	<	4.0e+01		4.0e-11
Eu154	<	2.7e+01		2.7e-11
Eu155	<	2.2e+01		2.2e-11
Th232dau	<	2.4e+01		2.4e-11
U235	<	8.7e+00		8.7e-12
U238	<	9.4e+02		9.4e-10
U238dau	<	1.6e+01		1.6e-11
Np237	<	1.5e+01		1.5e-11
Am241	<	2.7e+01		2.7e-11
Tot Act Gam (pCi/gm)		0.0e+00	Ci/gm	0.0e+00
Y/Sr-90	<	N/R		
Gross Alpha	<	1.7e+00		1.7e-12
Gross Beta	<	9.2e+00		9.2e-12 Reported as 137-Cs Betas.
AEA total	<	N/R		

Total Activity (pCi/gm) 9.0e+00
(Ci/gm) 9.0e-12

Cat I
B 6/4/98

Definitions:

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

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

SEH · TLW 6-3-98
Radiological analyst Date

Albert L Davis 6/3/98
Albert L Davis Date
Radiological Manager

000021

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

BONVR2

Project	105 C-Phase II		
Customer ID	B0NVV4	Other Solid	
RCF ID	RCF3456		
	Sample time, date	1017	6/2/98
	Analysis date		6/3/98

Isotope		Activity pCi/gm	2 s err	Ci/gm
K40	<	5.6e+01		5.6e-11
Co60	<	9.1e+00		9.1e-12
I129	<	6.4e+02		6.4e-10
Cs137	<	5.8e+00		5.8e-12
Eu152	<	4.3e+01		4.3e-11
Eu154	<	2.3e+01		2.3e-11
Eu155	<	2.1e+01		2.1e-11
Th232dau	<	2.3e+01		2.3e-11
U235	<	8.3e+00		8.3e-12
U238	<	7.1e+02		7.1e-10
U238dau	<	1.4e+01		1.4e-11
Np237	<	1.4e+01		1.4e-11
Am241	<	2.6e+01		2.6e-11
Tot Act Gam (pCi/gm)		0.0e+00	Ci/gm	0.0e+00
Y/Sr-90	<	N/R		
Gross Alpha	<	1.8e+00		1.8e-12
Gross Beta	<	1.2e+01		1.2e-11 Reported as 137-Cs Betas.
AEA total	<	N/R		
			Total Activity (pCi/gm)	1.3e+01
			(Ci/gm)	1.3e-11

Cs-I
B 6/4/98

Definitions:

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

The analysis of Np237 is based on the activity of Pa231

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

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

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

N/R means no result or analysis not requested.

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

SEH-JLD 6-3-98
Radiological analyst Date

Albert L Davis 6/3/98
Radiological Manager Date

000022

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

Project	105 C-Phase II		
Customer ID	B0NVV5	Other Solid	BONVR3
RCF ID	RCF3457		
	Sample time, date	1250	6/2/98
	Analysis date		6/3/98

Isotope		Activity pCi/gm	2 s err	Ci/gm
K40	<	5.3e+01		5.3e-11
Co60	<	2.4e+00		2.4e-12
I129	<	2.6e+01		2.6e-11
Cs137	<	4.8e+00		4.8e-12
Eu152	<	2.4e+01		2.4e-11
Eu154	<	8.7e+00		8.7e-12
Eu155	<	7.3e+00		7.3e-12
Th232dau	<	2.1e+01		2.1e-11
U235	<	2.1e+01		2.1e-11
U238	<	4.9e+02		4.9e-10
U238dau	<	2.7e+01		2.7e-11
Np237	<	6.5e+00		6.5e-12
Am241	<	4.3e+00		4.3e-12
Tot Act Gam (pCi/gm)		0.0e+00	Ci/gm	0.0e+00
Y/Sr-90	<	N/R		
Gross Alpha	<	1.1e+00		1.1e-12
Gross Beta	<	7.7e+00		7.7e-12 Reported as 137-Cs Betas.
AEA total	<	N/R		

Total Activity (pCi/gm) 9.0e+00
(Ci/gm) 9.0e-12

Cat I
6/4/98

Definitions:

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

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

SEH & TLD [illegible] 6-3-98
Radiological analyst Date

Albert I. Davis 6/3/98
Radiological Manager Date

000023

Figure 1

SAMPLE CHECK-IN LIST

Date/Time Received: 6/4 0840 SG#: W02411

Work Order Number: 806080 SAF #: B98-087

Shipping Container ID: CL449 Chain of Custody #: B98-087-04 +05

1. Custody Seals on shipping container intact? Yes [✓] No [ ]
2. Custody Seals dated and signed? Yes [✓] No [ ]
3. Chain-of-Custody record present? Yes [✓] No [ ]
4. Cooler temperature 30
5. Vermiculite/packing materials is Wet [ ] Dry [✓] n/a
6. Number of samples in shipping container: 27
7. Sample holding times exceeded? Yes [ ] No [✓]

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

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

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

Sample Custodian/Laboratory: Heidelberg Date: 6/4/98

Telephoned To: _____ On _____ By _____

000024

Bucktil

Figure 1

KI SAMPLE CHECK-IN LIST

Date/Time Received: ~~6-3-98~~ 6-4-98 SG#: W02411

Work Order Number: 806080 +110 SAF #: B98-087

Shipping Container ID: NOT Marked Chain of Custody #: B98-087-06 +07

1. Custody Seals on shipping container intact? Yes [✓] No [ ]
2. Custody Seals dated and signed? Yes [✓] No [ ]
3. Chain-of-Custody record present? Yes [✓] No [ ]
4. Cooler temperature 4°C
5. Vermiculite/packing materials is Wet [ ] Dry [✓]
6. Number of samples in shipping container: 24
7. Sample holding times exceeded? Yes [ ] No [✓]

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

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

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

Sample Custodian/Laboratory: [illegible] Date: 6-4-98

Telephoned To: _____ On _____ By _____

000015

Quanterra Environmental Services

015473

Login No.: 18070

Condition Upon Receipt Variance Report
St. Louis Laboratory

Client: BHI

Date: 6-5-98 Time: 0900

Project No: 550.260

Initiated by: Joe Tiemann

Shipper/No: Airborne

RFA/COC Numbers: B98-087-05

Condition/Variance (Check all that apply):

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

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

Notes: Received Hanford C-O-C - 6-5-98 and Richland C-O-C 6-6-98

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) Joe Tiemann Date: 6-5-98

Project Management Review: Robert E. White Date: 6-12-98

SIGNED ORIGINAL MUST BE RETAINED IN THE PROJECT FILE

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

000020

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

Project: 550.260

Category: PCB's
Method: EPA 8082
Matrix: SOLID

Sample Date : 06/03/98
Receipt Date : 06/04/98
Report Date : 09/22/98

Client ID: B0NVR6

Quanterra ID : 18070-014

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Aroclor-1016	12674-11-2	QCBLK174924-1	06/15/98	07/02/98	33	UG/KG	U	33	1
Aroclor-1221	11104-28-2	QCBLK174924-1	06/15/98	07/02/98	33	UG/KG	U	33	1
Aroclor-1232	11141-16-5	QCBLK174924-1	06/15/98	07/02/98	33	UG/KG	U	33	1
Aroclor-1242	53469-21-9	QCBLK174924-1	06/15/98	07/02/98	33	UG/KG	U	33	1
Aroclor-1248	12672-29-6	QCBLK174924-1	06/15/98	07/02/98	33	UG/KG	U	33	1
Aroclor-1254	11097-69-1	QCBLK174924-1	06/15/98	07/02/98	33	UG/KG	U	33	1
Aroclor-1260	11096-82-5	QCBLK174924-1	06/15/98	07/02/98	33	UG/KG	U	33	1
TCMX	877-09-8	QCBLK174924-1	06/15/98	07/02/98	1	%REC	*		1
DCB	2051-24-3	QCBLK174924-1	06/15/98	07/02/98	22	%REC	*		1

1D
PCB ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BONVR6

Lab Name: QUANTERRA,MO Contract: 550.260

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W02411

Matrix: (soil/water) SOIL Lab Sample ID: 18070-014

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

Level: (low/med) LOW Date Sampled: 06-03-98

% Moisture: not dec. _____ dec. _____ Date Extracted: 06-15-98

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 07-02-98

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

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

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

FORM I PEST

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

Project: 550.260

Category: ICAP Metals
Method: EPA 6010
Matrix: SOLID

Client ID: B0NVR6

Sample Date : 06/03/98
Receipt Date : 06/04/98
Report Date : 09/22/98

Quanterra ID : 18070-014

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Lead	7439-92-1	QCBLK175647-1	06/19/98	06/19/98	4.6	MG/KG	BN	10.0	1

000013

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

Project: 550.260

Category: Mercury
Method: EPA 7471
Matrix: SOLID

Sample Date : 06/03/98
Receipt Date : 06/04/98
Report Date : 09/22/98

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
B0NVR6	18070-014	Mercury	7439-97-6	QCBLK175686-1	06/19/98	06/19/98	0.94	MG/KG		0.033	1

W02441-QCS
R

Quanterra

Analytical Data Package Prepared For

Bechtel Hanford

JUL 1998
RECEIVED
Data
Log In

Analysis By

Quanterra Analytical Services

Richland Laboratory

Report Nbr: 5534

SDG No.	SAF No.	CLIENT ID No.	QUANTERRA ID No.
W02441	B98-087	B0NVN0	80650301
		B0NVM6	80650302
		B0NVM9	80650303
		B0NVX8	80650304
		B0NVX9	80650305
		B0NVN7	80650306
		B0NVN5	80650307
		B0NVN6	80650308
		B0NVP7	80650309
		B0NVP8	80650310
		B0NVP9	80650311
		B0NVR0	80650312
		B0NVR1	80650313
		B0NVR2	80650314
		B0NVR3	80650315
		B0NVN1	80650316
		B0NVN2	80650317
		B0NVN3	80650318

Comments:

0001

Quanterra

CERTIFICATE OF ANALYSIS

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

July 23, 1998

Attention: Joan Kessner

JUL 1998
RECEIVED
Data
Log In

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

I. Introduction

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

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

80650312	B0NVR0	Concrete	6/30/1998
80650313	B0NVR1	Concrete	6/30/1998
80650314	B0NVR2	Concrete	6/30/1998
80650315	B0NVR3	Concrete	6/30/1998
80650316	B0NVN1	Concrete	6/30/1998
80650317	B0NVN2	Concrete	6/30/1998
80650318	B0NVN3	Concrete	6/30/1998

II. Analytical Results/Methodology

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

The requested analyses were:

Alpha Spectroscopy
Americium-241 by method RICH-RC-5062
Plutonium-238, -239/40 by method RICH-RC-5062
Uranium-234, -235, -238 by method RICH-RC-5062
Gamma Spectroscopy
Gamma Scan by method RICH-RC-5017
Gas Proportional Counting
Total Strontium by method RICH-RC-5006

III. Quality Control

The samples analyzed under SDG W02441 were processed as quick turn samples and had two Laboratory Control Samples (LCS and LCS duplicate) and one method (reagent) blank analyzed with the batch. Any exceptions have been noted in the "Comments" section.

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

IV. Comments

Alpha Spectroscopy

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

Plutonium-238, -239/40 by method RICH-RC-5010
The LCS, LCS duplicate, batch blank and sample results are within contractual requirements.

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

Gamma Spectroscopy

Gamma Scan by method RICH-RC-5017
The LCS, LCS duplicate, batch blank and sample results are within contractual requirements.

Gas Proportional Counting

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

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

Reviewed and approved:

Andy Kopriva
Project Manager

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	SDG: /RPT GRP:	W02441 / 5534
LAB SAMPLE ID:	80650301	MATRIX:	OTHER
CLIENT ID:	B0NVN0	DATE RECEIVED:	6/30/1998 11:00:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	1.60E+02		1.2E+01	2.4E+01	9.82E-01	pCi/g	86.70%	RICHRC5062-A
PU-238	1.23E+01		3.8E+00	4.2E+00	1.27E+00	pCi/g	67.00%	RICHRC5062-P
PU239/40	2.55E+02		1.7E+01	4.0E+01	1.07E+00	pCi/g	67.00%	RICHRC5062-P
U-234	2.10E+00		1.3E+00	1.3E+00	1.08E+00	pCi/g	84.10%	RICHRC5062-U
U-235	-7.88E-03	U	1.6E-02	1.6E-02	7.16E-01	pCi/g	84.10%	RICHRC5062-U
U-238	1.96E+00		1.2E+00	1.3E+00	7.16E-01	pCi/g	84.10%	RICHRC5062-U
AM-241	2.88E+02		2.8E+01	4.0E+01	N/A	pCi/g	N/A	RICHRC5017
CO-60	5.04E+01		3.0E+00	5.9E+00	N/A	pCi/g	N/A	RICHRC5017
CS-137DA	2.29E+04		2.3E+03	2.3E+03	N/A	pCi/g	N/A	RICHRC5017
EU-152	1.04E+02		2.3E+01	2.5E+01	N/A	pCi/g	N/A	RICHRC5017
EU-154	2.59E+01	U	4.9E+00	5.5E+00	9.48E+00	pCi/g	N/A	RICHRC5017
EU-155	1.70E+01	U	1.2E+01	1.2E+01	1.94E+01	pCi/g	N/A	RICHRC5017
STRONTIUM	1.78E+04		1.4E+02	6.1E+03	8.07E+00	pCi/g	96.70%	RICHRC5006

Number of Results: 13

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02441 / 5534
LAB SAMPLE ID:	80650302	**MATRIX:**	OTHER
CLIENT ID:	B0NVM6	**DATE RECEIVED:**	6/30/1998 11:00:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	2.43E+01		5.4E+00	6.4E+00	1.36E+00	pCi/g	74.00%	RICHRC5062-A
PU-238	2.27E+00		1.7E+00	1.8E+00	1.42E+00	pCi/g	66.80%	RICHRC5062-F
PU239/40	2.67E+01		5.9E+00	7.1E+00	1.20E+00	pCi/g	66.80%	RICHRC5062-F
U-234	8.16E-01	U	8.3E-01	8.4E-01	8.37E-01	pCi/g	78.50%	RICHRC5062-L
U-235	2.08E-01	U	4.2E-01	4.2E-01	5.63E-01	pCi/g	78.50%	RICHRC5062-L
U-238	1.75E-01	U	4.2E-01	4.2E-01	9.51E-01	pCi/g	78.50%	RICHRC5062-L
AM-241	2.38E+01		2.1E+01	2.1E+01	N/A	pCi/g	N/A	RICHRC5017
CO-60	9.35E+01		4.0E+00	1.0E+01	N/A	pCi/g	N/A	RICHRC5017
CS-137DA	4.21E+03		2.1E+01	4.2E+02	N/A	pCi/g	N/A	RICHRC5017
EU-152	1.01E+02		1.4E+01	1.7E+01	N/A	pCi/g	N/A	RICHRC5017
EU-154	1.79E+01	U	3.6E+00	4.1E+00	7.73E+00	pCi/g	N/A	RICHRC5017
EU-155	-3.34E+00	U	6.5E+00	6.5E+00	1.06E+01	pCi/g	N/A	RICHRC5017
STRONTIUM	9.80E+02		2.9E+01	3.6E+02	7.55E+00	pCi/g	97.30%	RICHRC5006

Number of Results: 13

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	SDG: /RPT GRP:	W02441 / 5534
LAB SAMPLE ID:	80650303	MATRIX:	OTHER
CLIENT ID:	B0NVM9	DATE RECEIVED:	6/30/1998 11:00:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	5.98E+02		2.0E+01	7.4E+01	5.99E-01	pCi/g	91.70%	RICHRC5062-A
PU-238	3.68E+01		5.3E+00	7.0E+00	7.05E-01	pCi/g	77.90%	RICHRC5062-P
PU239/40	2.10E+03		4.0E+01	2.6E+02	7.05E-01	pCi/g	77.90%	RICHRC5062-P
U-234	2.03E+00		1.3E+00	1.3E+00	8.87E-01	pCi/g	83.10%	RICHRC5062-U
U-235	1.97E-01	U	4.1E-01	4.1E-01	7.47E-01	pCi/g	83.10%	RICHRC5062-U
U-238	1.19E+00		1.0E+00	1.0E+00	9.84E-01	pCi/g	83.10%	RICHRC5062-U
AM-241	7.07E+02		2.5E+01	7.5E+01	N/A	pCi/g	N/A	RICHRC5017
CO-60	1.68E+02		4.9E+00	1.8E+01	N/A	pCi/g	N/A	RICHRC5017
CS-137DA	8.06E+03		2.2E+01	8.1E+02	N/A	pCi/g	N/A	RICHRC5017
EU-152	4.80E+02		1.8E+01	5.1E+01	N/A	pCi/g	N/A	RICHRC5017
EU-154	1.14E+02		8.6E+00	1.4E+01	N/A	pCi/g	N/A	RICHRC5017
EU-155	1.43E+01	U	6.8E+00	6.9E+00	1.05E+01	pCi/g	N/A	RICHRC5017
STRONTIUM	3.21E+03		5.1E+01	1.1E+03	7.28E+00	pCi/g	97.90%	RICHRC5006

