

0060825

Analytical Data Package Prepared For

Bechtel Hanford

Chemical Analysis By

Quanterra Environmental Services
St. Louis Laboratory

Sample Delivery Group Number: W02437



BHI Identification Number

B0NRF5
B0NRF6
B0NRF7

Quanterra Identification Number

18225-001
18256-001
18275-001

RECEIVED
NOV 24 2003
EDMC

000001

Quanterra Incorporated
13715 Rider Trail North
Earth City, Missouri 63045

CASE NARRATIVE

314 298-8566 Telephone
314 298-8757 Fax

Bechtel Hanford Incorporated
3350 George Washington Way
Richland, Washington 99352

July 22, 1998

Attention: Joan Kessner



Project number	:	550.243
Date Received by Lab	:	June 26 through June 30, 1998
Number of Samples	:	Three - (3)
Sample Type	:	Water
SDG Number	:	W02437
Data Deliverable	:	Summary

II. Introduction

Between June 26 and June 30, 1998, a total of three (3) water samples were received by Quanterra, Richland and was transferred to Quanterra, St. Louis for chemical analysis. There are no comments or nonconformance memos associated with the shipping and receiving of these samples. Upon receipt, the sample was given the following laboratory ID numbers to correspond with the specific client ID:

<u>St. Louis ID</u>	<u>BHI ID</u>	<u>SAF Number</u>	<u>Matrix</u>	<u>Date of Receipt</u>
18225-001	B0NRF5	B98-078	Water	26-JUN-98
18256-001	B0NRF6	B98-078	Water	29-JUN-98
18275-001	B0NRF7	B98-078	Water	30-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: Total Organic Carbon by EPA Method 9060.
 Total Suspended Solids by EPA 160.2.

Deviation from Request: No Deviation from requested method.

Bechtel Hanford Incorporated
July 22, 1998
Project Number: 550.243
SDG: W02437
Page 2

IV. Definitions

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

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

V. Comments

General: *The first set of priority results was transmitted by facsimile on June 30, 1998. The second set of priority results was transmitted by facsimile on July 2, 1998. The third set of priority results was transmitted by facsimile on July 6, 1998.*

Wet Chemistry: A Laboratory Control Sample, Method Blank, Laboratory Duplicate and Matrix Spike were analyzed with each preparation batch per the protocol for this analysis. A laboratory duplicate was analyzed as matrix QC for TSS.

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
Project Manager

This page is left blank intentionally.

000004

WO 2437

Quanterra June 26, 1998 09:42 am

Account: 10722 Project: 550.243 Quanterra-Richland QAS No. 550.243 Rev. 1
Master Sample Login: 18225

Project Manager: R. White

Draft: Final

Entered and Reviewed by: [Signature]

PM Review: [Signature]

Sample Header Template:

Sample No.	Client ID	C-Matrix	Date: Collected	Received	Due	Shipper	Rad Category	Rad Sample No.
#	Comments	Analysis	Class	Preservative	Anal. Due Date	Hold Date Site	(Container Numbers:% Filled)	
18225-001	BONRF5 RICHLAND I.D. 80641201	Water	23-JUN-98 23:00	26-JUN-98 08:45	29-JUN-98	AIRBORNE	3* 3	R7429-001
1	AN - Amber Glass-500ml	TSS/160.2/Q4	S	COLD	29-JUN-98	30-JUN-98 S14C	(388202:99)	
1	AN - Amber Glass-250ML	TOC/9060/Q4	S	HCL	29-JUN-98	21-JUL-98 S14C	(388201:99)	
18225-001DUP	BONRF5 RICHLAND I.D. 80641201	Water	23-JUN-98 23:00	26-JUN-98 08:45	29-JUN-98	AIRBORNE	3*	R7429-001
1	AN - Amber Glass-500ml	TSS/160.2/Q4	S	COLD	29-JUN-98	30-JUN-98 S14C	(388202:99)	
1	AN - Amber Glass-250ML	TOC/9060/Q4	S	HCL	29-JUN-98	21-JUL-98 S14C	(388201:99)	
18225-001MS	BONRF5 RICHLAND I.D. 80641201	Water	23-JUN-98 23:00	26-JUN-98 08:45	29-JUN-98	AIRBORNE	3*	R7429-001
1	AN - Amber Glass-250ML	TOC/9060/Q4	S	HCL	29-JUN-98	21-JUL-98 S14C	(388201:99)	

000005

3*=Sample has not been rad screened.

Collector Rich Mahood	Company Contact Steve Vail	Telephone No. 373-3785	Project Coordinator TRENT, SJ	Data Turnaround 29 hrs
Project Designation 105-N Basin - Bulk Water Sampling - Quick Turn	Sampling Location 100N		SAF No. B98-078	
Ice Chest No.	Field Logbook No.		Method of Shipment Hand deliver - government vehicle	
Shipped To Quanterra Incorporated	Offsite Property No. S14C		Bill of Lading/Air Bill No.	
Waste Designation Client determined no waste codes associated with this project.			COA	

POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	HNO3 to pH <2	HNO3 to pH <2	None	PH-1 HCl or H2SO4 to pH <2 Cool	Cool 4C					
		Type of Container	P	P	P	PG	P				
	No. of Container(s)	0	1	1	1	1					
Special Handling and/or Storage Cool 4C	Volume	20ml	20ml	20ml	250ml	500ml					
SAMPLE ANALYSIS		Gross Alpha: Gross Beta	See item (1) in Special Instructions.	Activity Scan	TOC - 9060	TSS - 160.2					
806412		SIX W02437		806413							< 100 cpm on outside of cooler
Sample No.	Matrix *	Sample Date	Sample Time								
BONRF5 01	Water	6/23/98	23:00	X	X	X	X	X	200 cpm 20ml container	100%	100%
									400-500 cpm 250, 500 ml container		

CHAIN OF POSSESSION		Sign/Print Names		SPECIAL INSTRUCTIONS		Matrix *	
Relinquished By Richard O. Mahood Richard O. Mahood		Date/Time 6/24/98 02:30		Received By Janet K. Roth Janet K. Roth		Date/Time 6/24/98 0:00am	
Relinquished By Janet K. Roth J. Roth		Date/Time 6/23/98 19:55		Received By R. Nielson R. Nielson		Date/Time 6/24/98 1455	
Relinquished By R. Nielson R. Nielson		Date/Time 6/24/98 1625		Received By [Signature]		Date/Time 6/24/98 1605	
Relinquished By		Date/Time		Received By Joe Terman		Date/Time 6-26-98 0845	
LABORATORY SECTION		Received By		Title		Date/Time	
FINAL SAMPLE DISPOSITION		Disposal Method		Disposed By		Date/Time	

SPECIAL INSTRUCTIONS
 ** Janet Roth or Rich Mahood are to provide direction to the samplers concerning the required turnaround time for each sample
 ** The samplers are required to provide the proper turnaround time on each Chain of Custody.
 (1) Gamma Spectroscopy (Water) (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Antimony-125, Cesium-134) Gross Alpha/Beta to be taken out of the Gamma container.
 Quick turnaround contact S. Vail, S. Trout, or J. Roth 373-1051

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

000007

POTENTIAL HAZARDS

HEALTH

- Radiation presents minimal risk to transport workers, emergency response personnel, and the public during transportation accidents. Packaging durability is related to potential hazards of material.
- Low-level radioactive material; very low radiation hazard to people.
- Quantity of material presents low radiation hazard if released from package during accident.
- Some radioactive materials cannot be detected by commonly available instruments.
- Packages do not have RADIOACTIVE I, II, or III labels. Some may have EMPTY labels or may have the word "Radioactive" in the package marking.
- If any radioactive contamination occurs, it will be extremely low level.

FIRE OR EXPLOSION

- Some of these materials may burn, but most do not ignite readily.
- Radioactivity does not change flammability or other properties of materials.

PUBLIC SAFETY

- CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.
- Priorities for rescue, life-saving, first aid, and control of fire and other hazards are higher than the priority for measuring radiation levels.
- Radiation Authority must be notified of accident conditions, and is usually responsible for radiological decisions.
- Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions.
- Stay upwind.
- Keep unauthorized personnel away.
- Detain or isolate uninjured persons or equipment suspected to be contaminated; delay decontamination and cleanup until instructions are received from Radiation Authority.

PROTECTIVE CLOTHING

- Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters protective clothing will provide adequate protection.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 100 meters (330 feet).

Fire

- When a large quantity of this material is involved in a major fire, consider an initial evacuation distance of 300 meters (1000 feet) in all directions.

000008

EMERGENCY RESPONSE

FIRE

- Presence of radioactive material will not change effectiveness of fire control techniques.
- Move containers from fire area if you can do it without risk.
- Do not move damaged packages; move undamaged packages out of fire zone.

Small Fires

- Dry chemical, CO₂, water spray or regular foam.

Large Fires

- Water spray, fog (flooding amounts).

SPILL OR LEAK

- Do not touch damaged packages or spilled material.

Liquid Spills

- Cover with sand, earth or other noncombustible absorbent material.
- Cover powder spill with plastic sheet or tarp to minimize spreading.

FIRST AID

- Medical problems take priority over radiological concerns.
- Use first aid treatment according to the nature of the injury.
- Do not delay care and transport of a seriously injured person.
- Apply artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Injured persons who contacted released material may be a minor contamination problem to contacted persons, equipment and facilities.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, 7, UN 2910

THIS PACKAGE CONFORMS TO THE CONDITIONS AND LIMITATIONS SPECIFIED IN 49 CFR 173.421 FOR RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, UN 2910

U.S. DEPARTMENT OF ENERGY, RICHLAND WA.
BY RUST FEDERAL SERVICES HANFORD
P.O. BOX 1970, 2355 STEVENS DRIVE
RICHLAND, WA 99352

Weight

$$(790 \text{ ml}) \times (1 \text{ gm/ml}) = 790 \text{ gms.}$$

Have

$$\text{Cs-137} \quad 2.56 \times 10^3 \text{ pCi/gm} = 2.56 \times 10^{-9} \text{ Ci/gm} \Rightarrow 2.02 \times 10^6 \text{ Ci}$$

$$\text{Sr-90} \quad 2.41 \times 10^4 \text{ pCi/gm} = 2.41 \times 10^{-8} \text{ Ci/gm} \Rightarrow \underline{1.90 \times 10^5 \text{ Ci}}$$

$$\text{Total Ci} \quad 2.11 \times 10^5 \text{ Ci}$$

$$\text{Total TBq.} \quad 7.8 \times 10^{-7} \text{ TBq}$$

Allowed

<u>Isotope</u>	<u>A₂</u>	<u>A₂ (10⁻⁴)</u>
Cs-137	13.5 Ci	1.35 × 10 ⁻³ Ci
Sr-90	2.7 Ci	2.7 × 10 ⁻⁴ Ci

Have vs Allowed

$$\frac{\text{Total Have}}{\text{most Restrictive Allowed}} = \frac{2.11 \times 10^5 \text{ Ci}}{2.7 \times 10^{-4} \text{ Ci}} < 1$$

∴ Ltd qty.

000009

Historical Data Representation of BONKFS DAS 6/24/98

SDG NU	SAMP NUM	METHOD NAME	CON ID	CON LONG NAME	VALUE RP	ANAL U	LAB	EDD FI
W02318	BONKT2	GADGPC	12587-46-1	Gross alpha	8440	pC/L		W02318
W02318	BONKT2	GADGPC	12587-46-1	Gross alpha	8440	pC/L		W02318
W02318	BONKT2	GAMMAHI	10045-97-3	Cesium-137	2520000	pC/L		W02318
W02318	BONKT2	GAMMAHI	10045-97-3	Cesium-137	2580000	pC/L		W02318
W02318	BONKT2	GAMMAHI	10198-40-0	Cobalt-60	8440	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	10198-40-0	Cobalt-60	8650	pC/L		W02318
W02318	BONKT2	GAMMAHI	13967-70-9	Cesium-134	4450	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	13967-70-9	Cesium-134	1670	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	14234-35-6	Antimony-125	6500	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	14234-35-6	Antimony-125	5860	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	14391-16-3	Europium-155	10700	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	14391-16-3	Europium-155	-2420	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	14596-10-2	Americium-241	-2480	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	14596-10-2	Americium-241	4710	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	14683-23-9	Europium-152	-7880	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	14683-23-9	Europium-152	-2000	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	15585-10-1	Europium-154	705	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	15585-10-1	Europium-154	387	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	U-238	Uranium-238	277000	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	U-238	Uranium-238	277000	pC/L	U	W02318
W02318	BONKT2	GBDPC	12587-47-2	Gross beta	24100000	pC/L		W02318
W02318	BONKT2	GBDPC	12587-47-2	Gross beta	24100000	pC/L		W02318

$\beta = 5r-90$

Note: Two values reported for ea. isotope because re-run of sample requested with lengthened count time to obtain Co-60 value.

Per R. Weiss
5/5/98

BONKT2 used as representative of N-Basin water

000010

Author: Richard O Mahood at ~BHI019
Date: 6/24/98 1:23 AM
Priority: Normal
TO: Janet K Roth at ~BHI014
TO: David A St John at ~BHI001
TO: Steven W Vail at ~BHI018
TO: Stephen J Trent at ~BHI014
Subject: Samples Collected 6/23/98

----- Message Contents -----

← Janet

The sample (500 ml, 250 ml, 20 ml, 20 ml) BONRF5 is in the Corridor 22 Airlock RMA in a cooler bagged with ice and with a 125 ml potable water temperature vial. The sample is ready for Dave St John's folks to do the final packaging for shipment (attach labels, weigh, tape the cooler, etc.) The sample needs a shipment survey for Dave St John's folks to transport it tomorrow (and a final RCHP sign off in the package). The Chain of Custody is on your keyboard.

We need quick turnaround? on this sample. We also will need the QC samples run on this one also.

See you later.