Number of Results: 13

Result = IDL When Not Detected

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

Quanterra

SAMPLE RESULTS

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

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

Number of Results: 12

Quanterra

SAMPLE RESULTS

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

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

Number of Results: 12

Result = IDL When Not Detected

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

Quanterra

SAMPLE RESULTS

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

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

Number of Results: 12

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	SDG: /RPT GRP:	W02441 / 5534
LAB SAMPLE ID:	80650307	MATRIX:	OTHER
CLIENT ID:	B0NVN5	DATE RECEIVED:	6/30/1998 11:00:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	1.30E-01		1.1E-01	1.1E-01	5.84E-02	pCi/g	74.10%	RICHRC5062-A
PU-238	0.00E+00	U	0.0E+00	1.1E-01	9.80E-02	pCi/g	44.20%	RICHRC5062-P
PU239/40	6.95E-02	U	1.0E-01	1.0E-01	1.46E-01	pCi/g	44.20%	RICHRC5062-P
U-234	2.16E-01	J	1.3E-01	1.3E-01	1.08E-01	pCi/g	89.20%	RICHRC5062-U
U-235	1.49E-02	U	3.7E-02	3.8E-02	8.94E-02	pCi/g	89.20%	RICHRC5062-U
U-238	2.55E-01		1.4E-01	1.4E-01	9.97E-02	pCi/g	89.20%	RICHRC5062-U
CO-60	5.48E-02	U	1.6E-01	1.6E-01	3.42E-01	pCi/g	N/A	RICHRC5017
CS-137DA	5.26E+00		5.8E-01	7.9E-01	N/A	pCi/g	N/A	RICHRC5017
EU-152	1.34E-01	U	4.3E-01	4.3E-01	8.04E-01	pCi/g	N/A	RICHRC5017
EU-154	5.58E-01	U	5.4E-01	5.5E-01	1.29E+00	pCi/g	N/A	RICHRC5017
EU-155	4.29E-02	U	2.6E-01	2.6E-01	4.41E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	3.85E-01	U	3.1E-01	3.4E-01	7.59E-01	pCi/g	92.10%	RICHRC5006

Number of Results: 12

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

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	SDG: /RPT GRP:	W02441 / 5534
LAB SAMPLE ID:	80650308	MATRIX:	OTHER
CLIENT ID:	B0NVN6	DATE RECEIVED:	6/30/1998 11:00:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	1.06E-01		9.6E-02	9.7E-02	7.80E-02	pCi/g	78.60%	RICHRC5062-A
PU-238	0.00E+00	U	0.0E+00	9.4E-02	8.48E-02	pCi/g	53.80%	RICHRC5062-P
PU239/40	6.14E-02	U	8.9E-02	8.9E-02	1.14E-01	pCi/g	53.80%	RICHRC5062-P
U-234	2.51E-01	J	1.4E-01	1.4E-01	8.94E-02	pCi/g	87.60%	RICHRC5062-U
U-235	1.88E-02	U	3.9E-02	3.9E-02	7.12E-02	pCi/g	87.60%	RICHRC5062-U
U-238	3.92E-01		1.8E-01	1.8E-01	5.30E-02	pCi/g	87.60%	RICHRC5062-U
CO-60	1.33E-01	U	2.5E-01	2.5E-01	5.02E-01	pCi/g	N/A	RICHRC5017
CS-137DA	5.71E+00		6.6E-01	8.7E-01	N/A	pCi/g	N/A	RICHRC5017
EU-152	7.98E-01	U	4.9E-01	5.0E-01	9.37E-01	pCi/g	N/A	RICHRC5017
EU-154	6.71E-02	U	5.8E-01	5.8E-01	1.17E+00	pCi/g	N/A	RICHRC5017
EU-155	8.79E-02	U	3.0E-01	3.0E-01	5.26E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	6.39E-01	U	3.1E-01	3.9E-01	6.59E-01	pCi/g	99.00%	RICHRC5006

Number of Results: 12

Result = IDL When Not Detected

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

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	SDG: /RPT GRP:	W02441 / 5534
LAB SAMPLE ID:	80650309	MATRIX:	OTHER
CLIENT ID:	B0NVP7	DATE RECEIVED:	6/30/1998 11:00:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	1.25E-01		1.0E-01	1.0E-01	7.65E-02	pCi/g	74.50%	RICHRC5062-A
PU-238	0.00E+00	U	0.0E+00	8.4E-02	7.59E-02	pCi/g	55.90%	RICHRC5062-P
PU239/40	5.60E-02	U	7.9E-02	8.0E-02	7.58E-02	pCi/g	55.90%	RICHRC5062-P
U-234	1.43E-01	J	1.1E-01	1.1E-01	8.32E-02	pCi/g	81.70%	RICHRC5062-U
U-235	-4.14E-03	U	3.7E-03	3.7E-03	9.90E-02	pCi/g	81.70%	RICHRC5062-U
U-238	1.83E-01		1.2E-01	1.3E-01	9.44E-02	pCi/g	81.70%	RICHRC5062-U
CO-60	2.76E-01	U	1.5E-01	1.5E-01	3.96E-01	pCi/g	N/A	RICHRC5017
CS-137DA	2.82E+01		1.2E+00	3.1E+00	N/A	pCi/g	N/A	RICHRC5017
EU-152	1.48E-01	U	6.4E-01	6.4E-01	1.11E+00	pCi/g	N/A	RICHRC5017
EU-154	2.66E-01	U	2.4E-01	2.4E-01	6.98E-01	pCi/g	N/A	RICHRC5017
EU-155	3.35E-02	U	4.2E-01	4.2E-01	7.23E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	9.51E-01	J	3.4E-01	5.0E-01	6.39E-01	pCi/g	100.00%	RICHRC5006

Number of Results: 12

Result = IDL When Not Detected

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

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	SDG: /RPT GRP:	W02441 / 5534
LAB SAMPLE ID:	80650310	MATRIX:	OTHER
CLIENT ID:	B0NVP8	DATE RECEIVED:	6/30/1998 11:00:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	1.70E-01		1.2E-01	1.2E-01	7.78E-02	pCi/g	73.70%	RICHRC5062-A
PU-238	-1.24E-03	U	2.5E-03	2.5E-03	1.13E-01	pCi/g	50.80%	RICHRC5062-P
PU239/40	2.98E-02	U	6.2E-02	6.2E-02	1.13E-01	pCi/g	50.80%	RICHRC5062-P
U-234	2.65E-01	J	1.4E-01	1.5E-01	6.91E-02	pCi/g	84.80%	RICHRC5062-U
U-235	0.00E+00	U	0.0E+00	5.7E-02	5.14E-02	pCi/g	84.80%	RICHRC5062-U
U-238	2.26E-01		1.3E-01	1.3E-01	7.64E-02	pCi/g	84.80%	RICHRC5062-U
CO-60	1.19E-01	U	2.2E-01	2.2E-01	4.96E-01	pCi/g	N/A	RICHRC5017
CS-137DA	4.73E+01		1.9E+00	5.1E+00	N/A	pCi/g	N/A	RICHRC5017
EU-152	4.34E-01	U	1.0E+00	1.0E+00	1.68E+00	pCi/g	N/A	RICHRC5017
EU-154	2.00E-01	U	6.7E-01	6.7E-01	1.40E+00	pCi/g	N/A	RICHRC5017
EU-155	-1.34E-02	U	6.5E-01	6.5E-01	1.13E+00	pCi/g	N/A	RICHRC5017
STRONTIUM	3.14E-01	U	2.6E-01	2.9E-01	6.57E-01	pCi/g	100.00%	RICHRC5006

Number of Results: 12

Result = IDL When Not Detected

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

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02441 / 5534
LAB SAMPLE ID:	80650311	**MATRIX:**	OTHER
CLIENT ID:	B0NVP9	**DATE RECEIVED:**	6/30/1998 11:00:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	6.61E-02		7.6E-02	7.7E-02	5.96E-02	pCi/g	76.10%	RICHRC5062-A
PU-238	2.83E-02	U	5.7E-02	5.7E-02	7.65E-02	pCi/g	59.30%	RICHRC5062-P
PU239/40	5.65E-02	U	8.0E-02	8.0E-02	7.65E-02	pCi/g	59.30%	RICHRC5062-P
U-234	3.92E-01	J	1.9E-01	1.9E-01	7.93E-02	pCi/g	77.00%	RICHRC5062-U
U-235	-2.62E-03	U	3.0E-03	3.0E-03	9.42E-02	pCi/g	77.00%	RICHRC5062-U
U-238	2.61E-01		1.5E-01	1.5E-01	7.93E-02	pCi/g	77.00%	RICHRC5062-U
CO-60	1.72E-01	U	1.3E-01	1.3E-01	3.68E-01	pCi/g	N/A	RICHRC5017
CS-137DA	2.91E+01		1.3E+00	3.2E+00	N/A	pCi/g	N/A	RICHRC5017
EU-152	8.60E-01	U	6.0E-01	6.1E-01	1.14E+00	pCi/g	N/A	RICHRC5017
EU-154	4.41E-02	U	5.5E-01	5.5E-01	1.09E+00	pCi/g	N/A	RICHRC5017
EU-155	5.20E-02	U	4.0E-01	4.0E-01	6.80E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	6.83E+00		7.8E-01	2.7E+00	7.52E-01	pCi/g	97.90%	RICHRC5006

Number of Results: 12

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02441 / 5534
LAB SAMPLE ID:	80650312	**MATRIX:**	OTHER
CLIENT ID:	B0NVR0	**DATE RECEIVED:**	6/30/1998 11:00:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	5.70E-02	U	8.6E-02	8.6E-02	1.31E-01	pCi/g	65.10%	RICHRC5062-A
PU-238	-4.54E-03	U	5.2E-03	5.3E-03	1.63E-01	pCi/g	52.10%	RICHRC5062-P
PU239/40	0.00E+00	U	0.0E+00	1.1E-01	1.02E-01	pCi/g	52.10%	RICHRC5062-P
U-234	2.23E-01	J	1.4E-01	1.4E-01	1.15E-01	pCi/g	79.00%	RICHRC5062-U
U-235	-8.38E-04	U	1.7E-03	1.7E-03	7.62E-02	pCi/g	79.00%	RICHRC5062-U
U-238	3.13E-01		1.6E-01	1.7E-01	7.62E-02	pCi/g	79.00%	RICHRC5062-U
CO-60	8.04E-02	U	1.7E-01	1.7E-01	3.79E-01	pCi/g	N/A	RICHRC5017
CS-137DA	7.97E-02	U	1.4E-01	1.4E-01	2.94E-01	pCi/g	N/A	RICHRC5017
EU-152	1.94E-01	U	3.7E-01	3.7E-01	7.13E-01	pCi/g	N/A	RICHRC5017
EU-154	1.48E-01	U	4.3E-01	4.3E-01	9.66E-01	pCi/g	N/A	RICHRC5017
EU-155	-3.28E-02	U	2.7E-01	2.7E-01	4.39E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	2.25E-01	U	2.7E-01	2.9E-01	7.25E-01	pCi/g	98.40%	RICHRC5006

Number of Results: 12

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02441 / 5534
LAB SAMPLE ID:	80650313	**MATRIX:**	OTHER
CLIENT ID:	B0NVR1	**DATE RECEIVED:**	6/30/1998 11:00:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	9.98E-02	U	1.2E-01	1.2E-01	1.50E-01	pCi/g	63.50%	RICHRC5062-A
PU-238	8.31E-02	U	1.3E-01	1.3E-01	2.06E-01	pCi/g	48.80%	RICHRC5062-P
PU239/40	4.15E-02	U	9.0E-02	9.1E-02	1.81E-01	pCi/g	48.80%	RICHRC5062-P
U-234	3.16E-01	J	1.5E-01	1.6E-01	7.52E-02	pCi/g	87.40%	RICHRC5062-U
U-235	0.00E+00	U	0.0E+00	5.6E-02	5.06E-02	pCi/g	87.40%	RICHRC5062-U
U-238	1.28E-01		9.9E-02	1.0E-01	8.54E-02	pCi/g	87.40%	RICHRC5062-U
CO-60	7.86E-02	U	9.1E-02	9.1E-02	2.82E-01	pCi/g	N/A	RICHRC5017
CS-137DA	1.31E-01	U	1.6E-01	1.6E-01	3.45E-01	pCi/g	N/A	RICHRC5017
EU-152	0.00E+00	U	3.5E-01	3.5E-01	6.55E-01	pCi/g	N/A	RICHRC5017
EU-154	-4.48E-01	U	7.0E-01	7.0E-01	1.11E+00	pCi/g	N/A	RICHRC5017
EU-155	-1.94E-01	U	2.5E-01	2.5E-01	3.90E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	2.84E-01	U	2.6E-01	2.8E-01	6.57E-01	pCi/g	100.00%	RICHRC5006

Number of Results: 12

Result = IDL When Not Detected

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

Quanterra

SAMPLE RESULTS

LAB NAME:	**QUANTERRA, Richland**	**SDG: /RPT GRP:**	**W02441 / 5534**
LAB SAMPLE ID:	**80650314**	**MATRIX:**	**OTHER**
CLIENT ID:	**B0NVR2**	**DATE RECEIVED:**	**6/30/1998 11:00:00 AM**

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	5.06E-02	U	7.3E-02	7.3E-02	9.39E-02	pCi/g	58.50%	RICHRC5062-A
PU-238	7.69E-02	U	1.1E-01	1.1E-01	1.43E-01	pCi/g	38.50%	RICHRC5062-P
PU239/40	-1.57E-03	U	3.1E-03	3.1E-03	1.43E-01	pCi/g	38.50%	RICHRC5062-P
U-234	4.79E-01	J	2.9E-01	3.0E-01	1.76E-01	pCi/g	38.90%	RICHRC5062-U
U-235	4.21E-02	U	8.8E-02	8.8E-02	1.59E-01	pCi/g	38.90%	RICHRC5062-U
U-238	3.44E-01		2.5E-01	2.5E-01	2.00E-01	pCi/g	38.90%	RICHRC5062-U
CO-60	-1.52E-02	U	2.0E-01	2.0E-01	3.80E-01	pCi/g	N/A	RICHRC5017
CS-137DA	-1.95E-01	U	1.9E-01	2.0E-01	3.07E-01	pCi/g	N/A	RICHRC5017
EU-152	-5.31E-01	U	4.3E-01	4.3E-01	6.46E-01	pCi/g	N/A	RICHRC5017
EU-154	-5.53E-01	U	6.4E-01	6.4E-01	1.02E+00	pCi/g	N/A	RICHRC5017
EU-155	-4.69E-01	U	2.9E-01	2.9E-01	4.14E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	1.63E-01	U	2.4E-01	2.4E-01	6.48E-01	pCi/g	97.10%	RICHRC5006

Number of Results: 12

Result = IDL When Not Detected

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

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	SDG: /RPT GRP:	W02441 / 5534
LAB SAMPLE ID:	80650315	MATRIX:	OTHER
CLIENT ID:	B0NVR3	DATE RECEIVED:	6/30/1998 11:00:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	4.97E-02	U	7.0E-02	7.1E-02	6.72E-02	pCi/g	62.90%	RICHRC5062-A
PU-238	0.00E+00	U	0.0E+00	1.1E-01	1.00E-01	pCi/g	42.10%	RICHRC5062-P
PU239/40	6.83E-02	U	1.1E-01	1.1E-01	1.69E-01	pCi/g	42.10%	RICHRC5062-P
U-234	1.77E-01	J	1.2E-01	1.3E-01	1.13E-01	pCi/g	79.10%	RICHRC5062-U
U-235	1.48E-02	U	4.1E-02	4.1E-02	1.06E-01	pCi/g	79.10%	RICHRC5062-U
U-238	2.64E-01		1.5E-01	1.5E-01	8.86E-02	pCi/g	79.10%	RICHRC5062-U
CO-60	3.99E-02	U	1.5E-01	1.5E-01	3.17E-01	pCi/g	N/A	RICHRC5017
CS-137DA	2.12E-02	U	2.1E-01	2.1E-01	3.77E-01	pCi/g	N/A	RICHRC5017
EU-152	3.03E-01	U	3.0E-01	3.0E-01	6.21E-01	pCi/g	N/A	RICHRC5017
EU-154	9.80E-02	U	5.6E-01	5.6E-01	1.05E+00	pCi/g	N/A	RICHRC5017
EU-155	-3.99E-01	U	3.2E-01	3.3E-01	5.02E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	3.43E-01	U	2.9E-01	3.2E-01	7.49E-01	pCi/g	98.40%	RICHRC5006

Number of Results: 12

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02441 / 5534
LAB SAMPLE ID:	80650316	**MATRIX:**	OTHER
CLIENT ID:	B0NVN1	**DATE RECEIVED:**	6/30/1998 11:00:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	3.07E-01		1.7E-01	1.8E-01	6.40E-02	pCi/g	64.30%	RICHRC5062-
PU-238	-1.64E-03	U	3.3E-03	3.3E-03	1.49E-01	pCi/g	37.10%	RICHRC5062-
PU239/40	1.02E+00		4.1E-01	4.4E-01	1.49E-01	pCi/g	37.10%	RICHRC5062-
U-234	1.61E-01	J	1.2E-01	1.2E-01	1.08E-01	pCi/g	80.80%	RICHRC5062-
U-235	0.00E+00	U	0.0E+00	6.3E-02	5.64E-02	pCi/g	80.80%	RICHRC5062-
U-238	3.33E-01		1.7E-01	1.7E-01	5.64E-02	pCi/g	80.80%	RICHRC5062-
CO-60	7.54E-01	U	3.6E-01	3.7E-01	8.19E-01	pCi/g	N/A	RICHRC5017
CS-137DA	1.12E+02		2.7E+00	1.1E+01	N/A	pCi/g	N/A	RICHRC5017
EU-152	1.20E+01		2.2E+00	2.5E+00	N/A	pCi/g	N/A	RICHRC5017
EU-154	3.05E+00	U	1.2E+00	1.3E+00	2.70E+00	pCi/g	N/A	RICHRC5017
EU-155	8.18E-01	U	1.1E+00	1.1E+00	1.89E+00	pCi/g	N/A	RICHRC5017
STRONTIUM	1.72E+01		1.2E+00	6.3E+00	7.19E-01	pCi/g	100.00%	RICHRC5006

Number of Results: 12

Result = IDL When Not Detected

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

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	**SDG: /RPT GRP:**	W02441 / 5534
LAB SAMPLE ID:	80650317	**MATRIX:**	OTHER
CLIENT ID:	B0NVN2	**DATE RECEIVED:**	6/30/1998 11:00:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	1.84E-01		1.4E-01	1.4E-01	7.12E-02	pCi/g	59.70%	RICHRC5062-A
PU-238	5.69E-02	U	1.1E-01	1.1E-01	1.54E-01	pCi/g	27.60%	RICHRC5062-P
PU239/40	3.37E-01	J	2.8E-01	2.8E-01	2.29E-01	pCi/g	27.60%	RICHRC5062-P
U-234	2.41E-01	J	1.4E-01	1.4E-01	1.28E-01	pCi/g	94.40%	RICHRC5062-U
U-235	1.56E-02	U	3.9E-02	3.9E-02	9.35E-02	pCi/g	94.40%	RICHRC5062-U
U-238	3.64E-01		1.7E-01	1.8E-01	1.07E-01	pCi/g	94.40%	RICHRC5062-U
CO-60	-5.57E-03	U	1.4E-01	1.4E-01	2.63E-01	pCi/g	N/A	RICHRC5017
CS-137DA	3.08E+01		1.1E+00	3.3E+00	N/A	pCi/g	N/A	RICHRC5017
EU-152	1.05E-01	U	5.3E-01	5.3E-01	9.05E-01	pCi/g	N/A	RICHRC5017
EU-154	-2.48E-01	U	4.0E-01	4.0E-01	6.77E-01	pCi/g	N/A	RICHRC5017
EU-155	8.62E-02	U	3.2E-01	3.2E-01	5.31E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	1.07E+00		3.6E-01	5.4E-01	6.61E-01	pCi/g	100.00%	RICHRC5006

Number of Results: 12

Result = IDL When Not Detected

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

Quanterra Analytical Services, Inc
rptChemRadSample: v3.41

Quanterra

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	SDG: /RPT GRP:	W02441 / 5534
LAB SAMPLE ID:	80650318	MATRIX:	OTHER
CLIENT ID:	B0NVN3	DATE RECEIVED:	6/30/1998 11:00:00 AM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	0.00E+00	U	0.0E+00	8.0E-02	7.24E-02	pCi/g	59.90%	RICHRC5062-A
PU-238	0.00E+00	U	0.0E+00	1.4E-01	1.31E-01	pCi/g	33.20%	RICHRC5062-P
PU239/40	-3.86E-03	U	5.5E-03	5.5E-03	1.94E-01	pCi/g	33.20%	RICHRC5062-P
U-234	3.10E-01	J	1.6E-01	1.6E-01	1.12E-01	pCi/g	83.90%	RICHRC5062-U
U-235	-2.38E-03	U	2.7E-03	2.8E-03	8.57E-02	pCi/g	83.90%	RICHRC5062-U
U-238	3.31E-01		1.6E-01	1.7E-01	1.06E-01	pCi/g	83.90%	RICHRC5062-U
CO-60	2.11E-01	U	1.4E-01	1.4E-01	3.88E-01	pCi/g	N/A	RICHRC5017
CS-137DA	1.34E+01		8.7E-01	1.6E+00	N/A	pCi/g	N/A	RICHRC5017
EU-152	1.79E+00	U	6.3E-01	6.5E-01	1.29E+00	pCi/g	N/A	RICHRC5017
EU-154	7.36E-02	U	3.8E-01	3.8E-01	7.85E-01	pCi/g	N/A	RICHRC5017
EU-155	5.33E-01	U	3.0E-01	3.0E-01	5.76E-01	pCi/g	N/A	RICHRC5017
STRONTIUM	5.90E-01	U	2.9E-01	3.7E-01	6.38E-01	pCi/g	100.00%	RICHRC5006

Number of Results: 12

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

Quanterra Data Review Checklist
RADIOCHEMISTRY

Work Order number (s):	806503
Client ID:	BHQ
Due Date:	7/6/98
Lab Sample Number or SDG:	W02441
Method Test Parameters:	Am
Matrix:	Other

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

Comments on any "No" response: _____

First Level Review: [signature] Date: 7-6-98

Second Level Review: [signature] Date: 7/6/98

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

Quanterra Data Review Checklist
RADIOCHEMISTRY

Work Order number (s):	806523
Client ID:	BHQ
Due Date:	7/6/98
Lab Sample Number or SDG:	W12441
Method Test Parameters:	Ra228
Matrix:	Other

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

Comments on any "No" response: _____

First Level Review: [signature] Date: MC 7-6-98 7-6-98

Second Level Review: [signature] Date: 7/6/98

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

Quanterra Data Review Checklist
RADIOCHEMISTRY

Work Order number (s):	806073
Client ID:	BHQ
Due Date:	7/6/98
Lab Sample Number or SDG:	W02441
Method Test Parameters:	4280
Matrix:	Other

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

Comments on any "No" response: _____

First Level Review: Joel Klemzema Date: 7-6-98

Second Level Review: [illegible] Date: 7/6/98

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

Quanterra Data Review Checklist
RADIOCHEMISTRY

Work Order number (s):	806503
Client ID:	BHQ
Due Date:	7-6-98
Lab Sample Number (SDG):	W0244/
Method Test Parameters:	Gamma
Matrix:	7-6-98 BHQ Other

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

Comments on any "No" response: _____

First Level Review: [signature] Date: 7-6-98

Second Level Review: [signature] Date: 7/6/98

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

Report BHQ's " Co60, Cs137DA, Eu152, Eu154, Eu155 for blank + all samples.
Samples 01, 02, 03 also report Am241 HP.

Quanterra Data Review Checklist
RADIOCHEMISTRY

Work Order number (s):	806503
Client ID:	BHQ
Due Date:	7/6/98
Lab Sample Number or SDG:	W02441
Method Test Parameters:	TSR
Matrix:	Other

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

Comments on any "No" response: all yields ≤ 105%

First Level Review: [signature] Date: 7-2-98

Second Level Review: [signature] Date: 7/6/98

Form #: LS-038.2/96, Rev 4

CHAIN OF

CUSTODY FORMS

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B98-087-3	Page 1 of 1

Collector R Fahlberg	Company Contact S Marske	Telephone No. 373-4316	Project Coordinator TRENT, SJ	Data Turnaround 21 Days
Project Designation 105-C Phase II - Verification Sampling - Concrete	Sampling Location 100 C		SAF No. B98-087	
Ice Chest No. ERC96-028	Field Logbook No. EL 1309-2		Method of Shipment HAND DELIVERED	
Shipped To Quanterra Incorporated	Offsite Property No. N/A		Bill of Lading/Air Bill No. N/A	
Waste Designation Client determined no waste codes associated with this project.			COA	

POSSIBLE SAMPLE HAZARDS/REMARKS

SDG W002441

Special Handling and/or Storage

Preservation	None	Cool 4C	None	None							
Type of Container	aG	aG	aG	aG							
No. of Container(s)	0	1	1	1							
Volume	60mL	60mL	60mL	60mL							
SAMPLE ANALYSIS	Activity Scan	PCBs - 8080	See item (1) in Special Instructions.	ICP Metals - 6010A (Add-on) (Lead); Mercury - 7471 - (CV)							
806050301 ~~806036~~ ~~SDG~~ ~~W002409~~ 6/30/98		*									
Sample No.	Matrix *	Sample Date	Sample Time								
B0NVN0 01	Other Solid	5-29-98	1050	X	X	X	X				BONY TS

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By Renee Nielsen 6/2	Date/Time 98 1154	Received By Dawn Schlueter	Date/Time 6-2-98 1154
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

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

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

Matrix *

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

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

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B98-087-01	Page 1 of 1

Collector R Fahlberg	Company Contact S Maruke	Telephone No. 373-4316	Project Coordinator TRENT, SJ	Data Turnaround 21 Days
Project Designation 105-C Phase II - Verification Sampling - Concrete	Sampling Location 100 C		SAF No. B98-087	
Ice Chest No. ERC 96-028	Field Logbook No. EL 1309-2		Method of Shipment HAND DELIVERED	
Shipped To Quanterra Incorporated	Offsite Property No. N/A		Bill of Lading/Air Bill No. N/A	
Waste Designation Client determined no waste codes associated with this project.			COA	

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

806503

SAMPLE ANALYSIS

~~806036~~ 24 6/30/98

Preservation	None	Cool 4C	None	None								
Type of Container	sG	sG	sG	sG								
No. of Container(s)	0	1	1	1								
Volume	60mL	60mL	60mL	60mL								
	Activity Scan	PCBs - 8082	See item (1) in Special Instructions.	ICP Metals - 6010A (Add-on) (Lead); Mercury - 7471 - (CV)								
		*										
Sample No.	Matrix *	Sample Date	Sample Time									
B0NVM8 02	Other Solid	5-28-98	0915	X	X	X	X				BONVT0	
B0NVM9 03		5-28-98	1407	X	X	X	X				BONVT1	

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By: Renee Nielson	Date/Time 6/2/98 1154	Received By: Dawn M. Hawkins	Date/Time 1154 6-2-98
Relinquished By	Date/Time	Received By	Date/Time 2/02 PM
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

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

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

Matrix *

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

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

Bechtel Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B98-087-08	Page 1 of 1

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

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

806503 ~~SDL~~ ~~806114~~ ~~W02414~~

SAMPLE ANALYSIS

	Preservation	None	Cool 4C	None	None
	Type of Container	aG	aG	aG	aG
	No. of Container(s)	0	1	1	1
	Volume	60mL	60mL	60mL	60mL
		Activity Scan	PCBs - 8080	See item (1) in Special Instructions.	ICP Metals - 6010A (Add-on) (Lead); Mercury - 7471 - (CV)

	Sample No.	Matrix *	Sample Date	Sample Time									
4	BONVW4 X8 01	Other Solid	6.4.98	0810	X	X	X	X					BONVW4
5	BONVX9 02	other solid	6.4.98	0825	X	X	X	X					BONVW5
6	BONVN7 03	other solid	6.4.98	0840	X	X	X	X					BONVW6

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By D.St.John 6/3/98 13:30 Date/Time	Received By Date/Time 1330		
Relinquished By for R. Fahlberg	Received By 6-5-98		
Relinquished By Date/Time	Received By 2100cpm Date/Time		
Relinquished By Date/Time	Received By Date/Time		
Relinquished By Date/Time	Received By Date/Time		

SPECIAL INSTRUCTIONS

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

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

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

Matrix *

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

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

Bechtel Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B98-087-04	Page 1 of 1

Collector R Fahlberg	Company Contact S Marske	Telephone No. 373-4316	Project Coordinator TRENT, SJ	Data Turnaround 21 Days
Project Designation 105-C Phase II - Verification Sampling - Concrete	Sampling Location 100 C		SAF No. B98-087	
Ice Chest No. CL449	Field Logbook No. EL 1309-2		Method of Shipment HAND DELIVERED	
Shipped To Quanterra Incorporated	Offsite Property No. N/A		Bill of Lading/Air Bill No. N/A	
Waste Designation Client determined no waste codes associated with this project.			COA	

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

806503

SAMPLE ANALYSIS

806080 6/3/98 802411

Preservation	None	Cool 4C	None	None						
Type of Container	aG	aG	aG	aG						
No. of Container(s)	0	1	1	1						
Volume	60mL	60mL	60mL	60mL						
	Activity Scan	PCBs - 8080	See Item (1) in Special Instructions. 806110 6/4/98	ICP Metals - 6010A (Add-on) (Lead); Mercury - 7471 - (CV)						

Sample No.	Matrix *	Sample Date	Sample Time										
BONVN-5 01	Other Solid	6-2-98	0835	X	X	X	X					BONV	T7
BONVN6 02	other solid	6-2-98	0845	X	X	X	X					BONV	T8
BONVP7 03	other solid	6-2-98	0902	X	X	X	X					BONV	T9
BONVP8 04	other solid	6-2-98	0910	X	X	X	X					BONV	V0
BONVP9 05	other solid	6-2-98	0930	X	X	X	X					BONV	V1

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By Renee Nielsen	Date/Time 6/4/98 0840	Received By R Fahlberg	Date/Time 6-4-98 0840
Relinquished By	Date/Time	Received By 2100pm	Date/Time
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

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

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

Matrix *

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

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

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B98-087-05	Page 1 of 1

Collector R Fahlberg	Company Contact S Marske	Telephone No. 373-4316	Project Coordinator TRENT, SJ	Data Turnaround 21 Days
Project Designation 105-C Phase II - Verification Sampling - Concrete	Sampling Location 100 C		SAF No. B98-087	
Ice Chest No. CL449	Field Logbook No. EL 1309-2		Method of Shipment HAND DELIVERED	
Shipped To Quanterra Incorporated	Offsite Property No. N/A		Bill of Lading/Air Bill No. N/A	
Waste Designation Client determined no waste codes associated with this project.			COA	

POSSIBLE SAMPLE HAZARDS/REMARKS												
	Preservation	None	Cool 4C	None	None							
	Type of Container	sG	sG	sG	sG							
Special Handling and/or Storage	No. of Container(s)	0	1	1	1							
	Volume	60mL	60mL	60mL	60mL							
806503 SAMPLE ANALYSIS ~~806080~~ 24/6/2098		Activity Scan	PCBs - 8080	See item (1) in Special Instructions.	ICP Metals - 6010A (Add-on) (Lead); Mercury - 7471 - (CV)							
Sample No.	Matrix *	Sample Date	Sample Time									
BONVR0 00	Other Solid	6-2-98	0940	X	X	X	X				BON	VV2
BONVR1 07	other solid	6-2-98	1000	X	X	X	X				BON	VV3
BONVR2 08	other solid	6-2-98	1017	X	X	X	X				BON	VV4
BONVR3 09	other solid	6-2-98	1250	X	X	X	X				BON	VV5