← Rich Mahood

00001*

1. SHIP FROM U.S. DEPT. OF ENERGY C/O
 Company RHT - Hanford
 Address 105-N Basin, 100-N
 City, State, Zip Richland, WA 99352
 Contact David St. John
 Phone 509-376-3540 / 509-331-0621

RADIOACTIVE SHIPMENT RECORD 1038673
 Page 1 of 2

Ship Prepaid Collect
 Via Motor Air Psgr UPS
 Rail Air Cargo Site Carrier

SHIPMENT AUTHORIZATION NUMBER

2. SHIP TO
 Company Quanta
 Address 2800 G. Wash. Way
 City, State, Zip Richland WA 99352
 Attention Karen Actenberg
 Phone 509-375-2131

Markings Applied 6.
 Radioactive - LSA
 Radioactive - SCO
 Type A
 Type B with trefoil
 LSA Description 8.
 LSA-I
 LSA-II
 LSA-III
 SCO-I
 SCO-II

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

5. HM Proper Shipping Name: _____ Radioactive Material,
 excepted package - empty packaging 7 UN2910
 excepted package - instruments or articles 7 UN2910
 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

EMERGENCY RESPONSE 9.
 Telephone 509-373-3800
 Emergency Response Guide(s) 161

Labels Applied 10.
 Empty
 Radioactive White - I
 Radioactive Yellow - II
 Radioactive Yellow - III
 Subsidiary Hazard

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

Warning - Fissile Material Controlled Shipment. Do Not Load More Than 2/1A 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	SML57A	TAPE	P-137, Sr-90	N/A	7.8x157g	24 KG	
Polymer cooler containing sample BONAFES in double poly bag and sealed by wet ice									
TOTALS							N/A	7.8x157g	24 KG

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 M. G. [Signature] On behalf of DOE-RL Date 6-24-98 Organization T. L. Complete Cost Code (Inc. End Function) DE 8250

13. Surface Dose Rate of Package <0.005 or _____ mSv/hr
 <0.5 or _____ mrem/hr (N+β γ)
 Dose Rate @ 1 Meter from Surface of Package <0.005 or _____ mSv/hr
 <0.5 or _____ mrem/hr (N+β γ)
 Smears of Outer Container <0.41 Bq (22 dpm) β γ /cm²
 <0.04 Bq (2.2 dpm) α /cm²
 <Tbl. 2-2 HSRM 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. 05N Survey No. N593-2440 Date 6/24/98

14. TRANSPORTER DRIVER SIGNATURE [Signature] RECEIVER RECEIVER SIGNATURE [Signature] Date 6/24/98

15. OFFSITE AUTHORIZATION
 Shipment has been inspected and verified to be in compliance with DOT regulations
 Authorized Signature [Signature] Printed Name M. G. SAARIS Date 6-24-98

16. AUTHORIZATION FOR SHIPMENT
 AIR TRANSPORT CERTIFICATION N/A
 CARGO AIRCRAFT Cargo Aircraft Only Labels Applied
 PASSENGER AIRCRAFT Ltd City Research/Medical Diagnosis Human Medical Research
 Pkg. Dimensions (cm) N/A

17. OFFSITE AUTHORIZATION
 Tracking No. RMB4 26110 Date Shipped 6-24-98 Routing CHC M ETA 6-24-98
 Surveyed By N/A Date N/A Approved for Shipment Offsite [Signature] Date 6-24-98

Figure 1

SAMPLE CHECK-IN LIST

Date/Time Received: 6/24/98 1625 SG#: W02437
Work Order Number: 806412 + 413 SAF #: B98-078
Shipping Container ID: SML-574 Chain of Custody #: B98-078-02

- 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 2°C
- 5. Vermiculite/packing materials is Wet Dry *ice around samples*
- 6. Number of samples in shipping container: One sample, Four containers
- 7. Sample holding times exceeded? Yes No

8. Samples have: <input type="checkbox"/> tape <input checked="" type="checkbox"/> custody seals <input checked="" type="checkbox"/> hazard labels <input checked="" type="checkbox"/> appropriate sample labels
9. Samples are: <input checked="" type="checkbox"/> in good condition <input type="checkbox"/> broken <input type="checkbox"/> leaking <input type="checkbox"/> 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: 6/24/98

Telephoned To: _____ On _____ By _____

000013

Client Sample Screening Results

25-Jun-98

ml

CLIENT CODE ID	MATRIX	RECEIVED	DETECTOR	ACQ DATE	SAMPLE	MINUTES	CNTS A	NET CPM A	CNTS B	NET CPM B
BHQ BONRF5		6/24/1998 4:55:00 PM	QUAD22C	6/25/1998 9:52:55 AM	BONRF5	10	616	61.5385714	28388	2837.5057
	LIQUID		Bkg:	6/25/1998 2:28:45 AM	BKG	700	43	0.06142857	906	1.2942857
Anl Date: 6/25/1998	Tot Sa, Alq: 6.00E-02		1.00E-01	Alp: (Dpm/ 8.27E+01	(uCV 2.24E-02	(pCV 3.73E+05	± 1.9E+04	CAT III	6.7E-05	Lab
Ppt mg: 0	Units: L		ml	Bet; Alq): 5.24E+03	Sa): 1.42E+00	Lg): 2.36E+07	± 1.4E+05		2.1E-06	Alq Lg
BHQ BONRF5A		6/24/1998 4:55:00 PM	QUAD22C	6/25/1998 10:04:55 AM	BONRF5A	10	463	46.2385714	23577	2356.4057
	LIQUID		Bkg:	6/25/1998 2:28:45 AM	BKG	700	43	0.06142857	906	1.2942857
Anl Date: 6/25/1998	Tot Sa, Alq: 6.00E-02		1.00E-01	Alp: (Dpm/ 5.44E+01	(uCV 1.47E-02	(pCV 2.45E+05	± 1.6E+04	CAT III	1.0E-04	Lab
Ppt mg: 0	Units: L		ml	Bet; Alq): 4.35E+03	Sa): 1.18E+00	Lg): 1.96E+07	± 1.3E+05		2.6E-06	Alq Lg

BONRF5 is actual sample
 BONRF5A is duplicate new
 BD 6/25/98

000014



Radioactive Package Monitoring and Receipt (For DOT Compliance)

What radioactive labels are present on or in the package? (Circle)

Exempt - Complete Section A Radioactive White I - Complete Section B
Radioactive Yellow II - Complete Section B Radioactive Yellow III - Complete Section B

Client/Originator Beditel Carrier Airborne

Document/Shipping Number _____

Date/Time Received 6-26-98 0845

.....
Section A

Is package damaged (crushed, dented, wet, punctured, or stained)?

Yes - Complete Section B No - Complete Section C

.....
Section B

B.1 Using the dose rate, record the highest dose rate at contact with the surface of the package.

_____ μ R/hr

If this measurement exceeds;
500 μ R/hr for an exempt package; or
500 μ R/hr for Radioactive White I; or
50 mR/hr for Radioactive Yellow II; or
200 m R/hr for Radioactive Yellow III,
contact the RSO (or designee) immediately.

B.2 Using a single 47 mm glass microfiber filter, wipe a 100 cm x 100 cm (4 in x 4 in) area on three sides of the package (total 300 cm²). Place the wipe, exposed side facing upward into a petri dish. Using a Model 44-9 alpha-beta-gamma (α - β - γ) probe, determine the background countrate. The place the detector over the wipe and wait at least 2 minutes before recording the wipe countrate.

_____ wipe cpm - _____ background cpm = _____ net $\alpha/\beta/\gamma$ cpm

Is the net $\alpha/\beta/\gamma$ cpm less than 200 cpm? If yes, go to Section C. Is the net $\alpha/\beta/\gamma$ greater than 15,000 cpm? If yes, immediately **STOP** and contact RSO (or designee).



015712

Login No.: 18225

**Condition Upon Receipt Variance Report
St. Louis Laboratory**

Client: BHI (Richland)

Date: 6-26-98 Time: 0845

Project No: 550.243

Initiated by: Joe Tiemann

Shipper/No: Airborne

RFA/COC Numbers: 09780

Condition/Variance (Check all that apply):

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

No variances were noted during sample receipt.

Cooler Temperature Upon Receipt: 30c

Notes: _____

Corrective Action:

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

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

Sample(s) processed "as is". _____

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

Sample Control Supervisor Review: (or designate) Joe Tiemann Date: 6-26-98

Project Management Review: Robert E. White Date: 6-26-98

SIGNED ORIGINAL MUST BE RETAINED IN THE PROJECT FILE

000015A

W02437

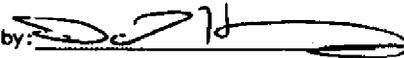
Quanterra July 03, 1998 08:04 am
Account: 10722 Project: 550.243 Quanterra-Richland QAS No. 550.243 Rev. 1
Master Sample Login: 18256

W2437P2

Project Manager: R. White

Draft: Final

Entered and Reviewed by:



PM Review:



Sample Header Template:

Sample No.	Client ID	C-Matrix	Date: Collected	Received	Due	Shipper	Rad Category	Rad Sample No.
#	Comments	Analysis	Class	Preservative	Anal. Due Date	Hold Date Site	(Container Numbers:% Filled)	
Data:	Container Type							
18256-001	B0NRF6 RICHLAND I.D. 80648701	Water	26-JUN-98 16:00	29-JUN-98 15:05	02-JUL-98	AIRBORNE	3	R7443-001
1	AN - Amber Glass-250ML	TOC/9060/04	S	HCL	02-JUL-98	24-JUL-98 S14C		(389061:99)
1	PN - Plastic-500ml	TSS/160.2/04	S	COLD	02-JUL-98	03-JUL-98 S14C		(389063:99)

000016

3*=Sample has not been rad screened.

Bechtel Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			B98-078-03	Page 1 of 1
Collector Rich Mahood	Company Contact Steve Vail	Telephone No. 373-3785	Project Coordinator TRENT, SJ		Data Turnaround	
Project Designation 105-N Basin - Bulk Water Sampling - Quick Turn	Sampling Location 100N	SAF No. B98-078		2hr turnaround		
Ice Chest No. ERC-96-012	Field Logbook No.	Method of Shipment Hand deliver - government vehicle				
Shipped To Quanterra Incorporated	Offsite Property No. NA	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	HNO3 to pH <2	HNO3 to pH <2	None	PH-1 HCl or H2SO4 to pH <2 Con	Cool 4C				
	Type of Container	P	P	P	aG	P				
	No. of Container(s)	0	1	1	1	1				
	Special Handling and/or Storage Cool 4C	Volume 20ml	20ml	20ml	250ml	500ml				

SAMPLE ANALYSIS		SDG	W02437	Gross Alpha, Gross Beta	See item (1) in Special Instructions	Activity Scan	TOC - 9060	TSS - 1002				
806487				806488								
Sample No.	Matrix *	Sample Date	Sample Time									
BONRF6 01	Water	6/26/98	16:00	X	X	X	X	X				
							100%	100%				

CHAIN OF POSSESSION		Kept in RMA in Corridor 22 with custody seal Sign/Print Names until shipment			SPECIAL INSTRUCTIONS				Matrix *	
Relinquished By Richard O. Mahood	Date/Time 6/26/98 16:45	Received By Matthew D. Brown	Date/Time 6/26/98 16:45	** Janet Roth or Rich Mahood are to provide direction to the samplers concerning the required turnaround time for each sample.				S = Soil		
Relinquished By Matthew D. Brown	Date/Time 6/29/98 19:15	Received By P. Schneider	Date/Time 6/29/98 19:15	** The samplers are required to provide the proper turnaround time on each Chain of Custody.				SE = Sediment		
Relinquished By P. Schneider	Date/Time 6/29/98 19:15	Received By R. Nelson	Date/Time 6/29/98 19:15	(1) Gamma Spectroscopy (Water) (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Antimony-125, Cesium-134); Gross Alpha and Gross Beta				SO = Solid		
Relinquished By R. Nelson	Date/Time 7-1-98 08:15	Received By Joe Terman	Date/Time 7-1-98 08:15	Quick turnaround, NO QC samples run for BONRF6				SL = Sludge		
LABORATORY SECTION	Received By	Title							Date/Time	
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By							Date/Time	

000018

Weight

$$(790 \text{ ml})(1 \text{ gm/ml}) = 790 \text{ gm}$$

Haul

$$\text{Cs-137} \quad 2.56 \times 10^3 \text{ pCi/gm} = 2.56 \times 10^{-9} \text{ Ci/gm} \Rightarrow 2.02 \times 10^{-6} \text{ Ci}$$

$$\text{Sr-90} \quad 2.41 \times 10^4 \text{ pCi/gm} = 2.41 \times 10^{-8} \text{ Ci/gm} \Rightarrow \frac{1.90 \times 10^{-5} \text{ Ci}}{2.11 \times 10^{-5} \text{ Ci}}$$

$$7.8 \times 10^{-7} \text{ Ci}$$

Allowed

<u>Isotopes</u>	<u>A₁</u>	<u>A₂(10⁻⁴)</u>
Cs-137	13.5 Ci	1.3 x 10 ⁻³ Ci
Sr-90	2.7 Ci	2.7 x 10 ⁻⁴ Ci

Here vs Allowed

$$\frac{\text{Total Haul}}{\text{Most Restrictive Allowed}} = \frac{2.11 \times 10^{-5} \text{ Ci}}{2.7 \times 10^{-4} \text{ Ci}} < 1$$

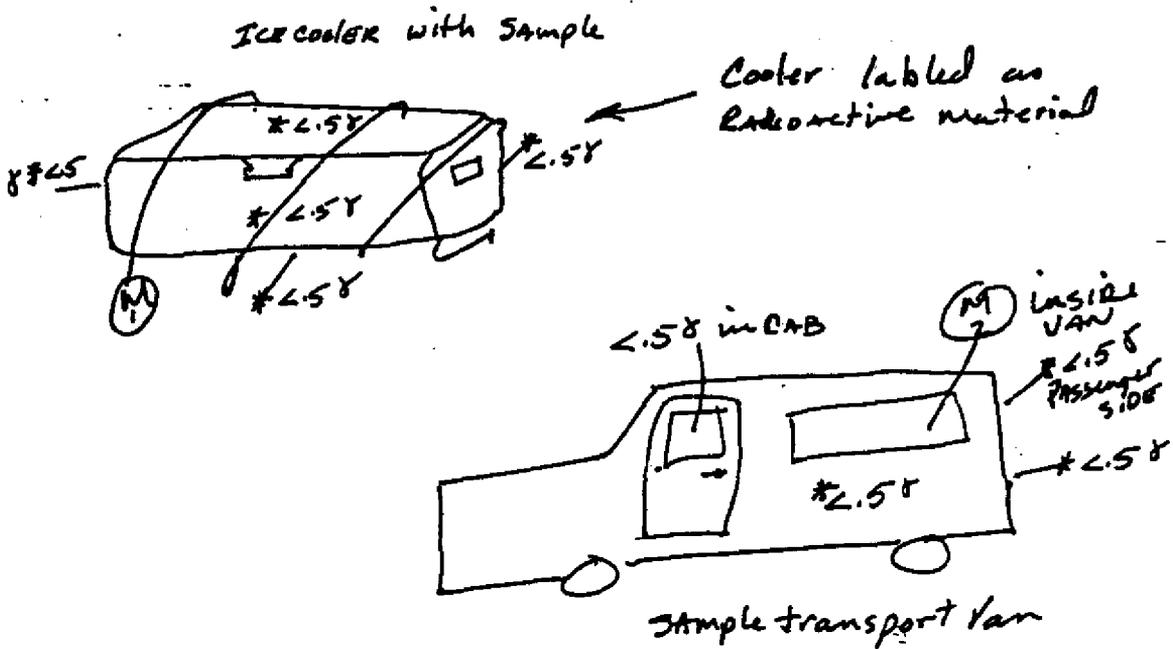
∴ Ltd Qty

ERC RADIOLOGICAL SURVEY RECORD

Page 1 of 2

Type of Survey (check one only) <input type="checkbox"/> Release <input type="checkbox"/> Routine <input type="checkbox"/> Work Progress <input checked="" type="checkbox"/> Shipment	Survey # RSR-NB-98-2667
--	-----------------------------------