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By: Greenfield 6/4/98 0840	Date/Time	Received By: Fahlberg 0840	Date/Time 6-4-98
Relinquished By	Date/Time	Received By: Lindsay	Date/Time
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

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

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

Matrix *

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

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

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B98-087-02	Page 1 of 1

Collector R Fahlberg	Company Contact S Marske	Telephone No. 373-4316	Project Coordinator TRENT, SJ	Data Turnaround 21 Days
Project Designation 105-C Phase II - Verification Sampling - Concrete	Sampling Location 100 C		SAF No. B98-087	
Ice Chest No. CL449	Field Logbook No. EL 1309-2		Method of Shipment HAND DELIVERED	
Shipped To Quanterra Incorporated	Offsite Property No.		Bill of Lading/Air Bill No.	
Waste Designation Client determined no waste codes associated with this project.			COA	

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

806503 806056 SDG W02411

SAMPLE ANALYSIS

Preservation				None	Cool 4C	None	None					
Type of Container				aG	aG	aG	aG					
No. of Container(s) / Volume				0 / 60mL	1 / 60mL	1 / 60mL	1 / 60mL					
				Activity Scan	PCBs - 8080	See item (1) in Special Instructions.	ICP Metals - 6010A (Add-on) (Lead); Mercury - 7471 - (CV)					
Sample No.	Matrix *	Sample Date	Sample Time									
✓ ~~BONVM0~~ BONVN101	Other Solid	6-1-98	1015	X	X	X	X					BONVT3
✓ BONVN2 02		6-1-98	1033	X	X	X	X					BONVT4
✓ BONVN3 03		6-1-98	1340	X	X	X	X					BONVT5
BONVN4		6-1-98	1400	X	X	X	X					~~BONVT6~~

CHAIN OF POSSESSION	Date/Time	Sign/Print Names	Date/Time
Relinquished By: Bill Nelson	6/3/98 0911	Received By: Heidelberg	6/3/98 0911
Relinquished By	Date/Time	Received By: 2100CPP	Date/Time
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

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

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

45 day price / 21 day "special" TAT - begin 30 & 15 day TAT. 6/3/98

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

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

BONVN3

Project	105 C Phase II		
Customer ID	999WTS		
RCF ID	RCF3K04		
	Sample time, date	1340	6/1/98
	Analysis date		6/2/98

Isotope		Activity pCi/gm		2 s err	Ci/gm
K40		8.2e+00	+/-	3.7e+00	8.2e-12
Co60	<	4.6e-01			4.6e-13
I129	<	7.1e+00			7.1e-12
Cs137		1.9e+01	+/-	1.7e+00	1.9e-11
Eu152	<	1.8e+00			1.8e-12
Eu154	<	1.2e+00			1.2e-12
Eu155	<	1.3e+00			1.3e-12
Th232dau	<	1.4e+00			1.4e-12
U235	<	5.2e-01			5.2e-13
U238	<	5.3e+01			5.3e-11
U238dau	<	1.0e+00			1.0e-12
Np237	<	9.6e-01			9.6e-13
Am241	<	9.6e-01			9.6e-13
Tot Act Gam (pCi/gm)		2.7e+01		Ci/gm	2.7e-11
Y/Sr-90	<	N/R			
Gross Alpha	<	1.8e+00			1.8e-12
Gross Beta		2.4e+01	+/-	8.5e+00	2.4e-11
AEA total	<	N/R			

Reported as 137-Cs Betas.

Total Activity (pCi/gm)	2.7e+01
(Ci/gm)	2.7e-11

Definitions:

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

All errors reported at 2 standard deviations

A Assigned as residual beta/alpha/Gamma/Beta balance.

For soils and natural samples, the following applies:

The analysis of U238 is based on the activity of Pa234m

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

Cat I

B 6/4/98

SEH & JLD [illegible] 6-2-98
Radiological analyst Date

Albert L. Davis 6/2/98
Radiological Manager Date

0039

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

BONVN2

Project	105 C Phase II
Customer ID	BONVT4
RCF ID	RCF3433
	Sample time, date 1033 6/1/98
	Analysis date 6/2/98

Isotope		Activity pCi/gm		2 s err	Ci/gm	
K40		1.8e+01	+/-	5.5e+00	1.8e-11	
Co60	<	9.4e-01			9.4e-13	
I129	<	5.6e+00			5.6e-12	
Cs137		8.8e+01	+/-	3.5e+00	8.8e-11	
Eu152	<	4.1e+00			4.1e-12	
Eu154	<	1.4e+00			1.4e-12	
Eu155	<	1.4e+00			1.4e-12	
Th232dau	<	3.2e+00			3.2e-12	
U235	<	3.3e+00			3.3e-12	
U238	<	7.1e+01			7.1e-11	
U238dau	<	1.4e+00			1.4e-12	
Np237	<	8.5e-01			8.5e-13	
Am241	<	9.1e-01			9.1e-13	
Tot Act Gam (pCi/gm)		8.3e+01		Ci/gm	8.3e-11	
Y/Sr-90	<	N/R				
Gross Alpha	<	3.2e+00			3.2e-12	
Gross Beta		4.9e+01	+/-	1.3e+01	4.9e-11	Reported as 137-Cs Beta.
AEA total	<	N/R				

Total Activity (pCi/gm) 8.8e+01
(Ci/gm) 8.8e-11

Cat I
B3 6/2/98

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

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

SEH-JLO & RID 6-2-98
Radiological analyst Date

Albert I. Davis 6/2/98
Radiological Manager Date

Post-it® Fax Note 7671 Date 6/2/98 # of pages ▶ 4
To Bob Eckhart From Al Davis
Co./Dept. Co.
Phone # Phone # 378-5751
Fax # 376-8851 Fax #

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

BONN N1

Project	105 C Phase II	
Customer ID	BONNT3	
RCF ID	RCF3432	
	Sample time, date	1015 6/1/98
	Analysis date	6/2/98

Isotope		Activity pCi/gm		2 s er	Ci/gm
K40	<	8.8e+00			8.8e-12
Co60	<	5.2e-01			5.2e-13
I129	<	8.8e+00			8.8e-12
Cs137		1.3e+02	+/-	1.0e+01	1.3e-10
Eu152		1.4e+01	+/-	3.2e+00	1.4e-11
Eu154		4.1e+00	+/-	1.3e+00	4.1e-12
Eu155	<	2.3e+00			2.3e-12
Th232deu	<	1.3e+00			1.3e-12
U235	<	1.4e+00			1.4e-12
U238	<	1.0e+02			1.0e-10
U238deu	<	1.8e+00			1.8e-12
Np237	<	1.8e+00			1.8e-12
Am241	<	9.0e-01			9.0e-13
Tot Act Gam (pCi/gm)		1.5e+02		Ci/gm	1.5e-10
Y/Sr-90	<	N/R			
Gross Alpha	<	4.1e+00			4.1e-12
Gross Beta		9.6e+01	+/-	1.9e+01	9.6e-11 Reported as 137-Cs Betas.
AEA total	<	N/R			

Total Activity (pCi/gm) 1.5e+02
(Ci/gm) 1.5e-10

Cat I

(3) 6/4/98

Definitions:

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

The analysis of Np237 is based on the activity of Pa233

U238deu is the activity of Pb214 and Bi214, short lived daughter products of U238. Equilibrium between parent and daughter products probably does not exist in disturbed materials.

Th32deu is the activity of Ac228, Pb212, and Tl208, short lived daughter products of 232Th. Equilibrium between parent and daughter products may not exist in disturbed materials.

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

N/R means no result or analysis not requested.

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

SEH-JLD 6-2-98
Radiological analyst Date

Albert I. Davis 6/2/98
Albert I. Davis Date
Radiological Manager

0041

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

BONVN3

Project	105 C Phase II	
Customer ID	B0NVT5	
RCF ID	RCF3434	
	Sample time, date	1340 6/1/98
	Analysis date	6/2/98

Isotope		Activity pCi/gm		2 s er	Ci/gm	
K40		8.2e+00	+/-	3.7e+00	8.2e-12	
Co60	<	4.6e-01			4.6e-13	
I129	<	7.1e+00			7.1e-12	
Cs137		1.9e+01	+/-	1.7e+00	1.9e-11	
Eu152	<	1.8e+00			1.8e-12	
Eu154	<	1.2e+00			1.2e-12	
Eu155	<	1.3e+00			1.3e-12	
Th232dau	<	1.4e+00			1.4e-12	
U235	<	5.2e-01			5.2e-13	
U238	<	5.3e+01			5.3e-11	
U238dau	<	1.0e+00			1.0e-12	
Np237	<	9.8e-01			9.8e-13	
Am241	<	9.8e-01			9.8e-13	
Tot Act Gam (pCi/gm)		2.7e+01		Ci/gm	2.7e-11	
Y/Sr-90	<	N/R				
Gross Alpha	<	1.8e+00			1.8e-12	
Gross Beta		2.4e+01	+/-	8.5e+00	2.4e-11	Reported as 137-Cs Betas.
AEA total	<	N/R				

Total Activity (pCi/gm) 2.7e+01
(Ci/gm) 2.7e-11

Definitions:

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

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

SEH & JLD 6-2-98
Radiological analyst Date

Albert L. Davis 6/2/98
Radiological Manager Date

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

BONVN2

Project	105 C Phase II
Customer ID	B0NVT4
RCF ID	RCF3433
Sample time, date	1033 5/1/96
Analysis date	5/2/96

Isotope		Activity pCi/gm		2 s err	Ci/gm	
K40		1.8e+01	+/-	5.5e+00	1.8e-11	
Co60	<	9.4e-01			9.4e-13	
I129	<	5.8e+00			5.8e-12	
Cs137		8.8e+01	+/-	3.5e+00	8.8e-11	
Eu152	<	4.1e+00			4.1e-12	
Eu154	<	1.4e+00			1.4e-12	
Eu155	<	1.4e+00			1.4e-12	
Th232dau	<	3.2e+00			3.2e-12	
U235	<	3.3e+00			3.3e-12	
U238	<	7.1e+01			7.1e-11	
U238dau	<	1.4e+00			1.4e-12	
Np237	<	8.5e-01			8.5e-13	
Am241	<	9.1e-01			9.1e-13	
Tot Act Gam (pCi/gm)		8.3e+01		Ci/gm	8.3e-11	
Y/Sr-90	<	N/R				
Gross Alpha	<	3.2e+00			3.2e-12	
Gross Beta		4.9e+01	+/-	1.3e+01	4.9e-11	Reported as 137-Cs Betas.
AEA total	<	N/R				

Total Activity (pCi/gm) 8.8e+01
(Ci/gm) 8.8e-11

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

Definitions:

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

SEAN JLO [illegible] 6-2-96
Radiological analyst Date

Albert L Davis 6/2/96
Radiological Manager Date

0043

Post-it® Fax Note 7671 Date 6/2/98 pages ▶ 4
To Bob Fahlberg From Al Davis
Co./Dept. Co.
Phone # Phone # 373-5731
Fax # 376-8851 Fax #

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

BONN N1

Project	105 C Phase II	
Customer ID	BONVT3	
RCF ID	RCF3432	
	Sample time, date	1015 6/1/98
	Analysis date	6/2/98

Isotope		Activity pCi/gm		2 s err	Ci/gm	
K40	<	8.8e+00			8.8e-12	
Co60	<	5.2e-01			5.2e-13	
I129	<	8.8e+00			8.8e-12	
Cs137		1.3e+02	+/-	1.0e+01	1.3e-10	
Eu152		1.4e+01	+/-	3.2e+00	1.4e-11	
Eu154		4.1e+00	+/-	1.3e+00	4.1e-12	
Eu155	<	2.3e+00			2.3e-12	
Th232dau	<	1.3e+00			1.3e-12	
U235	<	1.4e+00			1.4e-12	
U238	<	1.0e+02			1.0e-10	
U238dau	<	1.8e+00			1.8e-12	
Np237	<	1.8e+00			1.8e-12	
Am241	<	9.0e-01			9.0e-13	
Tot Act Gam (pCi/gm)		1.5e+02		Ci/gm	1.5e-10	
Y/Sr-90	<	N/R				
Gross Alpha	<	4.1e+00			4.1e-12	
Gross Beta		9.8e+01	+/-	1.9e+01	9.8e-11	Reported as 137-Cs Betas.
AEA total	<	N/R				

Total Activity (pCi/gm) 1.5e+02
(Ci/gm) 1.5e-10

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

Definitions:

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

For soils and natural samples, the following applies:

The analysis of U238 is based on the activity of Pa234m

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

SEH / JLD / [illegible] 6-2-98
Radiological analyst Date

Albert I. Davis 6/2/98
Albert I. Davis Date
Radiological Manager

0044

Bucket

Figure 1

SAMPLE CHECK-IN LIST

Date/Time Received: 6-3-98 6-4-98 SG#: W02411

Work Order Number: 806080 +110 SAF #: B98-087

Shipping Container ID: NOT Marked Chain of Custody # B98-087-06 +07

1. Custody Seals on shipping container intact? Yes [✓] No [ ]
2. Custody Seals dated and signed? Yes [✓] No [ ]
3. Chain-of-Custody record present? Yes [✓] No [ ]
4. Cooler temperature 4°C
5. Vermiculite/packing materials is Wet [ ] Dry [✓]
6. Number of samples in shipping container: 24
7. Sample holding times exceeded? Yes [ ] No [✓]

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

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

10. Where any anomalies identified in sample receipt? Yes [ ] No [✓]

11. Description of anomalies (include sample numbers): _____

Sample Custodian/Laboratory: Karen Hartley Date: 6-4-98

Telephoned To: _____ On _____ By _____

0045

Figure 1

SAMPLE CHECK-IN LIST

Date/Time Received: 6/4 0840 SG#: W02411

Work Order Number: 806080 SAF #: B98-087

Shipping Container ID: CL 449 Chain of Custody # B98-087-04 +05

1. Custody Seals on shipping container intact? Yes [✓] No [ ]
2. Custody Seals dated and signed? Yes [✓] No [ ]
3. Chain-of-Custody record present? Yes [✓] No [ ]
4. Cooler temperature 3°
5. Vermiculite/packing materials is Wet [ ] Dry [✓] n/a
6. Number of samples in shipping container: 27
7. Sample holding times exceeded? Yes [ ] No [✓]

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

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

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

Sample Custodian/Laboratory: Heidelberg Date: 6/4/98

Telephoned To: _____ On _____ By _____

B0N VR5

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

Project	105 C Phase II			
Customer ID	90NVV7	Other Solid		
RCF ID	RCF3464			
	Sample time, date		1200	6/3/98
	Analysis date			6/4/98

Isotope		Activity pCi/gm	2 s err	Ci/gm
K40	<	3.0e+01		3.0e-11
Co60	<	3.2e+00		3.2e-12
I129	<	1.3e+03		1.3e-09
Cs137	<	3.1e+00		3.1e-12
Eu152	<	1.6e+01		1.6e-11
Eu154	<	9.9e+00		9.9e-12
Eu155	<	1.4e+01		1.4e-11
Th232dau	<	4.7e+00		4.7e-12
U235	<	4.0e+00		4.0e-12
U238	<	2.7e+02		2.7e-10
U238dau	<	6.1e+00		6.1e-12
Np237	<	6.4e+00		6.4e-12
Am241	<	2.4e+01		2.4e-11
Tot Act Gam (pCi/gm)		0.0e+00	Ci/gm	0.0e+00
Y/Sr-90	<	NR		
Gross Alpha	<	4.2e-01		4.2e-13
Gross Beta		1.0e+01	+/- 4.1e+00	1.0e-11
AEA total	<	NR		

Repeated as 137-Cs Beta.

Total Activity (pCi/gm) 1.1e+01
(Ci/gm) 1.1e-11

Cat I
6/5/98

Definitions:

All errors reported at 2 standard deviations

A Assigned as residual loss from Gamma/Beta balance.

For soils and natural samples, the following applies:

The analysis of U238 is based on the activity of Pa234m

The analysis of Np237 is based on the activity of Pa233

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

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

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

NR means no result or analysis not requested.