RWP # / Rev. # NB 031 / R	Date 4/29/98	Time 1330	Location NB 105 N
-------------------------------------	------------------------	---------------------	------------------------------------



Unless noted, contamination levels are below the levels listed in Project Technical Assessment#: TA-97-02

-C-	Contamination Area	+-	High Contamination Area	-B-	Radiological Buffer Area	-AR-	Airborne Radioactivity Area	-RM-	Radioactive Materials Area	-R-	Radiation Area	-HR-	High Radiation Area	-VHR-	Very High Radiation Area				
○	Technical Smear	#	Direct	M	Large Area Wipe	Contact	Contact	β	General Area Dose Rate = Uncorrected Meter Reading (mR/hr)			Δ	Micro Rem (μR/hr)	N	Neutrons (mRem/hr)	[AS]	Air Sample Location	-SCA-	Soil Contamination Area

Instruments

Model	Serial #	Source (Initial)	Cal Due Date	Model	Serial #	Source (Initial)	Cal Due Date
R02	0020	Yates	12/31/98	HP-360	0041	Yates	10/29/98
L-177	0041	Yates	10/29/98		N N		

RCT Name/Signature/Date: K. Yates K. Yates 4/29/98	RCT Supervisor Name/Signature/Date:
--	-------------------------------------

Contamination Measurement Information

Circled values in Removable β - γ denotes mrad/hr β

Unless otherwise noted, use the following Correction Factors:

List other Correction Factors, instruments, and source documents:

Source smaller than probe size:

Source larger than probe size:

PAM = 7

P-11 probe = 10

PAM = 14

P-11 probe = 50

No.	Description of Item or Location	Removable (dpm/100 cm ²)				Total (dpm/100 cm ²)			
		α	α C-F	β - γ	β - γ C-F	α	α C-F	β - γ	β - γ C-F
M-1	Masslin/cooler	N/A	N/A	<1000	10				
M-2	Masslin/Back of van	N/A	N/A	<1000	10				

Corrected Dose Rate Calculations

Show all work. CF = 1 unless noted.

Location	Contact Readings		30 cm Readings	
	β (mrad/hr) (WO-WC) X CF = DR	γ (mR/hr) WC X CF = DR	β (mrad/hr) (WO-WC) X CF = DR	γ (mR/hr) WC X CF = DR
All locations outside cooler		<1.5		
All locations outside van	N/A	<1.5	N/A	N/A
Cab of van		N/A		<1.5

1. SHIP FROM U.S. DEPT. OF ENERGY C/O
 Company BHT - Hanford
 Address 100-N Basin
 City, State, Zip Richland WA 99352
 Contact David St John
 Phone 509-376-8540

RADIOACTIVE SHIPMENT RECORD 1038693
Page 1 of 2

Ship Prepaid Collect 4
 Via Motor Air Pkg UPS
 Rail Air Cargo Site Carrier

SHIPMENT AUTHORIZATION NUMBER

2. SHIP TO
 Company Quantella
 Address 7800 Genesee Wash Way
 City, State, Zip Richland WA 99352
 Attention Karen Arterburg
 Phone 509-375-3131

Markings Applied
 Radioactive - LSA
 Radioactive - SCO
 Type A
 Type B with trefoil
 LSA Description
 LSA-I
 LSA-II
 LSA-III
 SCO-I
 SCO-II

For Normal Forms only
 Identify
 Physical Form Liquid Gas
 Solid
 Chemical Form Elemental
 Metal Nitrate
 Oxide Mixture
 Other

5. HM Proper Shipping Name: _____ Radioactive Material

<input type="checkbox"/>	excepted package - empty packaging	7	UN2910
<input type="checkbox"/>	excepted package - instruments or articles	7	UN2910
<input checked="" type="checkbox"/>	excepted package - limited quantity of material	7	UN2910
<input type="checkbox"/>	excepted package - articles manufactured from natural or depleted uranium or natural thorium	7	UN2910
<input type="checkbox"/>	Special Form, n.o.s.	7	UN2974
<input type="checkbox"/>	Low Specific Activity, n.o.s.	7	UN2912
<input type="checkbox"/>	n.o.s.	7	UN2982
<input type="checkbox"/>	Fissile, n.o.s.	7	UN2918
<input type="checkbox"/>	Surface Contaminated Object	7	UN2913

Labels Applied
 Empty
 Radioactive White - I
 Radioactive Yellow - I
 Radioactive Yellow - II
 Subsidiary Hazard

EMERGENCY RESPONSE
 Telephone: 509-373-3000
 Emergency Response Guide(s): 161

Highway Route Controlled Quantity
 Exclusive Use Shipment with instructions
 Placards Applied
 If Rail Specify: _____
 Fissile Excepted, Gram
 Excepted Package Statement

Warning - Fissile Material Controlled Shipment. Do Not Load More Than 11A 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.L.	By Package	Gr. Wt. Kg.	
1	Sturvisight	N/A	FRC-96-0276		Cs-137, Sr-90	N/A	7.8x10 ² g	28kg	
Poly cooler containing sample no BONRE6 in double poly bags and packed as unit 10.									
TOTALS							N/A	7.8x10 ² g	28kg

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 David St John On behalf of DOE-RL Date 6/29/98 Organization FRC - AFS Complete Cost Code (Inc. End Function) DB-3250 2UNBOW 2800

13. Surface Dose Rate of Package
 <0.005 or _____ mSv/hr
 <0.5 or _____ mrem/hr (N+S Y)

Date Rate @ 1 Meter from Surface of Package
 <0.005 or _____ mSv/hr
 <0.5 or _____ mrem/hr (N+S Y)

Smears of Outer Container
 <0.41 Bq (22 dpm) & γ /cm²
 <0.04 Bq (2.2 dpm) e/cm²
 <Tbl. 2-2 HSRGM 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+S Y)

Signature - Radiation Monitoring _____ Bldg. 1705 N Survey No. 258-NB-98-2617 Date 6/29/98

14. TRANSPORTER DRIVER SIGNATURE [Signature] RECEPTOR SIGNATURE [Signature] Date 6/29/98

Vehicle Number 612-23803

15. OFFSITE AUTHORIZATION
 Shipment has been inspected and verified to be in compliance with DOT regulations
 Authorized Signature [Signature] Printed Name M.A. Sams Date 6-29-98

16. AUTHORIZATION FOR SHIPMENT
 AIR TRANSPORT CERTIFICATION N/A
 CARGO AIRCRAFT Cargo Aircraft Only Labels Applied Ltd Qty <3 T.I.
 PASSENGER AIRCRAFT Research/Medical Diagnosis Human Medical Research
 Pkg. Dimensions (cm) NA

17. OFFSITE AUTHORIZATION
 Tracking No. RMBH-2518 Date Shipped 6-29-98 Routing CH2M ETA 6-29-98
 Surveyed By NA Date NA Approved for Shipment Offsite [Signature] Date 6-29-98

Figure 1

SAMPLE CHECK-IN LIST

Date/Time Received: 6/29 1500 SG#: W02437
Work Order Number: 806487 + 488 SAF #: B98-078
Shipping Container ID: 96-012 Chain of Custody #: B98-078-03

- 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 5°
- 5. Vermiculite/packing materials is Wet [] Dry []
- 6. Number of samples in shipping container: 4
- 7. Sample holding times exceeded? Yes [] No []

8. Samples have: <input checked="" type="checkbox"/> tape <input checked="" type="checkbox"/> custody seals <input type="checkbox"/> hazard labels <input type="checkbox"/> appropriate sample labels
9. Samples are: <input checked="" type="checkbox"/> in good condition <input type="checkbox"/> broken <input type="checkbox"/> leaking <input type="checkbox"/> have air bubbles

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

Sample Custodian/Laboratory: Glidberg Date: 6/29/98

Telephoned To: _____ On _____ By _____

000023

Client Sample Screening Results

30-Jun-98

CLIENT CODE	ID	MATRIX	RECEIVED	DETECTOR	ACQ DATE	SAMPLE	MINUTES	CNTSA	NET CPMA	CNTSB	NET CPMB			
BH1	BONRF6		6/29/1998 3:05:00 PM	QUAD22C	6/30/1998 9:25:01 AM	BONRF6	10	259	25.86	16737	1672.3886			
		LIQUID		Bkg:	6/30/1998 2:34:31 AM	BKO	700	28	0.04	918	1.3114286			
Anal Date:	6/30/1998	Tei Sa, Alq:	6.00E-02	1.00E-01	Alpt (Dpm):	1.83E+01	(wCV)	4.93E-03	(pCV)	8.22E+04	± 9.7E+03	CAT	3.0E-04	Lab
Ppt mg:	0.2	Units:	L	ml	Bet; Alq:	3.10E+03	Sa):	8.37E-01	Lg):	1.39E+07	± 1.1E+05	III	3.6E-06	Alq Lg

Reviewed 6/30/98

*well below
licence limits*

000024

Login No.: 18252

**Condition Upon Receipt Variance Report
St. Louis Laboratory**

Client: Richland
Project No: 550.243
Shipper/No: Airborne

Date: 7-1-98 Time: 0815
Initiated by: Joe Tiemann
RFA/COC Numbers: 09787

Condition/Variance (Check all that apply):

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

No variances were noted during sample receipt.
Notes: -

Cooler Temperature Upon Receipt: 5°C

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: 7-1-98
Project Management Review: Robert E. White Date: 7-2-98

SIGNED ORIGINAL MUST BE RETAINED IN THE PROJECT FILE

W02437

W2437P3

Quanterra July 03, 1998 08:12 am
Account: 10722 Project: 550.243 Quanterra-Richland QAS No. 550.243 Rev. 1
Master Sample Login: 18275

Project Manager: R. White

Draft: Final: Entered and Reviewed by: [Signature] PM Review: Robert E. White

Sample Header Template:

Sample No.	Client ID	C-Matrix	Date: Collected	Received	Due	Shipper	Rad Category	Rad Sample No.
#	Comments	Analysis	Class	Preservative	Anal. Due Date	Hold Date Site	(Container Numbers:X Filled)	
Data:	Container Type							
18275-001	BONRF7 richland id 80700201	Water	30-JUN-98 00:00	30-JUN-98 14:40	06-JUL-98	AIRBORNE	3	R7453-001
1	AN - Amber Glass-250ML	TOC/9060/Q4	S	HCL	06-JUL-98	28-JUL-98 S4H		(389478:100)
1	PN - Plastic-500ml	TSS/160.2/Q4	S	COLD	06-JUL-98	07-JUL-98 S4H		(389477:100)

000026

3*=Sample has not been rad screened.

Bechtel Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			B98-078-04	Page <u>1</u> of <u>1</u>
Collector Rich Mahood		Company Contact Steve Vail		Telephone No. 373-3785	Project Coordinator TRENT, SJ	Data Turnaround <i>24 hr turnaround</i>
Project Designation 105-N Basin - Bulk Water Sampling - Quick Turn		Sampling Location 100N		SAF No. B98-078		
Ice Chest No.		Field Logbook No.		Method of Shipment Hand deliver - government vehicle		
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	Preservation	HNO3 to pH <2	HNO3 to pH <2	None	<i>pH-1</i> HCl or H2SO4 to pH <2 Cool	Cool 4C					
		Type of Container	P	P	P	aG	P				
	No. of Container(s)	0	1	1	1	1					
Special Handling and/or Storage Cool 4C	Volume	20ml	20ml	20ml	250ml	500ml					

SAMPLE ANALYSIS				Gross Alpha, Gross Beta	See item (1) in Special Instructions. + Gross Alpha + Gross Beta	Activity Scan	TOC - 9060	TSS - 1602				
Sample No.	Matrix *	Sample Date	Sample Time									
BONRF7	Water	6-30-98	00:00	X	X	X	X	X				
							100%	100%				

000028

CHAIN OF POSSESSION				SPECIAL INSTRUCTIONS				Matrix *			
Stored overnight in RMA in corridor 22 Airtack with custody seal.				<ul style="list-style-type: none"> Janet Roth or Rich Mahood are to provide direction to the samplers concerning the required turnaround time for each sample. The samplers are required to provide the proper turnaround time on each Chain of Custody. 				<ul style="list-style-type: none"> S = Soil SE = Sediment SO = Solid SL = Sludge W = Water O = Oil A = Air DS = Drum Solids DL = Drum Liquids T = Tissue WI = Wipe L = Liquid V = Vegetation X = Other 			
Relinquished By	Date/Time	Received By	Date/Time	(1) Gamma Spectroscopy (Water) (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Antimony-125, Cesium-134), Gross alpha and Gross Beta Quick turnaround, "No" QC on this sample SDG W02437							
Richard O. Mahood	6/30/98 0130	Janet Roth	6/30/98 6:00								
Janet Roth	6/30/98 13:25	P. Nielson	6/30/98 13:25								
P. Nielson	6/30/98 14:40	Janet Roth	6/30/98 14:40								
LABORATORY	Received By	Title						Date/Time			

Client Sample Screening Results

01-Jul-98

CLIENT CODE ID	MATRIX	RECEIVED	DETECTOR	ACQ DATE	SAMPLE	MINUTES	CNTS A	NET CPM A	CNTS B	NET CPM B
BH1 B0NRF7		6/30/1998 2:40:00 AM	QUAD22A	7/1/1998 8:02:01 AM	B0NRF7	10	333	33.2342857	19533	1952.0186
	LIQUID		Bkg:	7/1/1998 2:44:08 AM	BKG	700	46	0.06571429	897	1.2814286
Anal Date: 7/1/1998	Tot Sa, Alq: 6.00E-02 ✓		1.00E-01 ✓	Alp; (Dpm/	4.05E+01	(uCV 1.10E-02	(pCV 1.83E+05	± 1.4E+04	CAT	1.4E-04 Lab
Ppt mg: 0 ✓	Units: L		ml	Bet; Alq):	3.61E+03	Sa): 9.75E-01	Lq): 1.63E+07	± 1.2E+05	III	3.1E-06 Alq Lq

Reviewed 7/1/98 *[Signature]*

WELL below Licence Limits

000029

GUIDE
1

**RADIOACTIVE MATERIALS
(LOW LEVEL RADIATION)**

NAERG96

POTENTIAL HAZARDS

HEALTH

Radiation presents minimal risk to transport workers, emergency response personnel, and the public during transportation accidents. Packaging durability is related to potential hazards of material.

Low-level radioactive material; very low radiation hazard to people.

Quantity of material presents low radiation hazard if released from package during accident.

Some radioactive materials cannot be detected by commonly available instruments.

Packages do not have RADIOACTIVE I, II, or III labels. Some may have EMPTY labels or may have the word "Radioactive" in the package marking.

If any radioactive contamination occurs, it will be extremely low level.

FIRE OR EXPLOSION

Some of these materials may burn, but most do not ignite readily.

(Radioactivity does not change flammability or other properties of materials.)

PUBLIC SAFETY

CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.

Priorities for rescue, life-saving, first aid, and control of fire and other hazards are higher than the priority for measuring radiation levels.

Radiation Authority must be notified of accident conditions, and is usually responsible for radiological decisions.

Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions.

Stay upwind.

Keep unauthorized personnel away.

Detain or isolate uninjured persons or equipment suspected to be contaminated; delay decontamination and cleanup until instructions are received from Radiation Authority.

PROTECTIVE CLOTHING

Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters protective clothing will provide adequate protection.

EVACUATION

Large Spill

Consider initial downwind evacuation for at least 100 meters (330 feet).

When a large quantity of this material is involved in a major fire, consider an initial evacuation distance of 300 meters (1000 feet) in all directions.

PG 2 of 2

NAERG96

**RADIOACTIVE MATERIALS
(LOW LEVEL RADIATION)**

GUIDE
16

EMERGENCY RESPONSE

FIRE

- Presence of radioactive material will not change effectiveness of fire control techniques.
- Move containers from fire area if you can do so without risk.
- Do not move damaged packages; move undamaged packages out of fire zone.

Small Fires

- Dry chemical, CO₂, water spray or regular foam.

Large Fires

- Water spray, fog (flooding amounts).

SPILL OR LEAK

- Do not touch damaged packages or spilled material.

Liquid Spills

- Cover with sand, earth or other noncombustible absorbent material.
- Cover powder spill with plastic sheet or tarp to minimize spreading.

FIRST AID

- Medical problems take priority over radiological concerns.
- Use first aid treatment according to the nature of the injury.
- Do not delay care and transport of a seriously injured person.
- Apply artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Injured persons who contacted released material may be a minor contamination problem to contacted persons, equipment and facilities.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, 7, UN 2910

THIS PACKAGE CONFORMS TO THE CONDITIONS AND LIMITATIONS SPECIFIED IN 49 CFR 173.421 FOR RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, UN 2910

**U.S. DEPARTMENT OF ENERGY, RICHLAND WA.
BY RUST FEDERAL SERVICES HANFORD
P.O. BOX 1970, 2355 STEUBEN**

000030

Data Representation of AERS NO. BONKT2

SDG NU	SAMP NUM	METHOD NAME	CON ID	CON LONG NAME	VALUE RP	ANAL U	LAB	EDD FI
W02318	BONKT2	GADGPC	12587-46-1	Gross alpha	8440	PC/L		W02318
W02318	BONKT2	GADGPC	12587-46-1	Gross alpha	8440	PC/L		W02318
W02318	BONKT2	GAMMAHI	10045-97-3	Cesium-137	2520000	PC/L		W02318
W02318	BONKT2	GAMMAHI	10045-97-3	Cesium-137	2560000	PC/L		W02318
W02318	BONKT2	GAMMAHI	10198-40-0	Cobalt-60	8440	PC/L	U	W02318
W02318	BONKT2	GAMMAHI	10198-40-0	Cobalt-60	5650	PC/L		W02318
W02318	BONKT2	GAMMAHI	13967-70-9	Cesium-134	4450	PC/L	U	W02318
W02318	BONKT2	GAMMAHI	13967-70-9	Cesium-134	1670	PC/L	U	W02318
W02318	BONKT2	GAMMAHI	14234-35-6	Antimony-125	6500	PC/L	U	W02318
W02318	BONKT2	GAMMAHI	14234-35-6	Antimony-125	5960	PC/L	U	W02318
W02318	BONKT2	GAMMAHI	14391-16-3	Europium-155	10700	PC/L	U	W02318
W02318	BONKT2	GAMMAHI	14391-16-3	Europium-155	-2420	PC/L	U	W02318
W02318	BONKT2	GAMMAHI	14596-10-2	Americium-241	-2480	PC/L	U	W02318
W02318	BONKT2	GAMMAHI	14596-10-2	Americium-241	4710	PC/L	U	W02318
W02318	BONKT2	GAMMAHI	14683-23-9	Europium-152	-7880	PC/L	U	W02318
W02318	BONKT2	GAMMAHI	14683-23-9	Europium-152	-2000	PC/L	U	W02318
W02318	BONKT2	GAMMAHI	15585-10-1	Europium-154	705	PC/L	U	W02318
W02318	BONKT2	GAMMAHI	15585-10-1	Europium-154	397	PC/L	U	W02318
W02318	BONKT2	GAMMAHI	U-238	Uranium-238	277000	PC/L	U	W02318
W02318	BONKT2	GAMMAHI	U-238	Uranium-238	277000	PC/L	U	W02318
W02318	BONKT2	GBDPC	12587-47-2	Gross beta	24100000	PC/L		W02318
W02318	BONKT2	GBDPC	12587-47-2	Gross beta	24100000	PC/L		W02318

$\beta = Sr-90$

Note: Two values reported for ea. isotope because re-run of sample requested with lengthened count time to obtain Co-60 value.

Per R. Weiss
5/5/98

BONKT2 used as representation of N-Basin water

Weight

$$(790 \text{ ml})(1 \text{ gm/ml}) = 790 \text{ gm}$$

Haver

$$\text{Cs-137 } 2.56 \times 10^3 \text{ pCi/gm} = 2.56 \times 10^{-9} \text{ Ci/gm} \Rightarrow 2.02 \times 10^{-6}$$

$$\text{Sr-90 } 2.41 \times 10^4 \text{ pCi/gm} = 2.41 \times 10^{-8} \text{ Ci/gm} \Rightarrow 1.90 \times 10^{-5}$$

$$2.11 \times 10^{-5}$$

$$7.8 \times 10^{-7}$$

Allowed

<u>Isotopes</u>	<u>A₂</u>	<u>A₂(10⁻⁴)</u>
Cs-137	13.5 Ci	1.3 × 10 ⁻³ Ci
Sr-90	2.7 Ci	2.7 × 10 ⁻⁴ Ci

Haver vs Allowed

$$\frac{\text{Total Haver}}{\text{MOST Restrictive Allowed}} = \frac{2.11 \times 10^{-5} \text{ Ci}}{2.7 \times 10^{-4} \text{ Ci}} < 1$$

∴ Ltd Qty

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

RADIOACTIVE SHIPMENT RECORD

1038703

Page 1 of 2

Company BHE - Hanford
Address 100-N Basin
City, State, Zip Richland, Wa 99352
Contact David St John
Phone (509) 376-8540

Ship Prepaid Collect
Via Motor Air Psgr UPS
 Rail Air Cargo Site Carrier

SHIPMENT AUTHORIZATION NUMBER

SHIP TO
Company Quanterra
Address 2800 George Wash Way
City, State, Zip Richland, Wa 99352
Attention Karen Actenberg
Phone (509) 375-3131

Markings Applied
Radioactive - LSA
Radioactive - SCO
Type A
Type B with trefoil
LSA Description

For Normal Form only
Identify
Physical Form Liquid Gas
 Solid
Chemical Form Elemental
 Metal Nitrate
 Oxide Mixture
 Other

IM Proper Shipping Name: _____ Radioactive Material,
 Excepted package - empty packaging 7 UN2910
 Excepted package - instruments or articles 7 UN2910
 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

LSA-I
LSA-II
LSA-III
SCO-I
SCO-II

EMERGENCY RESPONSE
Telephone 509-373-3800
Emergency Response Guide(s) 161

Labels Applied
Empty
Radioactive White - I
Radioactive Yellow - II
Radioactive Yellow - III
Subsidiary Hazard

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

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

No. Pkg.	Model Package	COC/Spec	Serial No.	Seal No.	Isotopes	T.I.	Bq/Package	Gr. Wt. Kg.	
1	Strong tight	N/A	ENL22D	Tape	CS-137, Sr-90	NA	7.8x10 ⁷	23	
Poly cooler containing sample BONREF in double bag and packed on wet ice									
per may describe package in detail on one of the unused lines above									
TOTALS							N/A	7.8x10 ⁷	23

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 On behalf of DOE-RL Date 6/30/98 Organization ERC - AFS Complete Cost Code (Inc. End Function) DB 8250

Surface Dose Rate of Package <0.005 or _____ mSv/hr
Dose Rate @ 1 Meter from Surface of Package <0.005 or _____ mSv/hr
Smears of Outer Container <0.41 Bq (22 dpm) B & Y /cm²
 <0.04 Bq (2.2 dpm) alpha/cm²
 <Tbl. 2-2 HSRM 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+B & Y)

Additional Data and Instructions inc. Readings on Internal Packaging
Signature - Radiation Monitoring Rod Spencer Bldg. 105N Survey No. NB-98-2719 Date 6-30-98

TRANSPORTER DRIVER SIGNATURE 6323803
RECEIVER SIGNATURE Karen Actenberg Date 6-30-98

OFFSITE AUTHORIZATION
Shipment has been inspected and verified to be in compliance with DOT regulations
Authorized Signature M.A. SAMS Printed Name M.A. SAMS Date 6-30-98

AUTHORIZATION FOR SHIPMENT
AIR TRANSPORT CERTIFICATION N/A
CARGO AIRCRAFT Cargo Aircraft Only Labels Applied
PASSENGER AIRCRAFT Ltd Qty Research/Medical Diagnosis Human Medical Research
Pkg. Dimensions (cm) NA

OFFSITE AUTHORIZATION
Tracking No. RMBH 2636 Date Shipped 6-30-98 Routing CH2M ETA 6-30-98
Surveyed By NA Date N/A Approved for Shipment Offsite M.A. SAMS Date 6-30-98

000033

SHIP FROM U.S. DEPT. OF ENERGY C/O
 Company BHE - Hanford
 Address 100-N Basin
 City, State, Zip Richland, wa 99352
 Contact David St John
 Phone (509) 376-8540

RADIOACTIVE SHIPMENT RECORD 103870³
 Page 1 of 2
 Ship Prepaid Collect
 Via Motor Air Psgr UPS
 Rail Air Cargo Site Carrier
 SHIPMENT AUTHORIZATION NUMBER

SHIP TO
 Company Quanterra
 Address 2800 George Wash Way
 City, State, Zip Richland wa 99352
 Attention Karen Arsenberg
 Phone (509) 375-3131

Markings Applied 6
 Radioactive - LSA
 Radioactive - SCO
 Type A
 Type B with trefoil
 LSA Description NA
 LSA-I
 LSA-II
 LSA-III
 SCO-I
 SCO-II
 Labels Applied 10
 Empty
 Radioactive White - I
 Radioactive Yellow - II
 Radioactive Yellow - III
 Subsidiary Hazard
 For Normal Form only 7
 Identify
 Physical Form Liquid Gas
 Solid
 Chemical Form Elemental
 Metal Nitrate
 Oxide Mixture
 Other

HM Proper Shipping Name: _____ Radioactive Material:
 Excepted package - empty packaging 7 UN2910
 Excepted package - instruments or articles 7 UN2910
 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, a.o.s. 7 UN2912
 n.o.s. 7 UN2982
 Fissile, n.o.s. 7 UN2918
 Surface Contaminated Object 7 UN2913

EMERGENCY RESPONSE 9
 Telephone: 509-373-3800
 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

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

No. Pkg.	Model Package	COC/Spec	Serial No.	Seal No.	Isotopes	T.I.	Bq/Package	Gr. Wt. Kg.
1	Strong light	N/A	ENL220	Tape	CS-137, Sr-90	NA	7.8 x 10 ⁷ Bq	23
Poly cooler containing sample BONREF in double bag and packed on wet ice.								
Upper may describe package in detail on one of the unused lines above							TOTALS	N/A 7.8 x 10 ⁷ Bq 23

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 David St John On behalf of DOE-RL Date 6/30/98 Organization ERC-AES Complete Cost Code (Inc. End Function) DB 8250

Surface Dose Rate of Package <0.005 or _____ mSv/hr
 Dose Rate @ 1 Meter from Surface of Package <0.005 or _____ mSv/hr
 <0.5 or _____ mrem/hr (N+B Y) <0.5 or _____ mrem/hr (N+B Y)
 Smears of Outer Container
 <0.41 Bq (22 dpm) B Y/cm²
 <0.04 Bq (2.2 dpm) α/cm²
 Tbl. 2-2 HSRM Onsite Limits
 TRUCK LOAD OR EXCLUSIVE USE
 Surface <2 mSv/hr (200 mrem/hr)
 @ 2 meters <0.1 mSv/hr (10 mrem/hr)
 @ Cab <0.02 mSv/hr (2 mrem/hr) (Using N+B Y)

Signature - Radiation Monitoring Rob [unclear] Bldg. 105N Survey No. NB-98-2719 Date 6-30-98
 TRANSPORTER DRIVER SIGNATURE [unclear] RECEIVER SIGNATURE Karen Arsenberg Date 6-30-98
 Vehicle Number 56323803

OFFSITE AUTHORIZATION
 Shipment has been inspected and verified to be in compliance with DOT regulations
 Authorized Signature [unclear] Printed Name M.A. SAMS Date 6-30-98

AUTHORIZATION FOR SHIPMENT
 AIR TRANSPORT CERTIFICATION N/A
 CARGO AIRCRAFT Cargo Aircraft Only Labels Applied
 PASSENGER AIRCRAFT Ltd Qty Research/Medical Diagnosis Human Medical Research
 Pkg. Dimensions (cm) NA

OFFSITE AUTHORIZATION
 Tracking No. RMBH 2636 Date Shipped 6-30-98 Routing CH2M ETA 6-30-98
 Surveyed By NA Date NA Approved for Shipment Offsite [unclear] Date 6-30-98



Environmental Services

015750

550 243
18256

Login No.: 18775

Condition Upon Receipt Variance Report St. Louis Laboratory

Client: (Richard) BHI
Project No: 550.243
Shipper/No: Air borne

Date: 7-2-98 Time: 0830
Initiated by: Joe Tiemann
RFA/COC Numbers: 09791

Condition/Variance (Check all that apply):

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

No variances were noted during sample receipt. Cooler Temperature Upon Receipt: 5°C

Notes: _____

Corrective Action:

- Client's Name: _____ Informed verbally on: _____ By: _____
- Client's Name: _____ Informed in writing on: _____ By: _____
- Sample(s) processed "as is". _____
- Sample(s) on hold until: _____ If released, notify: _____