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

Radiological analyst — Date 6/4/98

Albert L. Davis
Radiological Manager — Date 6/4/98

0047

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

BONVN4

Project	105 C Phase II		
Customer ID	B0NVV6	Other Solid	
RCF ID	RCF3463		
Sample time, date		1230	6/3/98
Analysis date			6/4/98

Isotope		Activity pCi/gm	2 s err	Ci/gm
K40	<	3.8e+01		3.8e-11
Co60	<	2.8e+00		2.8e-12
I129	<	1.8e+01		1.8e-11
Cs137	<	2.8e+00		2.8e-12
Eu152	<	1.3e+01		1.3e-11
Eu154	<	1.4e+01		1.4e-11
Eu155	<	5.4e+00		5.4e-12
Th232dau	<	1.4e+01		1.4e-11
U235	<	1.3e+01		1.3e-11
U238	<	3.5e+02		3.5e-10
U238dau	<	5.8e+00		5.8e-12
Np237	<	4.5e+00		4.5e-12
Am241	<	3.8e+00		3.8e-12
Tot Act Gam (pCi/gm)		0.0e+00		Ci/gm 0.0e+00
Y/Sr-90	<	N/R		
Gross Alpha	<	1.3e+00		1.3e-12
Gross Beta		9.8e+00	+/- 4.7e+00	9.8e-12 Reported as 137-Cs Betas.
AEA total	<	N/R		

Total Activity (pCi/gm) 1.0e+01
(Ci/gm) 1.0e-11

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

Cat I
6/5/98

Definitions:

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

SEH - JLD 6.8.98
Radiological analyst

6-11-98
Date

Albert I. Davis
Radiological Manager

6/4/98
Date

Post-it® Fax Note 7671
To Al Gilliney
Co./Dept.
Phone #
Fax # 376-6851

Date 6/4
From Albert Davis
Co.
Phone # 373-9751
Fax #
# of pages ▶ 8

GAMMA-RAY ENERGY ANALYSIS REPORT
Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

BONVR6

Project	105 C Phase II		
Customer ID	[illegible]	Other Solid	
RCF ID	RCF3465		
	Sample time, date	1250	6/3/98
	Analysis date		6/4/98

Isotope		Activity pCi/gm		2 s err	Ci/gm	
K40		1.4e+01	+/-	4.8e+00	1.4e-11	
Co60	<	7.8e-01			7.8e-13	
I129	<	3.9e+00			3.9e-12	
Cs137	<	5.8e-01			5.8e-13	
Eu152	<	2.7e+00			2.7e-12	
Eu154	<	1.1e+00			1.1e-12	
Eu155	<	1.1e+00			1.1e-12	
Th232dau	<	2.7e+00			2.7e-12	
U235	<	2.8e+00			2.8e-12	
U238	<	8.7e+01			8.7e-11	
U238dau	<	4.8e+00			4.8e-12	
Np237	<	8.0e-01			8.0e-13	
Am241	<	7.4e-01			7.4e-13	
Tot Act Gam (pCi/gm)		1.4e+01			Ci/gm 1.4e-11	
Y/Sr-90	<	N/R				
Gross Alpha	<	1.1e+00			1.1e-12	
Gross Beta		1.1e+01	+/-	5.4e+00	1.1e-11	Reported as 137-Cs Betas.
AEA total	<	N/R				

Total Activity (pCi/gm) 1.2e+01
(Ci/gm) 1.2e-11

Cat I
6/15/98

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

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

SEPHFLD L. OLD 6-4-98
Radiological analyst Date

Albert L. Davis 6/4/98
Albert L. Davis Date
Radiological Manager

0049

BONVR8

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

Project	105 C Phase II		
Customer ID	BONVW0	Other Solid	
RCF ID	RCF3467		
	Sample time, date	1315	[redacted]
	Analysis date		[redacted]

Isotope		Activity pCi/gm	2 s err	Ci/gm
K40	<	3.6e+00		3.6e-12
Co60	<	4.8e-01		4.8e-13
I129	<	7.5e+00		7.5e-12
Cs137	<	3.9e-01		3.9e-13
Eu152	<	3.0e+00		3.0e-12
Eu154	<	1.3e+00		1.3e-12
Eu155	<	1.2e+00		1.2e-12
Th232dau	<	5.0e-01		5.0e-13
U235	<	4.5e-01		4.5e-13
U238	<	5.3e+01		5.3e-11
U238dau	<	6.6e-01		6.6e-13
Np237	<	8.2e-01		8.2e-13
Am241	<	8.5e-01		8.5e-13
Tot Act Gam (pCi/gm)		0.0e+00	Ci/gm	0.0e+00
Y/Sr-90	<	N/R		
Gross Alpha	<	9.0e-01		9.0e-13
Gross Beta	<	7.5e+00		7.5e-12 Reported as 137-Cs Betas.
AEA total	<	N/R		

Total Activity (pCi/gm) 8.0e+00
(Ci/gm) 8.0e-12

Cat I
(B) 6/8/98

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

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

The analysis of Np237 is based on the activity of Pa233

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

Th232dau is the activity of Ac228, Pb212, and Tl208, short lived daughter products of 232Th. Equilibrium between parent and daughter products may not exist in disturbed materials.

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

N/R means no result or analysis not requested.

SEHUZLO L. [illegible] 6-4-98
Radiological analyst Date

Albert L. Davis 6/4/98
Radiological Manager Date

0050

GAMMA-RAY ENERGY ANALYSIS REPORT
Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

BOXVX6

Project		105 C Phase II			
Customer ID		BBMW2	Other Soil		
RCF ID		RCF3469			
		Sample time, date		1345	5/3/98
		Assysis date			6/4/98

Isotope		Activity pCi/gm		2 s err	Ci/gm
K40		1.7e+01	+/-	4.7e+00	1.7e-11
Co60	<	3.9e-01			3.9e-13
I129	<	3.8e+00			3.8e-12
Cs137	<	5.1e-01			5.1e-13
Eu152	<	2.9e+00			2.9e-12
Eu154	<	2.7e+00			2.7e-12
Eu155	<	1.1e+00			1.1e-12
Th232dau	<	2.8e+00			2.8e-12
U235	<	2.4e+00			2.4e-12
U238	<	6.9e+01			6.9e-11
U238dau	<	2.0e+00			2.0e-12
Np237	<	3.5e-01			3.5e-13
Am241	<	6.9e-01			6.9e-13
Tot Act Gam (pC/gm)		1.7e+01		Ci/gm	1.7e-11
Y/Sr-90	<	NR			
Gross Alpha	<	5.5e+01			5.5e-11
Gross Beta		1.0e+01	+/-	4.4e+00	1.0e-11 Reported as 137-Cs Betas.
AEA total	<	NR			

Cat I

(R) 6/5/98

Total Activity (pCi/gm) 1.7e+01
(Ci/gm) 1.7e-11

Definitions:

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

NR means no result or analysis not requested.

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

CE HSTED 6.4.98
Radiological analyst

6-4-98
Date

Albert I. Davis
Radiological Manager

6/4/98
Date

0051

BONUX7

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility TM - RCF

Project	105 C Phase II		
Customer ID	B0NVW0	Other Solid	
RCF ID	RCF3408		
	Sample time, date	1356	6/3/98
	Analysis date		6/4/98

Isotope		Activity pCi/gm	±2 s er	Ci/gm
K40	<	3.3e+00		3.3e-12
Co60	<	5.8e-01		5.8e-13
I129	<	6.9e+00		6.9e-12
Cs137	<	3.8e-01		3.8e-13
Eu152	<	3.0e+00		3.0e-12
Eu154	<	1.4e+00		1.4e-12
Eu155	<	1.2e+00		1.2e-12
Th232deu	<	5.4e-01		5.4e-13
U235	<	4.1e-01		4.1e-13
U238	<	5.1e+01		5.1e-11
U238deu	<	5.6e-01		5.6e-13
Np237	<	7.7e-01		7.7e-13
Am241	<	8.7e-01		8.7e-13
Tot Act Gam (pCi/gm)		0.0e+00	Ci/gm	0.0e+00
Y/Sr-90	<	N/R		
Gross Alpha	<	8.3e-01		8.3e-13
Gross Beta		1.0e+01	+/- 4.4e+00	1.0e-11 Reported as 137-Cs Betas.
AEA total	<	N/R		

Total Activity (pCi/gm) 1.1e+01
(Ci/gm) 1.1e-11

Cat I
(R) 6/5/98

Definitions:

All errors reported at 2 standard deviations.
A Assigned as residual beta from Gamma/Beta balance.
For soils and natural samples, the following applies:
The analysis of U238 is based on the activity of Pb234m

The analysis of Np237 is based on the activity of Pa233

U238deu is the activity of Pb214 and Bi214, short-lived daughter products of U238. Equilibrium between parent and daughter products probably does not exist in disturbed materials.

Th32deu is the activity of Ac228, Pb212, and Tl208, short-lived daughter products of 232Th. Equilibrium between parent and daughter products may not exist in disturbed materials.

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

N/R means no result or analysis not requested.

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

SEH: THD 6/1/98 6-4-98
Radiological analyst Date

Albert I. Davis 6/4/98
Radiological Manager Date

0052

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

Project	105 C Phase II		
Customer ID	50NWW1	Other Solid	
RCF ID	RCF3468		
Sample time, date		1325	5/3/98
Analysis date			6/4/98

Isotope		Activity pCi/gm	2 s er	Ci/gm
K40	<	2.0e+01		2.0e-11
Co60	<	3.6e+00		3.6e-12
I129	<	1.5e+02		1.5e-09
Cs137	<	3.3e+00		3.3e-12
Eu152	<	1.9e+01		1.9e-11
Eu154	<	1.1e+01		1.1e-11
Eu155	<	1.4e+01		1.4e-11
Th232dau	<	4.5e+00		4.5e-12
U235	<	4.5e+00		4.5e-12
U238	<	2.5e+02		2.5e-10
U238dau	<	4.9e+00		4.9e-12
Np237	<	7.0e+00		7.0e-12
Am241	<	2.7e+01		2.7e-11
Tot Act Gam (pCi/gm)		0.0e+00	Ci/gm	0.0e+00
Y/Sr-90	<	N/R		
Gross Alpha	<	3.7e-01		3.7e-13
Gross Beta		1.0e+01 +/-	4.6e+00	1.0e-11 Reported as 137-Cs Betas.
AEA total	<	N/R		

Total Activity (pCi/gm) 1.1e+01
(Ci/gm) 1.1e-11

Cat I
(R) 6/5/98

Definitions:

All errors reported at 2 standard deviations

A Assigned as residual beta from Gamma/Beta balance.

For soils and natural samples, the following applies:

The analysis of U238 is based on the activity of Pa234m

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

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

SETH E. THOMPSON 6-4-98
Radiological analyst Date

Albert I. Davis 6/4/98
Radiological Manager Date

0053

GAMMA-RAY ENERGY ANALYSIS REPORT
Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

Project	105 C-Phase II		
Customer ID	B0NVV1	Other Solid	B0NVP9
RCF ID	RCF3453		
	Sample time, date	930	6/2/98
	Analysis date		6/3/98

Isotope		Activity pCi/gm		2 s err	Ci/gm
K40	<	5.9e+01			5.9e-11
Co60	<	8.8e+00			8.8e-12
I129	<	6.4e+02			6.4e-10
Cs137		1.9e+01	+/-	8.1e+00	1.9e-11
Eu152	<	3.6e+01			3.6e-11
Eu154	<	1.6e+01			1.6e-11
Eu155	<	2.0e+01			2.0e-11
Th232dau	<	2.3e+01			2.3e-11
U235	<	8.2e+00			8.2e-12
U238	<	6.9e+02			6.9e-10
U238dau	<	1.3e+01			1.3e-11
Np237	<	1.4e+01			1.4e-11
Am241	<	2.3e+01			2.3e-11
Tot Act Gam (pCi/gm)		1.9e+01		Ci/gm	1.9e-11
Y/Sr-90	<	N/R			
Gross Alpha	<	2.4e+00			2.4e-12
Gross Beta		3.8e+01	+/-	1.1e+01	3.8e-11 Reported as 137-Cs Betas.
AEA total	-<	N/R			

Total Activity (pCi/gm) 4.1e+01
(Ci/gm) 4.1e-11

Cat I

B 6/4/98

Definitions:

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

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

CLH + TLD Laird 6-3-98
Radiological analyst Date

Albert I. Davis 6/3/98
Albert I. Davis Date
Radiological Manager

0054

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

BONVP8

Project	105 C-Phase II		
Customer ID	B0NVV0	Other Solid	
RCF ID	RCF3452		
	Sample time, date	9:0	6/2/98
	Analysis date		6/3/98

Isotope		Activity pCi/gm		2 s err	Ci/gm
K40	<	1.4e+01			1.4e-11
Co60		2.1e+00	+/-	5.0e-01	2.1e-12
I129	<	3.7e+00			3.7e-12
Cs137		7.0e+01	+/-	3.3e+00	7.0e-11
Eu152	<	2.5e+00			2.5e-12
Eu154	<	1.0e+00			1.0e-12
Eu155	<	9.7e-01			9.7e-13
Th232dau	<	2.7e+00			2.7e-12
U235	<	2.2e+00			2.2e-12
U238	<	4.7e+01			4.7e-11
U238dau	<	1.3e+00			1.3e-12
Np237	<	1.0e+00			1.0e-12
Am241	<	5.2e-01			5.2e-13
Tot Act Gam (pCi/gm)		7.2e+01		Ci/gm	7.2e-11
Y/Sr-90	<	N/R			
Gross Alpha	<	4.0e+00			4.0e-12
Gross Beta		5.2e+01	+/-	1.3e+01	5.2e-11 Reported as 137-Cs Betas.
AEA total	<	N/R			

Total Activity (pCi/gm) 7.6e+01
(Ci/gm) 7.6e-11

Cat I

6/7/98

Definitions:

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

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

SLHS JLD 6-3-98
Radiological analyst Date

Albert I. Davis 6/3/98
Albert I. Davis Date
Radiological Manager

0055

GAMMA-RAY ENERGY ANALYSIS REPORT
Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

Project: 105 C-Phase II
Customer ID: B0NVT9 Other Solid B0NVP7
RCF ID: RCF3451
Sample time, date 902 6/2[illegible]
Analysis date 6/3[illegible]

Isotope		Activity pCi/gm		2 s err	Ci/gm
K40	<	7.8e+00			7.8e-12
Co60	<	5.8e-01			5.8e-13
I129	<	8.7e+00			8.7e-12
Cs137		3.2e+01	+/-	2.6e+00	3.2e-11
Eu152	<	2.9e+00			2.9e-12
Eu154	<	1.9e+00			1.9e-12
Eu155	<	1.5e+00			1.5e-12
Th232dau	<	8.5e-01			8.5e-13
U235	<	5.3e-01			5.3e-13
U238	<	5.9e+01			5.9e-11
U238dau	<	8.4e-01			8.4e-13
Np237	<	1.1e+00			1.1e-12
Am241	<	1.2e+00			1.2e-12
Tot Act Gam (pCi/gm)		3.2e+01		Ci/gm	3.2e-11
Y/Sr-90	<	N/R			
Gross Alpha	<	1.4e+00			1.4e-12
Gross Beta		2.6e+01	+/-	8.6e+00	2.6e-11 Reported as 137-Cs Betas.
AEA total	<	N/R			

Total Activity (pCi/gm) 3.3e+01
(Ci/gm) 3.3e-11

Cat I
6/4/96

Definitions:

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

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

[illegible] 6-4-96
Radiological analyst Date

Albert I. Davis 6/3/96
Albert I. Davis Date
Radiological Manager

0056

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

Project	105 C-Phase II		
Customer ID	60NVT8	Other Solid	BONVN6
RCF ID	RCF3450		
	Sample time, date	845	6/2/98
	Analysis date		6/3/98

Isotope		Activity pCi/gm		2 s err	Ci/gm	
K40		8.9e+00	+/-	4.0e+00	8.9e-12	
Co60	<	4.0e-01			4.0e-13	
I129	<	4.5e+00			4.5e-12	
Cs137		1.1e+01	+/-	1.3e+00	1.1e-11	
Eu152	<	2.8e+00			2.8e-12	
Eu154	<	1.4e+00			1.4e-12	
Eu155	<	1.1e+00			1.1e-12	
Th232dau	<	3.2e+00			3.2e-12	
U235	<	3.2e+00			3.2e-12	
U238	<	6.3e+01			6.3e-11	
U238dau	<	3.6e+00			3.6e-12	
Np237	<	5.4e-01			5.4e-13	
Am241	<	7.8e-01			7.8e-13	
Tot Act Gam (pCi/gm)		2.0e+01		Ci/gm	2.0e-11	
Y/Sr-90	<	N/R				
Gross Alpha	<	1.5e+00			1.5e-12	
Gross Beta		1.8e+01	+/-	6.8e+00	1.8e-11	Reported as 137-Cs Betas.
AEA total	<	N/R				