Sample Control Supervisor Review: (or designate) Joe Tiemann Date: 7-2-98
Project Management Review: Robert E. White Date: 7-2-98

SIGNED ORIGINAL MUST BE RETAINED IN THE PROJECT FILE

WET CHEMISTRY

000036

Bechtel Hanford Incorporated
3350 George Washington Way
Richland, WA 99352

Project: 550.243

Category: TSS
Method: EPA 160.2
Matrix: LIQUID

Sample Date : 06/23/98
Receipt Date : 06/26/98
Report Date : 06/30/98

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
BONRF5	18225-001	Total Suspended TSS		QCBLK176453-1	06/26/98	06/26/98	4.0	MG/L		1.00	1
BONRF5	18225-001DUP	Total Suspended TSS		QCBLK176453-1	06/26/98	06/26/98	4.0	MG/L		1.00	1
NA	QCBLK176453-1	Total Suspended TSS		QCBLK176453-1	06/26/98	06/26/98	1.00	MG/L	U	1.00	1
NA	QCCLS176453-1	Total Suspended TSS		QCBLK176453-1	06/26/98	06/26/98	98	%REC			1

000037

Bechtel Hanford Incorporated
3350 George Washington Way
Richland, WA 99352

Project: 550.243

Category: Total Organic Carbon
Method: EPA 9060
Matrix: LIQUID

Sample Date : 06/23/98
Receipt Date : 06/26/98
Report Date : 06/30/98

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
BONRF5	18225-001	Total Organic C TOC		QCBLK176376-1	06/27/98	06/27/98	8.37	MG/L		1.00	1
BONRF5	18225-001DUP	Total Organic C TOC		QCBLK176376-1	06/27/98	06/27/98	7.91	MG/L		1.00	1
BONRF5	18225-001MS	Total Organic C TOC		QCBLK176376-1	06/27/98	06/27/98	105	%REC			1
NA	QCBLK176376-1	Total Organic C TOC		QCBLK176376-1	06/27/98	06/27/98	1.00	MG/L	U	1.00	1
NA	QCLCS176376-1	Total Organic C TOC		QCBLK176376-1	06/27/98	06/27/98	100	%REC			1

000038

Bechtel Hanford Incorporated
3350 George Washington Way
Richland, WA 99352

Project: 550.243

Category: TSS
Method: EPA 160.2
Matrix: LIQUID

Sample Date : 06/26/98
Receipt Date : 06/29/98
Report Date : 07/02/98

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
BONRF6	18256-001	Total Suspended	TSS	QCBLK176859-1	07/01/98	07/01/98	6.0	MG/L		1.00	1
NA	QCBLK176859-1	Total Suspended	TSS	QCBLK176859-1	07/01/98	07/01/98	1.00	MG/L	U	1.00	1
NA	QCCLS176859-1	Total Suspended	TSS	QCBLK176859-1	07/01/98	07/01/98	101	%REC			1

000039

Bechtel Hanford Incorporated
3350 George Washington Way
Richland, WA 99352

Project: 550.243

Category: Total Organic Carbon
Method: EPA 9060
Matrix: LIQUID

Sample Date : 06/26/98
Receipt Date : 06/29/98
Report Date : 07/02/98

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
BONRF6	18256-001	Total Organic C TOC		QCBLK176750-1	07/01/98	07/01/98	6.58	MG/L		1.00	1
NA	QCBLK176750-1	Total Organic C TOC		QCBLK176750-1	07/01/98	07/01/98	0.370	MG/L	U	1.00	1
NA	QCCLS176750-1	Total Organic C TOC		QCBLK176750-1	07/01/98	07/01/98	99	%REC			1

000040

Bechtel Hanford Incorporated
3350 George Washington Way
Richland, WA 99352

Project: 550.243

Category: Total Organic Carbon
Method: EPA 9060
Matrix: LIQUID

Sample Date : 06/30/98
Receipt Date : 06/30/98
Report Date : 07/06/98

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
BONRF7	18275-001	Total Organic C TOC		QCBLK176922-1	07/02/98	07/02/98	6.16	MG/L		1.00	1
NA	QCBLK176922-1	Total Organic C TOC		QCBLK176922-1	07/02/98	07/02/98	0.370	MG/L	U	1.00	1
NA	QCLCS176922-1	Total Organic C TOC		QCBLK176922-1	07/02/98	07/02/98	104	%REC			1

000041

Bechtel Hanford Incorporated
3350 George Washington Way
Richland, WA 99352

Project: 550.243

Category: TSS
Method: EPA 160.2
Matrix: LIQUID

Sample Date : 06/30/98
Receipt Date : 06/30/98
Report Date : 07/06/98

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
BONRF7	18275-001	Total Suspended TSS		QCBLK177013-1	07/02/98	07/02/98	9.0	MG/L		1.00	1
NA	QCBLK177013-1	Total Suspended TSS		QCBLK177013-1	07/02/98	07/02/98	1.00	MG/L	U	1.00	1
NA	QCLCS177013-1	Total Suspended TSS		QCBLK177013-1	07/02/98	07/02/98	101	%REC			1

000042

Analytical Data Package Prepared For

Bechtel Hanford



Analysis By

Quanterra Analytical Services
Richland Laboratory

Report Nbr: 5522

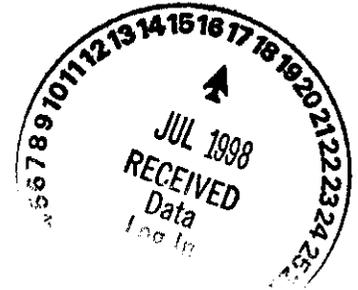
SDG No.	SAF No.	CLIENT ID No.	QUANTERRA ID No.
W02437	B98-078	B0NRF5	80641301
		B0NRF6	80648801
		B0NRF7	80700301

CERTIFICATE OF ANALYSIS

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

July 15, 1998

Attention: Joan Kessner



SAF Number : B98-078
Date First Sample Received : June 24, 1998
Number of Samples : Three
Sample Type : Water
SDG Number : W02437
Data Deliverable : 24 Hour Quick Turn / 14 Day Summary

I. Introduction

Between June 24, and June 30, 1998, three water samples were received by the Quanterra Environmental Services Richland Laboratory (QTESRL) for a 24 hour radiochemical analysis. Upon receipt, the samples were assigned the following laboratory ID numbers to correspond with the Bechtel Hanford (BHI) specific IDs:

<u>QTESRL ID#</u>	<u>BHI ID#</u>	<u>MATRIX</u>	<u>DATE OF RECEIPT</u>
80641301	B0NRF5	Water	6/24/98
80648801	B0NRF6	Water	6/29/98
80700301	B0NRF7	Water	6/30/98

II. Analytical Results/Methodology

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

Bechtel Hanford Inc.
July 15, 1998
Page 2

The requested analyses were:

- Gamma Spectroscopy**
- Gamma by method RICH-RC-5017
- Gas Proportional Counting**
- Gross Alpha by method RICH-RC-5014
- Gross Beta by method RICH-RC-5014

III. Quality Control

The analytical results for each analysis performed under SDG W02437 include a minimum of one Laboratory Control Sample (LCS), one method (reagent) blank, and one duplicate. Any exceptions have been noted in the "Comments" section. Since this sample was designated as a Quick Turn, an LCS duplicate was processed in place of a sample duplicate.

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

IV. Comments

Gamma Spectroscopy

Gamma by method RICH-RC-5017

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

Gas Proportional Counting

Gross Alpha by method RICH-RC-5014

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

Gross Beta by method RICH-RC-5014

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

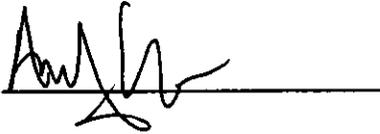
Bechtel Hanford Inc.

July 15, 1998

Page 3

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:

A handwritten signature in black ink, appearing to read "Andy Kopriva", written over a horizontal line.

Andy Kopriva
Project Manager

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland **SDG: /RPT GRP:** W02437 / 5522
LAB SAMPLE ID: 80641301 **MATRIX:** WATER
CLIENT ID: B0NRF5 **DATE RECEIVED:** 6/24/1998 4:25:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	-6.93E+03	U	3.2E+04	3.2E+04	5.06E+04	pCi/L	N/A	RICHRC5017
CO-60	1.06E+03	U	6.0E+03	6.0E+03	1.15E+04	pCi/L	N/A	RICHRC5017
CS-134	1.63E+03	U	7.2E+03	7.2E+03	1.25E+04	pCi/L	N/A	RICHRC5017
CS-137DA	3.18E+06		7.0E+04	3.3E+05	N/A	pCi/L	N/A	RICHRC5017
EU-152	2.37E+04	U	3.1E+04	3.1E+04	5.46E+04	pCi/L	N/A	RICHRC5017
EU-154	3.75E+03	U	1.2E+04	1.2E+04	2.60E+04	pCi/L	N/A	RICHRC5017
EU-155	-8.21E+03	U	2.4E+04	2.4E+04	3.98E+04	pCi/L	N/A	RICHRC5017
SB-125	5.43E+04	U	4.1E+04	4.2E+04	7.10E+04	pCi/L	N/A	RICHRC5017
ALPHA	4.89E+03		3.1E+03	3.2E+03	2.60E+03	pCi/L	100.00%	RICHRC5014
BETA	2.21E+07		4.0E+05	2.0E+06	2.50E+04	pCi/L	100.00%	RICHRC5014-B

Number of Results: 10

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland **SDG: /RPT GRP:** W02437 / 5522
LAB SAMPLE ID: 80648801 **MATRIX:** WATER
CLIENT ID: B0NRF6 **DATE RECEIVED:** 6/29/1998 3:05:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	-1.30E+04	U	3.4E+04	3.5E+04	5.38E+04	pCi/L	N/A	RICHRC5017
CO-60	-4.89E+03	U	6.0E+03	6.1E+03	9.78E+03	pCi/L	N/A	RICHRC5017
CS-134	8.07E+03	U	7.8E+03	7.8E+03	1.47E+04	pCi/L	N/A	RICHRC5017
CS-137DA	3.02E+06		7.1E+04	3.1E+05	N/A	pCi/L	N/A	RICHRC5017
EU-152	-1.86E+04	U	3.4E+04	3.4E+04	5.54E+04	pCi/L	N/A	RICHRC5017
EU-154	2.06E+03	U	1.2E+04	1.2E+04	2.49E+04	pCi/L	N/A	RICHRC5017
EU-155	5.38E+03	U	2.4E+04	2.4E+04	3.98E+04	pCi/L	N/A	RICHRC5017
SB-125	-2.31E+04	U	4.3E+04	4.3E+04	6.81E+04	pCi/L	N/A	RICHRC5017
ALPHA	4.39E+03		2.7E+03	2.8E+03	2.54E+03	pCi/L	100.00%	RICHRC5014
BETA	2.51E+07		4.3E+05	2.3E+06	2.37E+04	pCi/L	100.00%	RICHRC5014-B

Number of Results: 10

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland **SDG: /RPT GRP:** W02437 / 5522
LAB SAMPLE ID: 80700301 **MATRIX:** WATER
CLIENT ID: BONRF7 **DATE RECEIVED:** 6/30/1998 2:40:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	-1.28E+04	U	3.2E+04	3.2E+04	5.01E+04	pCi/L	N/A	RICHRC5017
CO-60	-2.17E+02	U	5.9E+03	5.9E+03	1.11E+04	pCi/L	N/A	RICHRC5017
CS-134	5.19E+01	U	7.4E+03	7.4E+03	1.29E+04	pCi/L	N/A	RICHRC5017
CS-137DA	2.99E+06		7.0E+04	3.1E+05	N/A	pCi/L	N/A	RICHRC5017
EU-152	-4.91E+03	U	3.1E+04	3.1E+04	5.23E+04	pCi/L	N/A	RICHRC5017
EU-154	1.41E+04	U	1.0E+04	1.0E+04	2.80E+04	pCi/L	N/A	RICHRC5017
EU-155	-2.03E+04	U	2.3E+04	2.3E+04	3.80E+04	pCi/L	N/A	RICHRC5017
SB-125	2.81E+04	U	4.1E+04	4.1E+04	6.85E+04	pCi/L	N/A	RICHRC5017
ALPHA	4.51E+03		1.8E+03	2.0E+03	1.45E+03	pCi/L	100.00%	RICHRC5014
BETA	1.89E+07		3.7E+05	1.7E+06	2.30E+04	pCi/L	100.00%	RICHRC5014-B

Number of Results: 10

BLANK RESULTS

LAB NAME: QUANTERRA, Richland SDG /RPT GRP: W02437 / 5522
 LAB SAMPLE ID: J064131B MATRIX: WATER

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	-4.51E+01	U	6.9E+02	6.9E+02	1.17E+03	pCi/L	N/A	RICHRC5017
CO-60	1.52E+02	U	1.4E+02	1.4E+02	4.00E+02	pCi/L	N/A	RICHRC5017
CS-134	1.83E+02	U	1.5E+02	1.5E+02	3.26E+02	pCi/L	N/A	RICHRC5017
CS-137DA	1.16E+02	U	1.8E+02	1.8E+02	3.64E+02	pCi/L	N/A	RICHRC5017
EU-152	3.53E+02	U	2.9E+02	3.0E+02	6.81E+02	pCi/L	N/A	RICHRC5017
EU-154	1.65E+02	U	2.3E+02	2.3E+02	7.67E+02	pCi/L	N/A	RICHRC5017
EU-155	6.45E+01	U	3.0E+02	3.0E+02	5.40E+02	pCi/L	N/A	RICHRC5017
SB-125	2.77E+02	U	4.3E+02	4.3E+02	8.42E+02	pCi/L	N/A	RICHRC5017
ALPHA	2.62E+00	U	1.1E+01	1.1E+01	3.14E+01	pCi/L	100.00%	RICHRC5014
BETA	1.04E+02	U	6.7E+01	6.8E+01	1.25E+02	pCi/L	100.00%	RICHRC5014-B

Number of Results: 10

BLANK RESULTS

LAB NAME: QUANTERRA, Richland SDG /RPT GRP: W02437 / 5522
LAB SAMPLE ID: J064881B MATRIX: WATER

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
ALPHA	8.38E+00	U	1.5E+01	1.5E+01	2.96E+01	pCi/L	100.00%	RICHRC5014
BETA	2.14E+01	U	5.3E+01	5.3E+01	1.25E+02	pCi/L	100.00%	RICHRC5014-B

Number of Results:

BLANK RESULTS

LAB NAME: QUANTERRA, Richland **SDG /RPT GRP:** W02437 / 5522
LAB SAMPLE ID: J064881X **MATRIX:** WATER

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	-1.99E+02	U	5.2E+02	5.2E+02	8.32E+02	pCi/L	N/A	RICHRC5017
CO-60	1.30E+02	U	1.2E+02	1.2E+02	3.42E+02	pCi/L	N/A	RICHRC5017
CS-134	-1.25E+02	U	1.5E+02	1.5E+02	2.41E+02	pCi/L	N/A	RICHRC5017
CS-137DA	1.18E+02	U	1.5E+02	1.5E+02	3.22E+02	pCi/L	N/A	RICHRC5017
EU-152	-4.21E+01	U	3.9E+02	3.9E+02	6.95E+02	pCi/L	N/A	RICHRC5017
EU-154	-4.71E+02	U	5.0E+02	5.1E+02	7.37E+02	pCi/L	N/A	RICHRC5017
EU-155	-2.50E+02	U	3.5E+02	3.5E+02	5.68E+02	pCi/L	N/A	RICHRC5017
SB-125	-5.78E+02	U	4.0E+02	4.1E+02	5.83E+02	pCi/L	N/A	RICHRC5017

Number of Results: 8

BLANK RESULTS

LAB NAME: QUANTERRA, Richland **SDG /RPT GRP:** W02437 / 5522
LAB SAMPLE ID: J070031B **MATRIX:** WATER

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
AM-241	1.08E+03	U	1.2E+03	1.2E+03	2.33E+03	pCi/L	N/A	RICHRC5017
CO-60	6.06E+01	U	2.1E+02	2.1E+02	4.27E+02	pCi/L	N/A	RICHRC5017
CS-134	-1.20E+02	U	1.5E+02	1.5E+02	2.49E+02	pCi/L	N/A	RICHRC5017
CS-137DA	-5.68E+01	U	1.9E+02	1.9E+02	3.14E+02	pCi/L	N/A	RICHRC5017
EU-152	-5.48E+00	U	4.2E+02	4.2E+02	7.21E+02	pCi/L	N/A	RICHRC5017
EU-154	-4.09E+01	U	3.5E+02	3.5E+02	7.60E+02	pCi/L	N/A	RICHRC5017
EU-155	-4.55E+00	U	3.0E+02	3.0E+02	5.34E+02	pCi/L	N/A	RICHRC5017
SB-125	-8.75E+01	U	3.9E+02	3.9E+02	6.55E+02	pCi/L	N/A	RICHRC5017
ALPHA	-2.52E+00	U	1.5E+00	1.5E+00	1.64E+01	pCi/L	100.00%	RICHRC5014
BETA	1.48E+01	U	5.1E+01	5.1E+01	1.23E+02	pCi/L	100.00%	RICHRC5014-B

Number of Results: 10

LABORATORY CONTROL SAMPLE

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02437 / 5522
LAB SAMPLE ID: J064131S MATRIX: WATER

ANALYTE	RESULT	COUNTING Q	ERROR (2 s)	TOTAL ERROR (2 s)	MDA/ IDL	REPORT UNIT	YIELD	EXPECTED	RECOVER
CO-60	3.19E+03	7.0E+02	7.7E+02	N/A	pCi/L	N/A	3.53E+03	90.23%	
CS-137DA	3.38E+03	6.2E+02	7.0E+02	N/A	pCi/L	N/A	3.54E+03	95.39%	
EU-152	1.96E+04	2.2E+03	3.0E+03	N/A	pCi/L	N/A	2.53E+04	77.62%	
ALPHA	1.43E+03	1.7E+02	3.5E+02	4.09E+01	pCi/L	100.00%	1.35E+03	105.88%	
BETA	1.39E+03	1.8E+02	2.2E+02	1.25E+02	pCi/L	100.00%	1.36E+03	102.08%	

Number of Results: 5

LABORATORY CONTROL SAMPLE

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02437 / 5522
 LAB SAMPLE ID: J064132S MATRIX: WATER

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/ IDL	REPORT UNIT	YIELD	EXPECTED	RECOVER
CO-60	3.65E+03		7.4E+02	8.3E+02	N/A	pCi/L	N/A	3.53E+03	103.32%
CS-137DA	3.56E+03		6.7E+02	7.6E+02	N/A	pCi/L	N/A	3.54E+03	100.65%
EU-152	2.10E+04		1.9E+03	2.8E+03	N/A	pCi/L	N/A	2.53E+04	82.73%
ALPHA	7.50E+02		1.3E+02	2.0E+02	3.60E+01	pCi/L	100.00%	8.12E+02	92.43%
BETA	1.46E+03		1.8E+02	2.2E+02	1.18E+02	pCi/L	100.00%	1.37E+03	106.59%

Number of Results: 5

LABORATORY CONTROL SAMPLE

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02437 / 5522
LAB SAMPLE ID: J064881S MATRIX: WATER

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/ IDL	REPORT UNIT	YIELD	EXPECTED	RECOVER
CO-60	3.94E+03		8.3E+02	9.2E+02	N/A	pCi/L	N/A	3.53E+03	111.65%
CS-137DA	3.12E+03		7.4E+02	8.0E+02	N/A	pCi/L	N/A	3.55E+03	87.82%
EU-152	2.39E+04		2.1E+03	3.2E+03	N/A	pCi/L	N/A	2.53E+04	94.60%
ALPHA	1.13E+03		1.5E+02	2.8E+02	2.96E+01	pCi/L	100.00%	1.36E+03	83.03%
BETA	1.49E+03		1.8E+02	2.2E+02	1.22E+02	pCi/L	100.00%	1.36E+03	109.79%

Number of Results: 5

LABORATORY CONTROL SAMPLE

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02437 / 5522
LAB SAMPLE ID: J064882S MATRIX: WATER

ANALYTE	RESULT	COUNTING Q ERROR (2 s)	TOTAL ERROR (2 s)	MDA/ IDL	REPORT UNIT	YIELD	EXPECTED	RECOVER
CO-60	3.45E+03	7.0E+02	7.8E+02	N/A	pCi/L	N/A	3.53E+03	97.66%
CS-137DA	3.33E+03	5.8E+02	6.7E+02	N/A	pCi/L	N/A	3.54E+03	93.94%
EU-152	2.31E+04	2.0E+03	3.0E+03	N/A	pCi/L	N/A	2.53E+04	91.18%
ALPHA	1.25E+03	1.6E+02	3.1E+02	3.43E+01	pCi/L	100.00%	1.36E+03	91.66%
BETA	1.34E+03	1.8E+02	2.2E+02	1.25E+02	pCi/L	100.00%	1.36E+03	98.60%

Number of Results: 5

LABORATORY CONTROL SAMPLE

LAB NAME: QUANTERRA, Richland **SDG: /RPT GRP:** W02437 / 5522
LAB SAMPLE ID: J070031S **MATRIX:** WATER

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/ IDL	REPORT UNIT	YIELD	EXPECTED	RECOVER
CO-60	3.13E+03		7.0E+02	7.7E+02	N/A	pCi/L	N/A	3.53E+03	88.76%
CS-137DA	3.45E+03		6.6E+02	7.5E+02	N/A	pCi/L	N/A	3.55E+03	97.19%
EU-152	2.41E+04		2.1E+03	3.2E+03	N/A	pCi/L	N/A	2.53E+04	95.51%
ALPHA	1.34E+03		1.1E+02	3.0E+02	1.91E+01	pCi/L	100.00%	1.36E+03	98.33%
BETA	1.32E+03		1.7E+02	2.1E+02	1.30E+02	pCi/L	100.00%	1.37E+03	96.79%

Number of Results:

LABORATORY CONTROL SAMPLE

LAB NAME: QUANTERRA, Richland **SDG: /RPT GRP:** W02437 / 5522
LAB SAMPLE ID: J070032S **MATRIX:** WATER

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/ IDL	REPORT UNIT	YIELD	EXPECTED	RECOVER
CO-60	3.27E+03		6.5E+02	7.3E+02	N/A	pCi/L	N/A	3.53E+03	92.50%
CS-137DA	3.63E+03		6.7E+02	7.6E+02	N/A	pCi/L	N/A	3.54E+03	102.61%
EU-152	2.38E+04		2.0E+03	3.1E+03	N/A	pCi/L	N/A	2.53E+04	94.14%
ALPHA	1.30E+03		1.0E+02	2.9E+02	1.64E+01	pCi/L	100.00%	1.36E+03	95.92%
BETA	1.30E+03		1.7E+02	2.1E+02	1.23E+02	pCi/L	100.00%	1.36E+03	95.69%

Number of Results:

**Quanterra Data Review Checklist
RADIOCHEMISTRY**

Work Order number (s): <u>806413</u>				
Client ID: <u>BHQ</u>				
Due Date: <u>6-26-98</u>				
Lab Sample Number or SDG: <u>W02437</u>				
Method Test Parameters: <u>Gamma</u>				
Matrix: <u>Water</u>				
Review Item	Yes (✓)	No (✓)	N/A (✓)	2 nd 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]*
 Second Level Review: *[Signature]*
 Form #: LS-038.2 /96, Rev.4

Date: 6-26-98
 Date: 6/26/98

Report BHQ's!

**Quanterra Data Review Checklist
RADIOCHEMISTRY**

Work Order number (s): <u>806988</u>				
Client ID: <u>BHQ</u>				
Due Date: <u>7-1-98</u>				
Lab Sample Number or SDG: <u>W02437</u>				
Method Test Parameters: <u>Gamma</u>				
Matrix: <u>Water</u>				
Review Item	Yes (✓)	No (✓)	N/A (✓)	2 nd 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 Kempema Date: 7-1-98
 Second Level Review: AM Date: 7/1/98
 Form #: LS-038,2/96, Rev.4

Report BHQ⁵ + Sb125, Cs137, Am241/H8.

⁵ = Co60, Cs137 Eu152, Eu154, Eu155

**Quanterra Data Review Checklist
RADIOCHEMISTRY**

Work Order number (st) <u>807003</u>				
Client ID: <u>BHQ</u>				
Due Date: <u>7-2-98</u>				
Lab Sample Number or SDG: <u>W02937</u>				
Method Test Parameters: <u>Gamma</u>				
Matrix: <u>Water</u>				
Review Item	Yes (✓)	No (✓)	N/A (✓)	2 nd 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?		/	AAE	
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?		/	AAE	
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: MDAS > ROL, extremely high activity produced volume analyzed

First Level Review: [Signature]
 Second Level Review: [Signature]
 Form #: LS-038.2/96, Rev. 4

Date: 7-2-98
 Date: 9/2/98

**Quanterra Data Review Checklist
RADIOCHEMISTRY**

Work Order number (st): <u>806413</u>				
Client ID: <u>BHQ</u>				
Due Date: <u>6-26-98</u>				
Lab Sample Number or SDG: <u>W02437</u>				
Method Test Parameters: <u>Alpha</u>				
Matrix: <u>Water</u>				
Review Item	Yes (✓)	No (✓)	NA (✓)	2 nd 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: *Bob Kempema*
 Second Level Review: *[Signature]*
 Form #: LS-038.2 /96/ Rev.4

Date: 6-26-98
 Date: 6/26/98

**Quanterra Data Review Checklist
RADIOCHEMISTRY**

Work Order number (sk)	806984			
Client ID:	BHQ			
Due Date:	7-1-98			
Lab Sample Number or SDG:	W02437			
Method Test Parameters:	a			
Matrix:	Water			
Review Item	Yes (✓)	No (✓)	N/A (✓)	2 nd 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 Thompson
 Second Level Review: [Signature]
 Form #: LS-038.2/96, Rev 4

Date: 7-1-98
 Date: 7/1/98

**Quanterra Data Review Checklist
RADIOCHEMISTRY**

Work Order number (s):	807003			
Client ID:	BHQ			
Due Date:	7/2/98			
Lab Sample Number or SDG:	W02437			
Method Test Parameters:	g			
Matrix:	Water			
Review Item	Yes (✓)	No (✓)	NA (✓)	2 nd 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?	APC	OK APC	APC	—
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?	APC	—	APC	—
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?			APC	
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?	—	US		
5. Were all calculations checked at a minimum frequency?	—			
6. Units checked?	—			

Comments on any "No" response: activity RD = 7 pCi/L Reduced volume - high sample

First Level Review: [Signature]
 Second Level Review: [Signature]
 Form #: LS-038.2/96, Rev. 4

Date: 7-2-98
 Date: 7/2/98

**Quanterra Data Review Checklist
RADIOCHEMISTRY**

Work Order number (s): <u>806413</u>				
Client ID: <u>BHQ</u>				
Due Date: <u>6-26-98</u>				
Lab Sample Number or SDG: <u>W92437</u>				
Method Test Parameters: <u>Beta</u>				
Matrix: <u>Water</u>				
Review Item	Yes (✓)	No (✓)	NA (✓)	2 nd 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: *Paul Kempema*
 Second Level Review: *[Signature]*
 Form #: LS-038.2/96, Rev. 4

Date: 6-26-98
 Date: 6/26/98

**Quanterra Data Review Checklist
RADIOCHEMISTRY**

Work Order number (s): <u>806488</u>				
Client ID: <u>BHQ</u>				
Due Date: <u>7-1-98</u>				
Lab Sample Number or SDG: <u>W02437</u>				
Method Test Parameters: <u>B</u>				
Matrix: <u>Water</u>				
Review Item	Yes (✓)	No (✓)	N/A (✓)	2 nd 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? <u>✓</u>	—			—
5. Were all calculations checked at a minimum frequency?	—			—
6. Units checked?	—			—

Comments on any "No" response: _____

First Level Review: [Signature]
 Second Level Review: [Signature]
 Form #: LS-038,2/96, Rev.4

Date: 7-1-98
 Date: 7/1/98

**Quanterra Data Review Checklist
RADIOCHEMISTRY**

Work Order number (s): <u>807003</u>				
Client ID: <u>BHQ</u>				
Due Date: <u>7-2-98</u>				
Lab Sample Number or SDG: <u>W02437</u>				
Method Test Parameters: <u>B</u>				
Matrix: <u>BHQ</u>				
Review Item	Yes (✓)	No (✓)	N/A (✓)	2 nd 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? <u>MDA 1707-276</u>				✓
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? <u>JS</u>	✓			✓
5. Were all calculations checked at a minimum frequency?			✓	
6. Units checked?			✓	

Comments on any "No" response: MDL = 8 pCi/L, reduced volumes - high activity

First Level Review: [Signature]

Date: 7-2-98

Second Level Review: [Signature]