Total Activity (pCi/gm) 2.1e+01
(Ci/gm) 2.1e-11

Cat I

B 6/4/98

Definitions:

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

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

Radiological analyst — Date 6-3-98

Albert I. Davis, Radiological Manager — Date 6/3/98

0057

GAMMA-RAY ENERGY ANALYSIS REPORT
Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

Project: 105 C-Phase II
Customer ID B0NVV5 Other Solid BONVR3
RCF ID RCF3457
Sample time, date 1250 6/2/98
Analysis date 6/3/98

Isotope		Activity pCi/gm	2 s err	Ci/gm
K40	<	5.3e+01		5.3e-11
Co60	<	2.4e+00		2.4e-12
I129	<	2.6e+01		2.6e-11
Cs137	<	4.8e+00		4.8e-12
Eu152	<	2.4e+01		2.4e-11
Eu154	<	8.7e+00		8.7e-12
Eu155	<	7.3e+00		7.3e-12
Th232dau	<	2.1e+01		2.1e-11
U235	<	2.1e+01		2.1e-11
U238	<	4.9e+02		4.9e-10
U238dau	<	2.7e+01		2.7e-11
Np237	<	6.5e+00		6.5e-12
Am241	<	4.3e+00		4.3e-12
Tot Act Gam (pCi/gm)		0.0e+00	Ci/gm	0.0e+00
Y/Sr-90	<	N/R		
Gross Alpha	<	1.1e+00		1.1e-12
Gross Beta	<	7.7e+00		7.7e-12 Reported as 137-Cs Betas.
AEA total	<	N/R		

Total Activity (pCi/gm) 9.0e+00
(Ci/gm) 9.0e-12

Cat I
6/4/98

Definitions:

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

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

SEH ETD 6/3/98
Radiological analyst Date

Albert L. Davis 6/3/98
Radiological Manager Date

0058

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

BONVR2

Project	105 C-Phase II		
Customer ID	B0NVV4	Other Solid	
RCF ID	RCF3456		
	Sample time, date	1017	6/2/98
	Analysis date		6/3/98

Isotope		Activity pCi/gm	2 s err	Ci/gm
K40	<	5.6e+01		5.6e-11
Co60	<	9.1e+00		9.1e-12
I129	<	6.4e+02		6.4e-10
Cs137	<	5.8e+00		5.8e-12
Eu152	<	4.3e+01		4.3e-11
Eu154	<	2.3e+01		2.3e-11
Eu155	<	2.1e+01		2.1e-11
Th232dau	<	2.3e+01		2.3e-11
U235	<	8.3e+00		8.3e-12
U238	<	7.1e+02		7.1e-10
U238dau	<	1.4e+01		1.4e-11
Np237	<	1.4e+01		1.4e-11
Am241	<	2.6e+01		2.6e-11
Tot Act Gam (pCi/gm)		0.0e+00	Ci/gm	0.0e+00
Y/Sr-90	<	N/R		
Gross Alpha	<	1.6e+00		1.6e-12
Gross Beta	<	1.2e+01		1.2e-11 Reported as 137-Cs Betas.
AEA total	<	N/R		

Total Activity (pCi/gm) 1.3e+01
(Ci/gm) 1.3e-11

Cat I
6/4/98

Definitions:

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

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

SEH-JLD by OVD 6-3-98
Radiological analyst Date

Albert L Davis 6/3/98
Albert L Davis Date
Radiological Manager

0059

GAMMA-RAY ENERGY ANALYSIS REPORT
Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

BONVR1

Project	105 C-Plasse II		
Customer ID	BONVV3	Other Solid	
RCF ID	RCF3455		
	Sample time, date	1000	6/2/98
	Analysis date		6/3/98

Isotope		Activity pCi/gm	2 s err	Ci/gm
K40	<	6.9e+01		6.9e-11
Co60	<	7.5e+00		7.5e-12
I129	<	6.8e+02		6.8e-10
Cs137	<	6.9e+00		6.9e-12
Eu152	<	4.0e+01		4.0e-11
Eu154	<	2.7e+01		2.7e-11
Eu155	<	2.2e+01		2.2e-11
Th232dau	<	2.4e+01		2.4e-11
U235	<	8.7e+00		8.7e-12
U238	<	9.4e+02		9.4e-10
U238dau	<	1.6e+01		1.6e-11
Np237	<	1.5e+01		1.5e-11
Am241	<	2.7e+01		2.7e-11
Tot Act Gam (pCi/gm)		0.0e+00	Ci/gm	0.0e+00
Y/Sr-90	<	N/R		
Gross Alpha	<	1.7e+00		1.7e-12
Gross Beta	<	9.2e+00		9.2e-12 Reported as 137-Cs Betas.
AEA total	<	N/R		
			Total Activity (pCi/gm)	9.0e+00
			(Ci/gm)	9.0e-12

Cat I
B 6/4/98

Definitions:

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

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

SEH · TLH 6-3-98
Radiological analyst Date

Albert L Davis 6/3/98
Albert L Davis Date
Radiological Manager

0060

GAMMA-RAY ENERGY ANALYSIS REPORT
Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

BONVRO

Project:	105 C-Phase II		
Customer ID	80NVV2	Other Solid	
RCF ID	RCF3454		
	Sample time, date	940	6/2/98
	Analysis date		6/3/98

Isotope		Activity pCi/gm	2 s err	Ci/gm
K40	<	5.8e+01		5.8e-11
Co60	<	8.8e+00		8.8e-12
I129	<	2.2e+01		2.2e-11
Cs137	<	3.4e+00		3.4e-12
Eu152	<	1.8e+01		1.8e-11
Eu154	<	7.5e+00		7.5e-12
Eu155	<	5.9e+00		5.9e-12
Th232dau	<	1.8e+01		1.8e-11
U235	<	1.6e+01		1.6e-11
U238	<	3.8e+02		3.8e-10
U238dau	<	5.9e+00		5.9e-12
Np237	<	4.6e+00		4.6e-12
Am241	<	4.5e+00		4.5e-12
Tot Act Gam (pCi/gm)		0.0e+00	Ci/gm	0.0e+00
Y/Sr-90	<	N/R		
Gross Alpha	<	9.1e-01		9.1e-13
Gross Beta		1.0e+01	+/- 5.8e+00	1.0e-11 Reported as 137-Cs Betas.
AEA total	<	N/R		

Total Activity (pCi/gm) 1.1e+01
(Ci/gm) 1.1e-11

Cat I

6/4/98

Definitions:

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

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

CEA J JLD 6/3/98
Radiological analyst Date

Albert I. Davis 6/3/98
Radiological Manager Date

0051

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

Project	105 C Phase II			
Customer ID	80NVV9	Other Solid		
RCF ID	RCF3466			
	Sample time, date		1305	6/3/98
	Analysis date			6/4/98

Isotope		Activity pCi/gm	2 s err	Ci/gm	
K40	<	3.7e+01		3.7e-11	
Co60	<	1.9e+00		1.9e-12	
I129	<	1.8e+01		1.8e-11	
Cs137	<	5.8e+00		5.8e-12	
Eu152	<	1.8e+01		1.8e-11	
Eu154	<	5.9e+00		5.9e-12	
Eu155	<	5.2e+00		5.2e-12	
Th232dau	<	1.3e+01		1.3e-11	
U235	<	1.3e+01		1.3e-11	
U238	<	2.7e+02		2.7e-10	
U238dau	<	1.8e+01		1.8e-11	
Np237	<	4.2e+00		4.2e-12	
Am241	<	3.4e+00		3.4e-12	
Tot Act Gam (pCi/gm)		0.0e+00	Ci/gm	0.0e+00	
Y/Sr-90	<	N/R			
Gross Alpha	<	9.0e-01		9.0e-13	
Gross Beta		9.3e+00	+/- 4.5e+00	9.3e-12	Reported as 137-Cs Betas.
AEA total	<	N/R			

Total Activity (pCi/gm) 1.0e+01
(Ci/gm) 1.0e-11

Cat I

R3 6/5/98

Definitions:

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

The analysis of Np237 is based on the activity of Pa233

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

Th232dau is the activity of Ac228, Pb212, and Tl208, short lived daughter products of 232Th. Equilibrium between parent and daughter products may not exist in disturbed materials.

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

N/R means no result or analysis not requested.

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

Radiological analyst — Date 6-4-98

Albert L. Davis, Radiological Manager — Date 6/4/98

Post-it® Fax Note 7671
To Ray Gallberg
Co./Dept.
Phone #
Fax # 376-0851
Date 6/5/98 # of pages ▶ 3
From Al Davis
Co.
Phone # 373-9751
Fax #

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

B0NVX8

Project	105 C Phase II	
Customer ID	B0NVW4 Other Solid	
RCF ID	RCF3476	
	Sample time, date 810	6/4/98
	Analysis date	6/5/98

Isotope		Activity pCi/gm	2 s err	Ci/gm
K40	<	2.3e+01		2.3e-11
Co60	<	4.2e+00		4.2e-12
I129	<	2.5e+03		2.5e-09
Cs137	<	3.5e+00		3.5e-12
Eu152	<	1.7e+01		1.7e-11
Eu154	<	1.2e+01		1.2e-11
Eu155	<	1.6e+01		1.6e-11
Th232dau	<	1.2e+01		1.2e-11
U235	<	4.7e+00		4.7e-12
U238	<	4.3e+02		4.3e-10
U238dau	<	1.3e+01		1.3e-11
Np237	<	6.6e+00		6.6e-12
Am241	<	3.0e+01		3.0e-11
Tot Act Gam (pCi/gm)		0.0e+00	Ci/gm	0.0e+00
Y/Sr-90	<	N/R		
Gross Alpha	<	9.0e-01		9.0e-13
Gross Beta		8.1e+00 +/-	2.3e+00	8.1e-12 Reported as 137-Cs Betas.
AEA total	<	N/R		

Total Activity (pCi/gm) 9.0e+00
(Ci/gm) 9.0e-12

Definitions:

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

The analyses of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

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

SEE ATTACHED 6-5-98
Radiological analyst Date

Albert L. Davis 6/5/98
Radiological Manager Date

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

BoNUX9

Project	105 C Phase II		
Customer ID	B0NW6	Other Solid	
RCF ID	RCF3477		
	Sample time, date	825	6/4/98
	Analysis date		6/5/98

Isotope		Activity pCi/gm	2 s err	Ci/gm	
K40	<	2.4e+01		2.4e-11	
Co60	<	2.2e+00		2.2e-12	
I129	<	1.3e+01		1.3e-11	
Cs137	<	1.5e+00		1.5e-12	
Eu152	<	1.0e+01		1.0e-11	
Eu154	<	4.6e+00		4.6e-12	
Eu155	<	4.0e+00		4.0e-12	
Th232dau	<	1.2e+01		1.2e-11	
U235	<	9.3e+00		9.3e-12	
U238	<	2.6e+02		2.6e-10	
U238dau	<	3.8e+00		3.8e-12	
Np237	<	2.4e+00		2.4e-12	
Am241	<	2.8e+00		2.8e-12	
Tot Act Gam (pCi/gm)		0.0e+00	Ci/gm	0.0e+00	
Y/Sr-90	<	N/R			
Gross Alpha	<	7.9e-01		7.9e-13	
Gross Beta		8.5e+00	+/- 2.1e+00	8.5e-12	Reported as 137-Cs Betas.
AEA total	<	N/R			

Total Activity (pCi/gm) 9.0e+00
(Ci/gm) 9.0e-12

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

Definitions:

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

SETH JLA by CMD 6-5-98
Radiological analyst Date

Albert I. Davis 6/5/98
Albert I. Davis Date
Radiological Manager

0064

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

Project	105 C Phase II		BONVN7
Customer ID	BONVN6	Other Solid	
RCF ID	RCF3478		
	Sample time, date	840	[redacted]
	Analysis date		[redacted]

Isotope		Activity pCi/gm		2 s err	Ci/gm	
K40	<	3.4e+01			3.4e-11	
Co60	<	3.7e+00			3.7e-12	
I129	<	1.7e+03			1.7e-09	
Cs137	<	3.3e+00			3.3e-12	
Eu152	<	1.9e+01			1.9e-11	
Eu154	<	1.1e+01			1.1e-11	
Eu155	<	1.5e+01			1.5e-11	
Th232dau	<	1.1e+01			1.1e-11	
U235	<	4.7e+00			4.7e-12	
U238	<	4.2e+02			4.2e-10	
U238dau	<	7.0e+00			7.0e-12	
Np237	<	6.9e+00			6.9e-12	
Am241	<	3.3e+01			3.3e-11	
Tot Act Gam (pCi/gm)		0.0e+00		Ci/gm	0.0e+00	
Y/Sr-90	<	N/R				
Gross Alpha	<	8.0e-01			8.0e-13	
Gross Beta		8.7e+00	+/-	2.2e+00	8.7e-12	Reported as 137-Cs Betas.
AEA total	<	N/R				

Total Activity (pCi/gm) 1.0e+01
(Ci/gm) 1.0e-11

Definitions:

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

All errors reported at 2 standard deviations
A Assigned as residual beta from Gamma/Beta balance.
For soils and natural samples, the following applies:
The analysis of U235 is based on the activity of Pa234m

The analysis of Np237 is based on the activity of Pa233

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

Th232dau is the activity of Ac228, Pb212, and Tl208, short lived daughter products of 232Th. Equilibrium between parent and daughter products may not exist in disturbed materials.

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

N/R means no result or analysis not requested.

SEE HI JLD 6-5-95
Radiological analyst Date

Albert I. Davis 6/5/95
Radiological Manager Date

0095

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

Project	188 C Phase II			BONVN7
Customer ID	888VW6	Other Solid		
RCF ID	RCF3478			
	Sample time, date		840	6/4/98
	Analysis date			6/5/98

Isotope		Activity pCi/gm	2 s err	Ci/gm
K40	<	3.4e+01		3.4e-11
Co60	<	3.7e+00		3.7e-12
I129	<	1.7e+03		1.7e-09
Cs137	<	3.3e+00		3.3e-12
Eu152	<	1.9e+01		1.9e-11
Eu154	<	1.1e+01		1.1e-11
Eu155	<	1.5e+01		1.5e-11
Th232dau	<	1.1e+01		1.1e-11
U235	<	4.7e+00		4.7e-12
U238	<	4.2e+02		4.2e-10
U238dau	<	7.0e+00		7.0e-12
Np237	<	6.9e+00		6.9e-12
Am241	<	3.3e+01		3.3e-11
Tot Act Gam (pCi/gm)		0.0e+00	Ci/gm	0.0e+00
Y/Sr-90	<	N/R		
Gross Alpha	<	8.0e-01		8.0e-13
Gross Beta		8.7e+00	+/- 2.2e+00	8.7e-12 Reported as 137-Cs Betas.
AEA total	<	N/R		
			Total Activity (pCi/gm)	1.0e+01
			(Ci/gm)	1.0e-11

Cat I

R3 6/8/98

Definitions:

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

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

SRH: TLD 6-5-98
Radiological analyst Date

Albert I. Davis 6/5/98
Radiological Manager Date

0056

Post-it® Fax Note 7671 Date 6/5/98 Pages ▶ 3
To Bill Gill Hanford From Albert L. Davis
Co./Dept. Co.
Phone # Phone # 372-9751
Fax # 376-0851 Fax #

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

B0NVX8

Project	105 C Phase I		
Customer ID	B0NVW4	Other Solid	
RCF ID	RCF3476		
	Sample taken, date	810	6/4/98
	Analysis date		6/5/98

Isotope		Activity pCi/gm	2 s err	Ci/gm	
K40	<	2.3e+01		2.3e-11	
Co60	<	4.2e+00		4.2e-12	
I129	<	2.5e+03		2.5e-09	
Cs137	<	3.5e+00		3.5e-12	
Eu152	<	1.7e+01		1.7e-11	
Eu154	<	1.2e+01		1.2e-11	
Eu155	<	1.8e+01		1.8e-11	
Th232dau	<	1.2e+01		1.2e-11	
U235	<	4.7e+00		4.7e-12	
U238	<	4.3e+02		4.3e-10	
U238dau	<	1.3e+01		1.3e-11	
Np237	<	6.6e+00		6.6e-12	
Am241	<	3.0e+01		3.0e-11	
Tot Act Gam (pCi/gm)		0.0e+00		Ci/gm 0.0e+00	
Y/Sr-90	<	N/R			
Gross Alpha	<	9.0e-01		9.0e-13	
Gross Beta		8.1e+02	+/- 2.3e+00	8.1e-12	Reported as 137-Cs Betas.
AEA total	<	N/R			

Total Activity (pCi/gm) 9.0e+00
(Ci/gm) 9.0e-12

Cat I

R3 6/8/98

Definitions:

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis was requested.

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

SHELD LOND 6-5-98
Radiological analyst Date

Albert L. Davis 6/5/98
Radiological Manager Date

0067

GAMMA-RAY ENERGY ANALYSIS REPORT
Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

BONUX9

Project	105 C Phase II	
Customer ID	BONW6	Other Solid
RCF ID	RCF3477	
	Sample time, date	825 [redacted]
	Analysis date	[redacted]

Isotope		Activity pCi/gm	2 s err	Ci/gm
K40	<	2.4e+01		2.4e-11
Co60	<	2.2e+00		2.2e-12
I129	<	1.3e+01		1.3e-11
Cs137	<	1.5e+00		1.5e-12
Eu152	<	1.0e+01		1.0e-11
Eu154	<	4.6e+00		4.6e-12
Eu155	<	4.0e+00		4.0e-12
Th232dau	<	1.2e+01		1.2e-11
U235	<	9.3e+00		9.3e-12
U238	<	2.8e+02		2.8e-10
U238dau	<	3.8e+00		3.8e-12
Np237	<	2.4e+00		2.4e-12
Am241	<	2.8e+00		2.8e-12
Tot Act Gam (pCi/gm)		9.0e+00	Ci/gm	0.0e+00
Y/Sr-90	<	N/R		
Gross Alpha	<	7.9e-01		7.9e-13
Gross Beta		8.5e+00	+/- 2.1e+00	8.5e-12 Reported as 137-Cs Betas.
AEA total	<	N/R		

Total Activity (pCi/gm) 9.0e+00
(Ci/gm) 9.0e-12

Cat I
R3
6/18/98

Definitions:

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

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

SETH JLA 6/10 6-5-98
Radiological analyst Date

Albert L Davis 6/5/98
Radiological Manager Date

0068

Figure 1

SAMPLE CHECK-IN LIST

Date/Time Received: 6-5-98 1300 SG#: W02414

Work Order Number: 806114 SAF #: B98-087

Shipping Container ID: ERC96-085 Chain of Custody #: B98-087-08

1. Custody Seals on shipping container intact? Yes [✓] No []
2. Custody Seals dated and signed? Yes [✓] No []
3. Chain-of-Custody record present? Yes [✓] No []
4. Cooler temperature 4°C
5. Vermiculite/packing materials is Wet [] Dry [✓]
6. Number of samples in shipping container: 9
7. Sample holding times exceeded? Yes [] No [✓]

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

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

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

Sample Custodian/Laboratory: Karen Dittenlu Date: 6-5-98

Telephoned To: _____ On _____ By _____

105-C Phase II

SHEET NO. 1 of 4 DATE 6/2/98

PROJECT NO. B98-087

Weight

= 80 gms.

Have

Co-60	1.1×10^{2} pCi/gm	$= 1.1 \times 10^{-10}$ Ci/gm	⇒ 8.8×10^{-9} Ci
Cs-137	5.2×10^{3} pCi/gm	$= 5.2 \times 10^{-9}$ Ci/gm	⇒ 4.16×10^{-7} Ci
Eu-152	1.6×10^{2} pCi/gm	$= 1.6 \times 10^{-10}$ Ci/gm	⇒ 1.2×10^{-8} Ci
Pu-239/240	1.1×10^{2} pCi/gm	$= 1.1 \times 10^{-10}$ Ci/gm	⇒ 8.8×10^{-9} Ci
		Total Ci =	4.5×10^{-7} Ci
		Total Bq	1.7×10^{-8} TBq

Allowed

Isotope	A_2	A_2 (10^{-3})
Co-60	10.8 Ci	1.08×10^{-2} Ci
Cs-137	13.5 Ci	1.35×10^{-2} Ci
Eu-152	24.3 Ci	2.43×10^{-2} Ci
Pu-239/240	5.41×10^{-3} Ci	5.41×10^{-6} Ci

Weight

80 gms

Have

Co-60	1.8×10^{2} pCi/gm	$= 1.8 \times 10^{-10}$ Ci/gm	$\Rightarrow 1.4 \times 10^{-8}$ Ci
Cs-137	1.0×10^{4} pCi/gm	$= 1.0 \times 10^{-8}$ Ci/gm	$\Rightarrow 8.0 \times 10^{-7}$ Ci
Eu-152	5.0×10^{2} pCi/gm	$= 5.0 \times 10^{-10}$ Ci/gm	$\Rightarrow 4.0 \times 10^{-8}$ Ci
Am-241	3.5×10^{2} pCi/gm	$= 3.5 \times 10^{-10}$ Ci/gm	$\Rightarrow 2.8 \times 10^{-8}$ Ci
Pu-239/240	9.9×10^{2} pCi/gm	$= 9.9 \times 10^{-10}$ Ci/gm	$\Rightarrow 7.9 \times 10^{-8}$ Ci
Sr-90	1.8×10^{4} pCi/gm	$= 1.8 \times 10^{-9}$ Ci/gm	$\Rightarrow 1.4 \times 10^{-6}$ Ci

Total Ci $= 2.4 \times 10^{-6}$ Ci

Total Bq $= 8.8 \times 10^{-8}$ TBq

Allowed

Isotope	A_2	A_2 (10^{-3})
Co-60	10.8 Ci	1.08×10^{-2} Ci
Cs-137	13.5 Ci	1.35×10^{-2} Ci
Eu-152	24.3 Ci	2.43×10^{-2} Ci
Am-241	5.41×10^{-8} Ci	5.41×10^{-6} Ci
Pu-239/240	5.41×10^{-3} Ci	5.41×10^{-6} Ci
Sr-90	2.70 Ci	2.7×10^{-3} Ci

CH2MHILL SUBJECT BONUTZ / BONVNO 105-C Phase II BY
SHEET NO. 3 of 4 DATE 6/2/98
PROJECT NO. B98-087

Weight

80 gms

Have

Cs-137	2.8×10^{2} pCi/gm	$= 2.8\times10^{-10}$ Ci/gm	$\Rightarrow 2.2\times10^{-8}$ Ci
Am-241	2.7×10^{2} pCi/gm	$= 2.7\times10^{-10}$ Ci/gm	$\Rightarrow 2.2\times10^{-8}$ Ci
Pu-239/240	6.2×10^{2} pCi/gm	$= 6.2\times10^{-10}$ Ci/gm	$\Rightarrow 4.9\times10^{-8}$ Ci
Sr-90	2.1×10^{4} pCi/gm	$= 2.1\times10^{-8}$ Ci/gm	$\Rightarrow 1.68\times10^{-6}$ Ci

Total Ci $= 1.8\times10^{-6}$ Ci

Total Bq $= 6.6\times10^{-5}$ TBq

Allowed

Isotope	A_2	$A_2 (10^{-3})$
Cs-137	13.5 Ci	1.35×10^{-2} Ci
Am-241	5.41×10^{-3} Ci	5.41×10^{-6} Ci
Pu-239/240	5.41×10^{-3} Ci	5.41×10^{-6} Ci
Sr-90	~~2.7×10~~ 2.7 Ci	2.7×10^{-3} Ci

$$\frac{2.28\times10^{-8}\ Ci}{1.08\times10^{-2}\ Ci} + \frac{1.24\times10^{-6}\ Ci}{1.35\times10^{-2}\ Ci} + \frac{4.56\times10^{-7}\ Ci}{2.43\times10^{-2}\ Ci}$$

$$+ \frac{5.00\times10^{-8}\ Ci}{5.41\times10^{-6}\ Ci} + \frac{1.37\times10^{-7}\ Ci}{5.41\times10^{-6}\ Ci} + \frac{3.08\times10^{-6}\ Ci}{2.7\times10^{-3}\ Ci}$$

$$= 0.03 < 1$$

$\therefore$ ltd qty.

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

Project 1C5 C Phase II
Customer ID 80NVT2 Other Solid BoNVNO
RCF ID RCF3412
Sample time, date 1C50 5/29/98
Analysis date 5/29/98

Isotope		Activity pCi/gm		2 s err	Ci/gm
K40	<	4.7e+00			4.7e-12
Co60		2.1e+01	+/-	2.1e+00	2.1e-11
I129	<	5.7e+01			5.7e-11
Cs137		2.8e+02	+/-	2.0e+01	2.8e-10
Eu152		6.7e+01	+/-	1.2e+01	6.7e-11
Eu154		1.8e+01	+/-	4.1e+00	1.8e-11
Eu155	<	2.3e+01			2.3e-11
Th232dau	<	4.2e+00			4.2e-12
U235	<	5.0e+01			5.0e-11
U238	<	1.4e+02			1.4e-10
U238dau	<	1.8e+01			1.8e-11
Np237	<	1.5e+01			1.5e-11
Am241		2.7e+02	+/-	2.3e+01	2.7e-10
Tot Act Gam (pCi/gm)		6.5e+02		Ci/gm	6.5e-10
Y/Sr-90	<	N/R			
Gross Alpha		8.2e+02	+/-	7.2e+01	8.2e-10 ← Pu
Gross Beta		2.1e+04	+/-	2.9e+03	2.1e-08 Reported as 137-Cs Betas. ← Sr-90
AEA total	<	N/R			

Total Activity (pCi/gm) 2.1e+04
(Ci/gm) 2.1e-08

Cat II

R3 6/2/98

Definitions:

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

The analysis of Np237 is based on the activity of Pa231

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

Th232dau is the activity of Ac228, Pb212, and Tl208, short lived daughter products of 232Th. Equilibrium between parent and daughter products may not exist in disturbed materials.

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

N/R means no result or analysis not requested.

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

SETH C. JLLGOD 6-1-98
Radiological analyst Date

Albert L. Davis 6/1/98
Radiological Manager Date

GAMMA-RAY ENERGY ANALYSIS REPORT
Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

BON VM9

Project	TCS C Phase II	
Customer ID	80NVT1 Other Solid	
RCF ID	RCF3410	
	Sample time, date	1407 5/28/98
	Analysis date	5/28/98

Isotope		Activity pCi/gm		2 s err	Ci/gm
K40	<	1.0e+01			1.0e-11
Co60		1.8e+02	+/-	1.4e+01	1.8e-10
I129	<	9.4e+01			9.4e-11
Cs137		1.0e+04	+/-	7.4e+02	1.0e-08
Eu152		5.0e+02	+/-	4.6e+01	5.0e-10
Eu154		1.1e+02	+/-	1.5e+01	1.1e-10
Eu155	<	1.6e+01			1.6e-11
Th232dau	<	1.2e+01			1.2e-11
U235	<	8.6e+01			8.6e-11
U238	<	4.0e+02			4.0e-10
U238dau	<	1.7e+01			1.7e-11
Np237	<	1.6e+01			1.6e-11
Am241		3.5e+02	+/-	2.9e+01	3.5e-10
Tot Act Gam (pCi/gm)		1.2e+04		Ci/gm	1.2e-08
Y/Sr-90	<	N/R			
Gross Alpha		9.9e+02	+/-	1.1e+02	9.9e-10 ← Pu
Gross Beta		1.8e+04	+/-	2.4e+03	1.8e-08 Reported as 137-Cs Betas. ← Sr-90
AEA total	<	N/R			

Total Activity (pCi/gm) 1.8e+04
(Ci/gm) 1.8e-08

Cat II
Rg 6/2/98

Definitions:

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

The analysis of Np237 is based on the activity of Pa233

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

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

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

N/R means no result or analysis not requested.

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

SEHCJED Lyard 6-01-98
Radiological analyst Date

Albert L. Davis 6/1/98
Radiological Manager Date

0075

GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.
Radiological Counting Facility THI - RCF

BONVM6

Project	105C Phase II		
Customer ID	BONVT0	Other Solid	
RCF ID	RCF3408		
	Sample Rec'd, date	915	5/28/98
	Analysis date		5/28/98

Isotope		Activity pCi/gm		2 s err	Ci/gm
K40		5.1e+01	+/-	1.8e+01	5.1e-11
Co60		1.1e+02	+/-	8.3e+00	1.1e-10
I129	<	6.4e+01			6.4e-11
Cs137		5.2e+03	+/-	1.7e+02	5.2e-09
Eu152		1.6e+02	+/-	1.1e+01	1.6e-10
Eu154		3.2e+01	+/-	6.7e+00	3.2e-11
Eu155	<	9.0e+00			9.0e-12
Th232dau	<	1.5e+01			1.5e-11
U235	<	2.6e+01			2.6e-11
U238	<	3.2e+02			3.2e-10
U238dau	<	9.1e+00			9.1e-12
Np237	<	9.4e+00			9.4e-12
Am241		6.5e+01	+/-	7.9e+00	6.5e-11
Tot Act Gam (pCi/gm)		5.7e+03		Ci/gm	5.7e-09
Y/Sr-90	<	N/R			
Gross Alpha		1.1e+02	+/-	2.0e+01	1.1e-10 ← Pu
Gross Beta		3.5e+03	+/-	4.8e+02	3.5e-09 Reported as 137-Cs Betas. ← Cs-137
AEA total	<	N/R			
				Total Activity (pCi/gm)	5.8e+03
				(Ci/gm)	5.8e-09

Cat II

6/2/98

Definitions:

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

The analysis of Np237 is based on the activity of Pa233

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

Th232dau is the activity of Ac228, Pb212, and Tl208, short lived daughter products of 232Th. Equilibrium between parent and daughter products may not exist in disturbed materials.

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

N/R means no result or analysis not requested.

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

SEE ATTACHED 6-01-98
Radiological analyst Date

Albert I. Davis 6/1/98
Radiological Manager Date

0076

RADIOACTIVE SHIPMENT RECORD

103865[2]

Page 1 of 2

1. SHIP FROM U.S. DEPT. OF ENERGY C/O

Company: RHT Hanford
Address: 3725 Bldg 300-Area
City, State, Zip: Richland WA 99352
Contact: Robert Fahlberg
Phone: 509-372-8101

Ship: [X] Prepaid [ ] Collect

Via: [X] Motor [ ] Air Pasg [ ] UPS [ ] Rail [ ] Air Cargo [ ] Site Carrier

SHIPMENT AUTHORIZATION NUMBER

2. SHIP TO

Company: Quanterra Laboratory
Address: 2900 George Wa Way
City, State, Zip: Richland, WA 99352
Attention: Karen Ackenbergs
Phone: 509-375-2121

[redacted]
Radioactive - LSA [ ]
Radioactive - SCO [ ]
Type A [ ] N/A
Type B with fissile [ ]
[redacted]
LSA-I [ ]
LSA-II [ ] N/A
LSA-III [ ]
SCO-I [ ]
SCO-II [ ]

Labels Applied 10.
Empty [ ] N/A
Radioactive White - I [ ]
Radioactive Yellow - II [ ]
Radioactive Yellow - III [ ]
Subsidiary Hazard [ ]

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

EMERGENCY RESPONSE 8.
Telephone: 509-373-3900
Emergency Response Guide(s): #161

Highway Route Controlled Quantity [ ]
Exclusive Use Shipment with instructions [ ]
Placards Applied [ ]
If Rail Specify:
Fissile Excepted, Grams [ ]
Excepted Package Statement [X]

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
	Surface Contaminated Object	7	UN2913

Warning – Fissile Material Controlled Shipment. Do Not Load More Than N/A Packages Per Vehicle. In Loading and Storage Areas, Keep at Least 20 Feet From Other Packages Bearing Radioactive Labels.

11.	No. Pkg.	Model Package	COC/Spec	Serial No.	Seal No.	Isotopes	T.I.	Bq/Package	Gr. Wt. Kg.
	1	Strong Tight	N/A	ERC96-028	Tape	Sr-90, Cs-137, Co-60, Ra-226/226	N/A	1.7x10^7 Bq	29.
	Samples: BONUMS, BONUMS and BONUMS double bagged in poly bags and packed in wet ice								
	(Shipper may describe package in detail on one of the unused lines above)					TOTALS	N/A	1.7x10^7 Bq	29.

12. 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 regulations of the Department of Transportation.