Date: 7/2/98

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

**CHAIN OF
CUSTODY FORMS**

Bechtel Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST						B98-078-02		Page 1 of 1	
Collector Rich Mahood		Company Contact Steve Vail		Telephone No. 373-3785		Project Coordinator TRENT, SJ		Data Turnaround 29 hrs			
Project Designation 105-N Basin - Bulk Water Sampling - Quick Turn		Sampling Location 100N		SAF No. B98-078							
Ice Chest No.		Field Logbook No.		Method of Shipment Hand deliver - government vehicle							
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				Preservation	HNO3 to pH <2	HNO3 to pH <2	None	HCl or H2SO4 to pH <2 Cool	Cool 4C		
				Type of Container	P	P	P	aG	P		
Special Handling and/or Storage Cool 4C				No. of Container(s)	0	1	1	1	1		
				Volume	20ml	20ml	20ml	250ml	500ml		
SAMPLE ANALYSIS				Gross Alpha; Gross Beta	See item (1) in Special Instructions.	Activity Scan	TOC - 9060	TSS - 160.2			
806412				SIX WO2437		806413		< 100 cpm on outside of cooler			
Sample No.	Matrix *	Sample Date	Sample Time								
BONRF5 01	Water	6/23/98	23:00	X	X	X	X	X	200 cpm 20ml container 400-500 cpm 250, 500 ml container		
CHAIN OF POSSESSION				SPECIAL INSTRUCTIONS				Matrix *			
Relinquished By: Richard O. Mahood, Date/Time: 6/24/98 02:30 Received By: Janet K. Roth, Date/Time: 6/24/98 0:00 Relinquished By: Janet K. Roth, Date/Time: 6/29/98 14:55 Received By: R. Nielson, Date/Time: 6/24/98 14:55 Relinquished By: R. Nielson, Date/Time: 6/24/98 16:25 Received By: [Signature], Date/Time: 6/24/98 16:25				** Janet Roth or Rich Mahood are to provide direction to the samplers concerning the required turnaround time for each sample. ** The samplers are required to provide the proper turnaround time on each Chain of Custody. (1) Gamma Spectroscopy (Water) (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Antimony-125, Cesium-134) Gross Alpha/Beta to be taken out of the Gamma container. Quick turnaround contact S. Vail, S. Trout, or J. Roth 373-1051				# = 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			

0028

GUIDE 161 RADIOACTIVE MATERIALS
(LOW LEVEL RADIATION)

NAERG96

POTENTIAL HAZARDS**HEALTH**

- Radiation presents minimal risk to transport workers, emergency response personnel, and the public during transportation accidents. Packaging durability is related to potential hazards of material.
- Low-level radioactive material; very low radiation hazard to people.
- Quantity of material presents low radiation hazard if released from package during accident.
- Some radioactive materials cannot be detected by commonly available instruments.
- Packages do not have RADIOACTIVE I, II, or III labels. Some may have EMPTY labels or may have the word "Radioactive" in the package marking.
- If any radioactive contamination occurs, it will be extremely low level.

FIRE OR EXPLOSION

- Some of these materials may burn, but most do not ignite readily.
- Radioactivity does not change flammability or other properties of materials.

PUBLIC SAFETY

- CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.
- Priorities for rescue, life-saving, first aid, and control of fire and other hazards are higher than the priority for measuring radiation levels.
- Radiation Authority must be notified of accident conditions, and is usually responsible for radiological decisions.
- Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions.
- Stay upwind.
- Keep unauthorized personnel away.
- Detain or isolate uninjured persons or equipment suspected to be contaminated; delay decontamination and cleanup until instructions are received from Radiation Authority.

PROTECTIVE CLOTHING

- Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters protective clothing will provide adequate protection.

EVACUATION**Large Spill**

- Consider initial downwind evacuation for at least 100 meters (330 feet).

Fire

- When a large quantity of this material is involved in a major fire, consider an initial evacuation distance of 300 meters (1000 feet) in all directions.

NAERG96

RADIOACTIVE MATERIALS
(LOW LEVEL RADIATION)**GUIDE 161****EMERGENCY RESPONSE****FIRE**

- Presence of radioactive material will not change effectiveness of fire control techniques.
- Move containers from fire area if you can do it without risk.
- Do not move damaged packages; move undamaged packages out of fire zone.

Small Fires

- Dry chemical, CO₂, water spray or regular foam.

Large Fires

- Water spray, fog (flooding amounts).

SPILL OR LEAK

- Do not touch damaged packages or spilled material.

Liquid Spills

- Cover with sand, earth or other noncombustible absorbent material.
- Cover powder spill with plastic sheet or tarp to minimize spreading.

FIRST AID

- Medical problems take priority over radiological concerns.
- Use first aid treatment according to the nature of the injury.
- Do not delay care and transport of a seriously injured person.
- Apply artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Injured persons who contacted released material may be a minor contamination problem to contacted persons, equipment and facilities.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-
LIMITED QUANTITY OF MATERIAL, 7, UN 2910THIS PACKAGE CONFORMS TO THE CONDITIONS
AND LIMITATIONS SPECIFIED IN 49 CFR
173.421 FOR RADIOACTIVE MATERIAL,
EXCEPTED PACKAGE-LIMITED QUANTITY OF
MATERIAL, UN 2910U.S. DEPARTMENT OF ENERGY, RICHLAND WA.
BY RUST FEDERAL SERVICES HANFORD
P.O. BOX 1970, 2355 STEVENS DRIVE
RICHLAND, WA 99352

Weight

$(790 \text{ ml}) \times (1 \text{ gm/ml}) = 790 \text{ gms.}$

Have

Cs-137 $2.56 \times 10^3 \text{ pCi/gm} = 2.56 \times 10^{-9} \text{ Ci/gm} \Rightarrow 2.02 \times 10^6 \text{ Ci}$

Sr-90 $2.41 \times 10^4 \text{ pCi/gm} = 2.41 \times 10^{-8} \text{ Ci/gm} \Rightarrow 1.90 \times 10^5 \text{ Ci}$

Total Ci $2.11 \times 10^5 \text{ Ci}$

Total TBq. $7.8 \times 10^{-7} \text{ TBq}$

Allowed

<u>Isotopes</u>	<u>A₂</u>	<u>A₂ (10⁻⁴)</u>
Cs-137	13.5 Ci	$1.35 \times 10^{-3} \text{ Ci}$
Sr-90	2.7 Ci	$2.7 \times 10^{-4} \text{ Ci}$

Have vs Allowed

$\frac{\text{Total Have}}{\text{most Restrictive Allowed}} = \frac{2.11 \times 10^5 \text{ Ci}}{2.7 \times 10^{-4} \text{ Ci}} < 1$

\therefore Ltd qty.

Historical Data Representation of BONKFS

DAS
6/24/98

SDG NU	SAMP NUM	METHOD NAME	CON ID	CON LONG NAME	VALUE RP	ANAL U	LAB	EDD FI
W02318	BONKT2	GADGPC	12587-46-1	Gross alpha	8440	PC/L		W02318
W02318	BONKT2	GADGPC	12587-46-1	Gross alpha	8440	PC/L		W02318
W02318	BONKT2	GAMMAH1	10045-97-3	Cesium-137	2520000	PC/L		W02318
W02318	BONKT2	GAMMAH1	10045-97-3	Cesium-137	2560000	PC/L		W02318
W02318	BONKT2	GAMMAH1	10198-40-0	Cobalt-60	8440	PC/L	U	W02318
W02318	BONKT2	GAMMAH1	10198-40-0	Cobalt-60	5650	PC/L		W02318
W02318	BONKT2	GAMMAH1	13967-70-9	Cesium-134	4450	PC/L	U	W02318
W02318	BONKT2	GAMMAH1	13967-70-9	Cesium-134	1670	PC/L	U	W02318
W02318	BONKT2	GAMMAH1	14234-35-6	Antimony-125	6500	PC/L	U	W02318
W02318	BONKT2	GAMMAH1	14234-35-6	Antimony-125	5660	PC/L	U	W02318
W02318	BONKT2	GAMMAH1	14391-16-3	Europium-155	10700	PC/L	U	W02318
W02318	BONKT2	GAMMAH1	14391-16-3	Europium-155	-2420	PC/L	U	W02318
W02318	BONKT2	GAMMAH1	14596-10-2	Americium-241	-2480	PC/L	U	W02318
W02318	BONKT2	GAMMAH1	14596-10-2	Americium-241	4770	PC/L	U	W02318
W02318	BONKT2	GAMMAH1	14683-23-9	Europium-152	-7880	PC/L	U	W02318
W02318	BONKT2	GAMMAH1	14683-23-9	Europium-152	-2000	PC/L	U	W02318
W02318	BONKT2	GAMMAH1	15585-10-1	Europium-154	705	PC/L	U	W02318
W02318	BONKT2	GAMMAH1	15585-10-1	Europium-154	387	PC/L	U	W02318
W02318	BONKT2	GAMMAH1	U-238	Uranium-238	277000	PC/L	U	W02318
W02318	BONKT2	GAMMAH1	U-238	Uranium-238	277000	PC/L	U	W02318
W02318	BONKT2	GBDPC	12587-47-2	Gross beta	24100000	PC/L		W02318
W02318	BONKT2	GBDPC	12587-47-2	Gross beta	24100000	PC/L		W02318

 $\beta = 5r-90$

Note: Two values reported for ea. isotope because re-run of sample requested with lengthened count time to obtain Co-60 value.

Per R. Weiss
5/5/98

BONKT2 used as representation of N-Basin water.

Author: Richard O Mahood at ~BHI019
Date: 6/24/98 1:23 AM
Priority: Normal
TO: Janet K Roth at ~BHI014
TO: David A St John at ~BHI001
TO: Steven W Vail at ~BHI018
TO: Stephen J Trent at ~BHI014
Subject: Samples Collected 6/23/98

----- Message Contents -----

← Janet

The sample (500 ml, 250 ml, 20 ml, 20 ml) BONRF5 is in the Corridor 22 Airlock RMA in a cooler bagged with ice and with a 125 ml potable water temperature vial. The sample is ready for Dave St John's folks to do the final packaging for shipment (attach labels, weigh, tape the cooler, etc.) The sample needs a shipment survey for Dave St John's folks to transport it tomorrow (and a final RCHP sign off in the package). The Chain of Custody is on your keyboard.

We need quick turnaround? on this sample. We also will need the QC samples run on this one also.

See you later.

← Rich Mahood

1. SHIP FROM U.S. DEPT. OF ENERGY C/O
 Company BHT - Hanford
 Address 105-N Basin, 100-N
 City, State, Zip Richland, WA 99352
 Contact David St. John
 Phone 509-376-5540 / 509-531-0621

RADIOACTIVE SHIPMENT RECORD 1038673
Page 1 of 2

Ship Prepaid Collect 4.
 Via Motor Air Psgr UPS
 Rail Air Cargo Site Carrier

SHIPMENT AUTHORIZATION NUMBER _____

2. SHIP TO
 Company Quanterra
 Address 2800 G. Wash. Way
 City, State, Zip Richland WA 99352
 Attention Karen Actenberg
 Phone 509-375-2131

Markings Applied 6.
 Radioactive - LSA
 Radioactive - SCO
 Type A
 Type B with trefoil
 LSA Description 8.
 LSA-I
 LSA-II
 LSA-III
 SCO-I
 SCO-II

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

5. HM Proper Shipping Name: _____ Radioactive Material, _____

<input type="checkbox"/>	excepted package - empty packaging	7	UN2910
<input type="checkbox"/>	excepted package - instruments or articles	7	UN2910
<input checked="" type="checkbox"/>	excepted package - limited quantity of material	7	UN2910
<input type="checkbox"/>	excepted package - articles manufactured from natural or depleted uranium or natural thorium	7	UN2910
<input type="checkbox"/>	Special Form, n.o.s.	7	UN2974
<input type="checkbox"/>	Low Specific Activity, n.o.s.	7	UN2912
<input type="checkbox"/>	n.o.s.	7	UN2982
<input type="checkbox"/>	Fissile, n.o.s.	7	UN2918
<input type="checkbox"/>	Surface Contaminated Object	7	UN2913

Labels Applied 10.
 Empty
 Radioactive White - I
 Radioactive Yellow - II
 Radioactive Yellow - III
 Subsidiary Hazard

EMERGENCY RESPONSE 9.
 Telephone 509-373-3800
 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

Warning - Fissile Material Controlled Shipment. Do Not Load More Than 1/4 Packages Per Vehicle. In Loading and Storage Areas, Keep at Least 20 Feet From Other Packages Bearing Radioactive Labels.

11. No. Pkg.	Model/Package	COG/Spec	Serial No.	Seal No.	Isotopes	T.I.	Bq/Package	Gr. Wt. Kg.	
1	Strong Tight	N/A	5ML574	TOP	Co-137, Sr-90	N/A	7.8x1572	24 KG	
Polymer cooler containing sample BONREFS in double poly bag and packed on wet ice									
TOTALS							N/A	7.8x1572	24 KG

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 M.G. St. John On behalf of DOE-RL Date 6-24-98 Organization T.C. Complete Cost Code (Inc. End Function) DE 8250

13. Surface Dose Rate of Package <0.005 or _____ mSv/hr
 <0.5 or _____ mrem/hr (N+β γ)

Dose Rate @ 1 Meter from Surface of Package <0.005 or _____ mSv/hr
 <0.5 or _____ mrem/hr (N+β γ)

Smears of Outer Container <0.41 Bq (22 dpm) β γ/cm²
 <0.04 Bq (2.2 dpm) α/cm²
 <Tbl. 2-2 HSRM 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)

Signature - Radiation Monitoring M.G. St. John Bldg. 05N Survey No. 2993-2440 Date 6/24/98

14. TRANSPORTER DRIVER SIGNATURE Karen Nielsen RECEIVER RECEIVER SIGNATURE M.G. St. John Date 6/24/98

15. OFFSITE AUTHORIZATION
 Shipment has been inspected and verified to be in compliance with DOT regulations
 Authorized Signature M.G. St. John Printed Name M.G. ST. JOHN Date 6-24-98

16. AUTHORIZATION FOR SHIPMENT
 AIR TRANSPORT CERTIFICATION N/A
 CARGO AIRCRAFT Cargo Aircraft Only Labels Applied Ltd Qty <3 T.I.
 PASSENGER AIRCRAFT Research/Medical Diagnosis Human Medical Research
 Pkg. Dimensions (cm) N/A

17. OFFSITE AUTHORIZATION
 Tracking No. RMB4 2616 Date Shipped 6-24-98 Routing CH2M ETA 6-24-98
 Surveyed By N/A Date N/A Approved for Shipment Offsite M.G. St. John Date 6-24-98

Figure 1

SAMPLE CHECK-IN LIST

Date/Time Received: 6/24/98 1625 SG#: W02437
Work Order Number: 806412 + 413 SAF #: B98-078
Shipping Container ID: SML-574 Chain of Custody #: B98-078-02

- 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 2°c
- 5. Vermiculite/packing materials is Wet Dry *ice around samples*
- 6. Number of samples in shipping container: one sample, Four containers
- 7. Sample holding times exceeded? Yes No