Certifier's Signature: [signature] On behalf of DOE-RL | Date: 6-2-98 | Organization: EPC-AFS | Complete Cost Code (Inc. End Function): DB-8250 RINSCO 2900

13. Surface Dose Rate of Package: [X] <0.005 or N/A mSv/hr; <0.5 or N/A mrem/hr (N+β γ)

Dose Rate @ 1 Meter from Surface of Package: [X] <0.005 or N/A mSv/hr; <0.5 or N/A mrem/hr (N+β γ)

Smears of Outer Container: [X] <0.41 Bq (22 dpm) β γ /cm² [ ] <0.04 Bq (2.2 dpm) α /cm² [ ] <TbL 2-2 HSRCM Onsite Limits

TRUCK LOAD OR EXCLUSIVE USE: Surface [ ] <2 mSv/hr (200 mrem/hr); @ 2 meters [ ] <0.1 mSv/hr (10 mrem/hr); @ Cab or sleeper [ ] <0.02 mSv/hr (2 mrem/hr) (Using N+β γ)

Additional Data and Instructions (inc. Readings on Internal Packaging)

Signature - Radiation Monitoring: [signature] | Bldg. 3725 | Survey No. FF4-98-1149 | Date 6-2-98

14. TRANSPORTER: Vehicle Number G6323803 | DRIVER SIGNATURE [signature]

RECEIVER: RECEIVER SIGNATURE [signature] | Date 6-2-98

15. OFFSITE AUTHORIZATION

Shipment has been inspected and verified to be in compliance with DOT regulations

Authorized Signature: [signature] | Printed Name: MA SAMS | Date 6-2-98

16. AUTHORIZATION FOR SHIPMENT

AIR TRANSPORT CERTIFICATION: [ ] N/A

CARGO AIRCRAFT: [ ] Cargo Aircraft Only Labels Applied

PASSENGER AIRCRAFT: [ ] Ltd Qty [ ] <3 T.I. [ ] Research/Medical Diagnosis [ ] Human Medical Research

Pkg. Dimensions (cm): N/A 0077

17. OFFSITE AUTHORIZATION

Tracking No.	Date Shipped	Routing	ETA
RMA4255	6-2-98	CH2M	6-2-98

Surveyed By	Date	Approved for Shipment Offsite	Date
N/A	N/A	[signature]	6-2-98

54-6000-088 (06/97)

Figure 1

SAMPLE CHECK-IN LIST

Date/Time Received: 6/2/98 SG#: W02409

Work Order Number: 806036 SAF #: B98-087

Shipping Container ID: ERC-96026 Chain of Custody # B98-087-3 +1

1. Custody Seals on shipping container intact? Yes [] No [✓]
2. Custody Seals dated and signed? Yes [✓] No []
3. Chain-of-Custody record present? Yes [✓] No []
4. Cooler temperature 4°C
5. Vermiculite/packing materials is Wet [] Dry [✓]
6. Number of samples in shipping container: 9
7. Sample holding times exceeded? Yes [] No [✓]

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

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

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

Sample Custodian/Laboratory: [signature] Date: 6-2-98

Telephoned To: _____ On _____ By _____

0078

7-6-98

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

30-Jun-1998
Page 1

CUSTOMER: BHQ

SAMPLE DELIVERY GROUP W02441

MATRIX : OTHER B98-087

BATCH NUMBER 06-503

	QES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
1)	80650301		BHQ	BONVN0	
2)	80650302		BHQ	BONVM6	
3)	80650303		BHQ	BONVM9	
4)	80650304		BHQ	BONVX8	
5)	80650305		BHQ	BONVX9	
6)	80650306		BHQ	BONVN7	
7)	80650307		BHQ	BONVN5	
8)	80650308		BHQ	BONVN6	
9)	80650309		BHQ	BONVP7	
10)	80650310		BHQ	BONVP8	
11)	80650311		BHQ	BONVP9	
12)	80650312		BHQ	BONVR0	

ACTIONS (Initial & Date)

) INITIATED JH 6/30/98

SOP(S) # RD7800

) PREP LAB RECEIVED 6-30-98 DOC

SOP(S) # RICHRC5013-0

SAMPLE REMAINDER STORED 6-30-98 DOC

SOP(S) # ~~~

SEPARATION LAB RECEIVED BJS 7-1-98

SOP(S) # RICHRC5062.3

Coppt. BJS 7-2-98 RICHRC5003.1

5) COUNTING/MEASUREMENT LAB 7/2/98

SOP(S) # RICHRC0002

6) DATA REVIEWED AND ANALYTICAL PREP STORED JK 7-6-98

SOP(S) # RICHRC0002 Rev 2

JS-EQJC145 20.227 ± 0.18087

JS-EQJC146 20.278 ± ~~0.188~~ 0.18132 7/6/98

0079

Due 7-6-98

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

CUSTOMER: BHQ

SAMPLE DELIVERY GROUP W02441

MATRIX : OTHER B98-087

BATCH NUMBER 06-503

	QES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
1)	80650313		BHQ	BONVR1	
2)	80650314		BHQ	BONVR2	
3)	80650315		BHQ	BONVR3	
4)	80650316		BHQ	BONVN1	
5)	80650317		BHQ	BONVN2	
6)	80650318		BHQ	BONVN3	
	80650318 IS ES				

ACTIONS (Initial & Date)

1) INITIATED DH 6/30/98

SOP(S) # RD 8000

2) PREP LAB RECEIVED 6-30-98 DR

SOP(S) # RICHRC5013-0

3) SAMPLE REMAINDER STORED 6-30-98 DR

SOP(S) # ~~N~~

4) SEPARATION LAB RECEIVED 7-1-98

SOP(S) # RICHRC5062.3

Coppt. 7-2-98 RICHRC5002.1

5) COUNTING/MEASUREMENT LAB

SOP(S) # RICHRC5002

6) DATA REVIEWED AND ANALYTICAL PREP STORED 7-6-98

SOP(S) # RICHRC5002 Rev 2

1 Jul-98
7-6-98

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

30-Jun-1998
Page 1

CUSTOMER: BHQ

SAMPLE DELIVERY GROUP W02441

MATRIX : OTHER B98-087

BATCH NUMBER 06-503

	QES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
1)	80650301		BHQ	BONVN0	
2)	80650302		BHQ	BONVM6	
3)	80650303		BHQ	BONVM9	
4)	80650304		BHQ	BONVX8	
5)	80650305		BHQ	BONVX9	
6)	80650306		BHQ	BONVN7	
7)	80650307		BHQ	BONVN5	
8)	80650308		BHQ	BONVN6	
9)	80650309		BHQ	BONVP7	
10)	80650310		BHQ	BONVP8	
11)	80650311		BHQ	BONVP9	
12)	80650312		BHQ	BONVR0	

ACTIONS (Initial & Date)

) INITIATED JH 6/30/98

SOP(S) # RD 88002

) PREP LAB RECEIVED 6-30-98 ok

SOP(S) # RICHREC5013-0

) SAMPLE REMAINDER STORED 6-30-98 ok

SOP(S) # n/a

) SEPARATION LAB RECEIVED BJS 7-1-98

SOP(S) # RICHREC5062.3

Coppt 7-2-98 RICHREC5003.1

5) COUNTING/MEASUREMENT LAB

SOP(S) # RICH40005

6) DATA REVIEWED AND ANALYTICAL PREP STORED 7-8-98 7-16-98

SOP(S) # RICHREC0002 Rev 2

1S- EQJC145 20.082 ± 0.62995

2S- EQJC146 20.100 ± 0.63053

Due 7-6-98

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

30-Jun-1998
Page 2

CUSTOMER: BHQ

SAMPLE DELIVERY GROUP W02441

MATRIX : OTHER B98-087

BATCH NUMBER 06-503

	QES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
1)	80650313		BHQ	BONVR1	Forgot substrate during Coppt.
2)	80650314		BHQ	BONVR2	
3)	80650315		BHQ	BONVR3	
4)	80650316		BHQ	BONVN1	
5)	80650317		BHQ	BONVN2	
6)	80650318		BHQ	BONVN3	
	J0650318				
	1S				
	2S				

ACTIONS (Initial & Date)

1) INITIATED 7/6/30/98

SOP(S) # RD7800

2) PREP LAB RECEIVED 6-30-98 ok

SOP(S) # RICHRC5030

3) SAMPLE REMAINDER STORED 6-30-98 ok

SOP(S) # na

4) SEPARATION LAB RECEIVED BJS 7-1-98

SOP(S) # RICHRC5062-3

Copied from page 1 of COC JMC 7-6-98

Coppt BJS 7-2-98 RICHRC5003.1

5) COUNTING/MEASUREMENT LAB Alpha

SOP(S) # alpha

6) DATA REVIEWED AND ANALYTICAL PREP STORED JMC 7-6-98

SOP(S) # RICHRC5002 Rev 2

1 due 7-6-98

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

30-Jun-1998
Page 1

CUSTOMER: BHQ — SAMPLE DELIVERY GROUP W02441

MATRIX : OTHER B98-087 — BATCH NUMBER D6-503

	QES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
1)	80650301		BHQ	BONVN0	
2)	80650302		BHQ	BONVM6	
3)	80650303		BHQ	BONVM9	
4)	80650304		BHQ	BONVX8	
5)	80650305		BHQ	BONVX9	
6)	80650306		BHQ	BONVN7	
7)	80650307		BHQ	BONVN5	
8)	80650308		BHQ	BONVN6	
9)	80650309		BHQ	BONVP7	
10)	80650310		BHQ	BONVP8	
11)	80650311		BHQ	BONVP9	
12)	80650312		BHQ	BONVR0	

ACTIONS (Initial & Date)

1) INITIATED 6/30/98
SOP(S) # RD7807

2) PREP LAB RECEIVED 6-30-98 DOC
SOP(S) # RICHRC5013-0

3) SAMPLE REMAINDER STORED 6-30-98 DOC
SOP(S) # ~~n~~

4) SEPARATION LAB RECEIVED 7-1-98
SOP(S) # RICHRC5062.3
E.D. 7-2-98 RICHRC5039.1

5) COUNTING/MEASUREMENT LAB 7/2/98
SOP(S) # RICHRC0002

6) DATA REVIEWED AND ANALYTICAL PREP STORED 7-6-98
SOP(S) # RICHRC0002 Rev 0

IS EQJC145 20.535 ± 0.12161

2S EQJC144 20.473 ± 0.12165

0033

Dup 1-6-98

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

CUSTOMER: BHQ

SAMPLE DELIVERY GROUP W02441

MATRIX : OTHER B98-081

BATCH NUMBER 06-503

	QES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
1)	80650313		BHQ	BONVR1	
2)	80650314		BHQ	BONVR2	
3)	80650315		BHQ	BONVR3	
4)	80650316		BHQ	BONVN1	
5)	80650317		BHQ	BONVN2	
6)	80650318		BHQ	BONVN3	
	J065031 8	1S 2S			

ACTIONS (Initial & Date)

1) INITIATED JH 6/30/98

SOP(S) # RD8800

2) PREP LAB RECEIVED 6-30-98 OK

SOP(S) # RICHRC5013-0

3) SAMPLE REMAINDER STORED 6-30-98 OK

SOP(S) # ~~NA~~

4) SEPARATION LAB RECEIVED TB 7-1-98

SOP(S) # RICHRC5062.3

E.D. TB 7-2-98 RICHRC5039.1

5) COUNTING/MEASUREMENT LAB 7/2/98

SOP(S) # RICHRC0008

6) DATA REVIEWED AND ANALYTICAL PREP STORED MK 7-6-98

SOP(S) # RICHRC0002 Rev

Due 7-6-98

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

30-Jun-1998
Page 1

CUSTOMER: BHQ

SAMPLE DELIVERY GROUP W0024411

MATRIX : OTHER B98-087

BATCH NUMBER 06-503

	GES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
1)	80650301		BHQ	BONVN0	
2)	80650302		BHQ	BONVM6	
3)	80650303		BHQ	BONVM9	
4)	80650304		BHQ	BONVX8	
5)	80650305		BHQ	BONVX9	
6)	80650306		BHQ	BONVN7	
7)	80650307		BHQ	BONVN5	
8)	80650308		BHQ	BONVN6	
9)	80650309		BHQ	BONVP7	
10)	80650310		BHQ	BONVP8	
11)	80650311		BHQ	BONVP9	
12)	80650312		BHQ	BONVR0	

ACTIONS (Initial & Date)

INITIATED JH 6/30/98

SOP(S) # RD3800

PREP LAB RECEIVED ~~Dec~~ 6-30-98

SOP(S) # RICHRC5013-0 RICHRC5017-1

SAMPLE REMAINDER STORED 7-1-98 DK

SOP(S) # N/A

SEPARATION LAB RECEIVED

SOP(S) #

5) COUNTING/MEASUREMENT LAB 7/1/98

SOP(S) # RICHRD0007

6) DATA REVIEWED AND ANALYTICAL PREP STORED JK 7-6-98

SOP(S) # RICHRC0002 Rev 2

Due 7-6-98

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

CUSTOMER: BHQ

SAMPLE DELIVERY GROUP W02441

MATRIX : OTHER B98-087

BATCH NUMBER 06-503

	QES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
1)	80650313		BHQ	BONVR1	
2)	80650314		BHQ	BONVR2	
3)	80650315		BHQ	BONVR3	
4)	80650316		BHQ	BONVN1	
5)	80650317		BHQ	BONVN2	
6)	80650318	DUC 6-30-98	BHQ	BONVN3	
	J06503 1S 2S				

ACTIONS (Initial & Date)

1) INITIATED JH 6/30/98

SOP(S) # RD88002

2) PREP LAB RECEIVED 6-30-98 DR

SOP(S) # RICHRC 5013-0 5017-1

3) SAMPLE REMAINDER STORED 7-1-98 DR

SOP(S) # N/A

4) SEPARATION LAB RECEIVED

SOP(S) #

5) COUNTING/MEASUREMENT LAB 7/1/98

SOP(S) # RICHR0007

6) DATA REVIEWED AND ANALYTICAL PREP STORED JK 7-6-98

SOP(S) # RICHRC0002 Rev2

Rec'd 7-6-98

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

30-Jun-1998
Page 1

CUSTOMER: BHQ

SAMPLE DELIVERY GROUP WO2441

MATRIX : OTHER B98-087

BATCH NUMBER 06-503

	QES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
1)	80650301		BHQ	BONVN0	
2)	80650302		BHQ	BONVM6	
3)	80650303		BHQ	BONVM9	
4)	80650304		BHQ	BONVX8	
5)	80650305		BHQ	BONVX9	
6)	80650306		BHQ	BONVN7	
7)	80650307		BHQ	BONVN5	
8)	80650308		BHQ	BONVN6	
9)	80650309		BHQ	BONVP7	
10)	80650310		BHQ	BONVP8	
11)	80650311		BHQ	BONVP9	
12)	80650312		BHQ	BONVR0	

ACTIONS (Initial & Date)

1) INITIATED 6/30/98
SOP(S) # RD8802

2) PREP LAB RECEIVED 6-30-98 DVR
SOP(S) # RICHRC5013-0

3) SAMPLE REMAINDER STORED 6-30-98 DVR
SOP(S) # —

4) SEPARATION LAB RECEIVED RTM 7/1/98
SOP(S) # RichRC5006/2

5) COUNTING/MEASUREMENT LAB 7/2/98
SOP(S) # RICHRD0003

6) DATA REVIEWED AND ANALYTICAL PREP STORED MK 7-2-98
SOP(S) # RICHRC0202 Rev 2

1S-EQL 1845 30.145 ± 0.45805

2S EQL 1846 30.185 ± 0.45866

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CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

30-Jun-1998
Page 2

CUSTOMER: BHQ — SAMPLE DELIVERY GROUP W02441

MATRIX : OTHER B98-087 — BATCH NUMBER 06-503

	QES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
1)	80650313		BHQ	BONVR1	
2)	80650314		BHQ	BONVR2	
3)	80650315		BHQ	BONVR3	
4)	80650316		BHQ	BONVN1	
5)	80650317		BHQ	BONVN2	
6)	80650318		BHQ	BONVN3	
	J065031B 1S 2S				

ACTIONS (Initial & Date)

) INITIATED JH 6/30/98

SOP(S) # RD 8500

) PREP LAB RECEIVED 6-30-98 [illegible]

SOP(S) # RichMC5013-0

) SAMPLE REMAINDER STORED 6-30-98 [illegible]

SOP(S) # [illegible]

) SEPARATION LAB RECEIVED RTm 7/1/98

SOP(S) # RichRC5006/2

5) COUNTING/MEASUREMENT LAB 7/2/98 [illegible]

SOP(S) # RichRD0003

6) DATA REVIEWED AND ANALYTICAL PREP STORED MK 7-2-98

SOP(S) # RICHRC0002 Rev 2

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