8. Samples have: <input type="checkbox"/> tape <input checked="" type="checkbox"/> custody seals <input checked="" type="checkbox"/> hazard labels <input checked="" type="checkbox"/> appropriate sample labels
9. Samples are: <input checked="" type="checkbox"/> in good condition <input type="checkbox"/> broken <input type="checkbox"/> leaking <input type="checkbox"/> 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: 6/24/98

Telephoned To: _____ On _____ By _____

Client Sample Screening Results

25-Jun-98

ml vlt

CLIENT CODE	ID	MATRIX	RECEIVED	DETECTOR	ACQ DATE	SAMPLE	MINUTES	CNTS A	NET CPM A	CNTS B	NET CPM B			
BHQ	BONRF5		6/24/1998 4:55:00 PM	QUAD22C	6/25/1998 9:52:55 AM	BONRF5	10	616	61.5385714	28388	2837.5057			
		LIQUID		Bkg:	6/25/1998 2:28:45 AM	BKG	700	43	0.06142857	.906	1.2942857			
Anl Date:	6/25/1998	Tot Sa, Alq:	6.00E-02	, 1.00E-01	Alp; (Dpm/	8.27E+01	(uCI/	2.24E-02	(pCV/	3.73E+05	± 1.9E+04	CAT	6.7E-05	Lab
Ppt mg:	0	Units:	L	, ml	Bet; Alq):	5.24E+03	Sa):	1.42E+00	Lg):	2.36E+07	± 1.4E+05	III	2.1E-06	Alq Lg
BHQ	BONRF5A		6/24/1998 4:55:00 PM	QUAD22C	6/25/1998 10:04:55 AM	BONRF5A	10	463	46.2385714	23577	2356.4057			
		LIQUID		Bkg:	6/25/1998 2:28:45 AM	BKG	700	43	0.06142857	.906	1.2942857			
Anl Date:	6/25/1998	Tot Sa, Alq:	6.00E-02	, 1.00E-01	Alp; (Dpm/	5.44E+01	(uCI/	1.47E-02	(pCV/	2.45E+05	± 1.6E+04	CAT	1.0E-04	Lab
Ppt mg:	0	Units:	L	, ml	Bet; Alq):	4.35E+03	Sa):	1.18E+00	Lg):	1.96E+07	± 1.3E+05	III	2.6E-06	Alq Lg

BONRF5 is actual sample

BONRF5A is duplicate screen

BD 6/25/98

0035

Bechtel Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				B98-078-03	Page 1 of 1
Collector Rich Mahood		Company Contact Steve Vail		Telephone No. 373-3785		Project Coordinator TRENT, SJ	
Project Designation 105-N Basin - Bulk Water Sampling - Quick Turn		Sampling Location 100N		SAF No. B98-078		Data Turnaround 2hr turnaround	
Ice Chest No. ERC-96-012		Field Logbook No.		Method of Shipment Hand deliver - government vehicle			
Shipped To Quanterra Incorporated		Offsite Property No. NA		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	HNO3 to pH <2	HNO3 to pH <2	None	HCl or H2SO4 to pH <2 Cool	Cool 4C					
		Type of Container	P	P	P	aG	P				
	No. of Container(s)	0	1	1	1	1					
Special Handling and/or Storage Cool 4C	Volume	20ml	20ml	20ml	250ml	500ml					

SAMPLE ANALYSIS				Gross Alpha, Gross Beta	See item (1) in Special Instructions.	Activity Scan	TOC - 9060	TSS - 160.2				
806487				SDG	W02437	806488						
Sample No.	Matrix *	Sample Date	Sample Time									
BONRF6	01	Water	6/26/98	16:00	X	X	X	X	X			

CHAIN OF POSSESSION				SPECIAL INSTRUCTIONS				Matrix *					
Kept in RMA in corridor 22 with custody seal until shipment				** Janet Roth or Rich Mahood are to provide direction to the samplers concerning the required turnaround time for each sample. ** The samplers are required to provide the proper turnaround time on each Chain of Custody.				S = Soil SE = Sediment SO = Solid SL = Sludge W = Water O = Oil A = Air DS = Drum Solids DL = Drum Liquids T = Tissue W1 = Wipe L = Liquid V = Vegetation X = Other					
Relinquished By Richard O. Mahood 6/26/98 Date/Time 16:45		Received By Matthew D. Brown 6/26/98 Date/Time 16:45		Relinquished By Matthew D. Brown 6/29/98 Date/Time 13:15		Received By P. Schneider 6/29/98 Date/Time 13:15		Relinquished By P. Schneider 6/29/98 Date/Time 13:15		Received By H. Hildeberg 6/29/98 Date/Time 13:15		Relinquished By H. Hildeberg 6/29/98 Date/Time 13:15	
LABORATORY SECTION				Received By				Title					
								Date/Time					

(1) Gamma Spectroscopy (Water) {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Gamma Spec - Add-on {Americium-241, Antimony-125, Cesium-134}; Gross Alpha and Gross Beta

Quick turnaround, no QC samples run for BONRF6

0036

Data Representative of HETS NO.

SDG NU	SAMP NUM	METHOD NAME	CON ID	CON LONG NAME	VALUE RP	ANAL U	LAB	EDD FI
W02318	BONKT2	GADGPC	12587-46-1	Gross alpha	8440	pC/L		W02318
W02318	BONKT2	GADGPC	12587-46-1	Gross alpha	8440	pC/L		W02318
W02318	BONKT2	GAMMAHI	10045-97-3	Cesium-137	2520000	pC/L		W02318
W02318	BONKT2	GAMMAHI	10045-97-3	Cesium-137	2580000	pC/L		W02318
W02318	BONKT2	GAMMAHI	10198-40-0	Cobalt-60	8440	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	10198-40-0	Cobalt-60	5650	pC/L		W02318
W02318	BONKT2	GAMMAHI	13967-70-9	Cesium-134	4450	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	13967-70-9	Cesium-134	1870	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	14234-35-6	Antimony-125	6500	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	14234-35-6	Antimony-125	5660	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	14391-16-3	Europium-155	10700	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	14391-16-3	Europium-155	-2420	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	14596-10-2	Americium-241	-2480	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	14596-10-2	Americium-241	4710	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	14683-23-9	Europium-152	-7880	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	14683-23-9	Europium-152	-2000	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	15585-10-1	Europium-154	705	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	15585-10-1	Europium-154	387	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	U-238	Uranium-238	277000	pC/L	U	W02318
W02318	BONKT2	GAMMAHI	U-238	Uranium-238	277000	pC/L	U	W02318
W02318	BONKT2	GBDPC	12587-47-2	Gross beta	24100000	pC/L		W02318
W02318	BONKT2	GBDPC	12587-47-2	Gross beta	24100000	pC/L		W02318

$\beta = 5r-90$

Note: Two values reported for ea. isotope because re-run of sample requested with lengthened count time to obtain Co-60 value.

Per R. Weiss
5/5/98

BONKT2 used as representative of N-Basin water

Weight

$$(790 \text{ ml})(1 \text{ gm/ml}) = 790 \text{ gm}$$

Haul

Cs-137 $2.56 \times 10^3 \text{ pCi/gm} = 2.56 \times 10^{-9} \text{ Ci/gm} \Rightarrow 2.02 \times 10^{-5} \text{ Ci}$

Sr-90 $2.41 \times 10^4 \text{ pCi/gm} = 2.41 \times 10^{-8} \text{ Ci/gm} \Rightarrow 1.90 \times 10^{-5} \text{ Ci}$

$2.11 \times 10^{-5} \text{ Ci}$
 $7.8 \times 10^{-5} \text{ Ci}$

Allowed

<u>Isotopes</u>	<u>A₁</u>	<u>A₂ (10⁻⁴)</u>
Cs-137	13.5 Ci	$1.3 \times 10^{-3} \text{ Ci}$
Sr-90	2.7 Ci	$2.7 \times 10^{-4} \text{ Ci}$

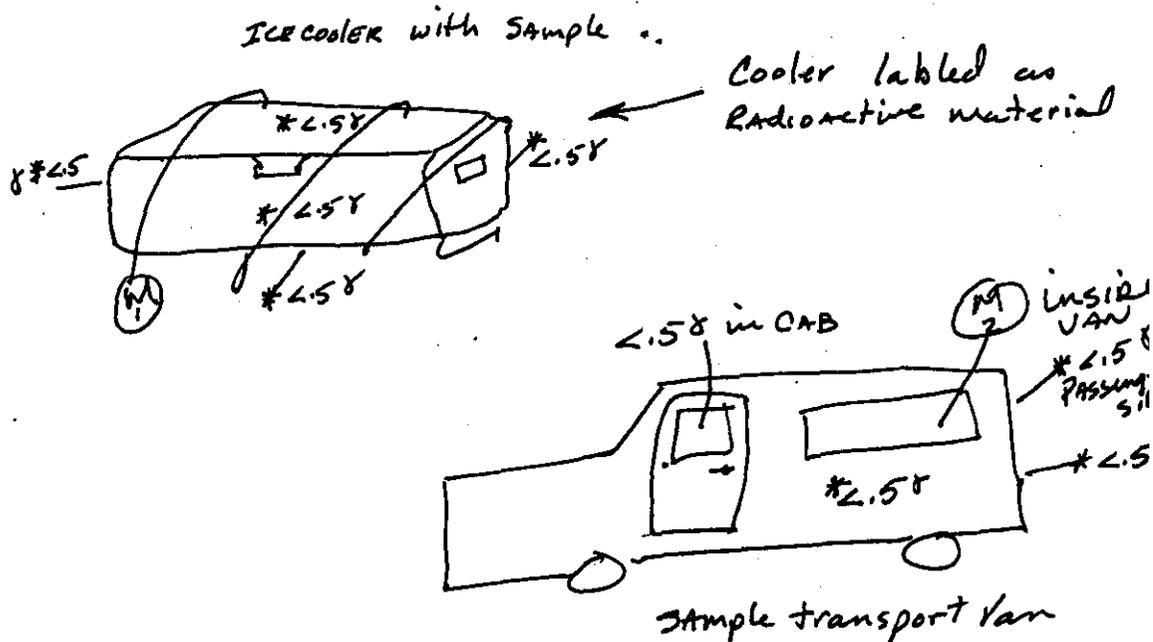
Here vs Allowed

$$\frac{\text{Total Haul}}{\text{MOST Restrictive Allowed}} = \frac{2.11 \times 10^{-5} \text{ Ci}}{2.7 \times 10^{-4} \text{ Ci}} < 1$$

∴ Ltd Qty

ERC RADIOLOGICAL SURVEY RECORD

Type of Survey (check one only)			Survey #
<input type="checkbox"/> Release	<input type="checkbox"/> Routine	<input type="checkbox"/> Work Progress	<input checked="" type="checkbox"/> Shipment
RWP # / Rev. #	Date	Time	Location
NB 031 / R	6/29/98	1330	NB 105 N



Unless noted, contamination levels are below the levels listed in Project Technical Assessment #: TA-97-02

C	Contamination Area	H	High Contamination Area	B	Radiological Buffer Area	AR	Airborne Radioactivity Area	RM	Radioactive Materials Area	R	Radiation Area	HR	High Radiation Area	VHR	Very High Radiation Area		
O	Technical Smear	#	Direct	M	Large Area Wipe	Contact 30 cm	Contact 30 cm	β	General Area Dose Rate = Uncorrected Meter Reading (mR/hr)	Δ	Micro Rem ($\mu\text{R/hr}$)	N	Neutrons (mRem/hr)	[AS]	Air Sample Location	-SCA-	Soil Contaminated Area

Instruments

Model	Serial #	Source \checkmark (Initial)	Cal Due Date	Model	Serial #	Source \checkmark (Initial)	Cal Due Date
R02	0020	Yates	12/31/98	HP-360	0041	Yates	10/29/98
L-177	0041	Yates	10/29/98		N/A		

RCT Name/Signature/Date:
K. Yates
K. Yates 6/29/98

RCT Supervisor Name/Signature/Date:

Contamination Measurement Information

Circled values in Removable β - γ denotes mrad/hr β

Unless otherwise noted, use the following Correction Factors:

List other Correction Factors, instruments, and source document

Source smaller than probe size:

Source larger than probe size:

PAM = 7

P-11 probe = 10

PAM = 14

P-11 probe = 50

No.	Description of Item or Location	Removable (dpm/100 cm ²)				Total (dpm/100 cm ²)		
		α	α C-F	β - γ	β - γ C-F	α	α C-F	β - γ
M-1	Masslin/cooler	N/A	N/A	<1000	10			
M-2	Masslin/Back of Van	N/A	N/A	<1000	10			
							N	A
		N						
		A						

Corrected Dose Rate Calculations

Show all work. CF = 1 unless noted.

Location	Contact Readings		30 cm Readings	
	β (mrad/hr) (WO-WC) X CF = DR	γ (mR/hr) WC X CF = DR	β (mrad/hr) (WO-WC) X CF = DR	γ (mR/hr) WC X CF = DR
All locations outside cooler	N/A	<1.5	N/A	N/A
All locations outside van	N/A	<1.5	N/A	N/A
Cab of Van	N/A	N/A	N/A	<1.5
		N		
		A		

1. SHIP FROM U.S. DEPT. OF ENERGY C/O
 Company BHT - Hanford
 Address 100-N Basin
 City, State, Zip Richland WA 99352
 Contact David St John
 Phone 509-376-8540

RADIOACTIVE SHIPMENT RECORD 10386
 Page 1 of
 Ship Prepaid Collect
 Via Motor Air Psgr UPS
 Rail Air Cargo Site Carri
 SHIPMENT AUTHORIZATION NUMBER _____

2. SHIP TO
 Company Quantoria
 Address 7800 George Washington Way
 City, State, Zip Richland WA 99352
 Attention Karen Arterburg
 Phone 509-375-3131

Markings Applied: Radioactive - LSA
 Radioactive - SCO Type A
 Type B with trefoil
 LSA Description: LSA-I
 LSA-II
 LSA-III
 SCO-I
 SCO-II
 Labels Applied: Empty
 Radioactive White - I
 Radioactive Yellow - II
 Radioactive Yellow - III
 Subsidiary Hazard
 For Normal Form only Identify
 Physical Form Liquid Gas
 Solid
 Chemical Form Elem
 Metal Nitrat
 Oxide Mixtu
 Other

5. HM	Proper Shipping Name:	Radioactive Material:
<input type="checkbox"/>	excepted package - empty packaging	7 UN2910
<input type="checkbox"/>	excepted package - instruments or articles	7 UN2910
<input checked="" type="checkbox"/>	excepted package - limited quantity of material	7 UN2910
<input type="checkbox"/>	excepted package - articles manufactured from natural or depleted uranium or natural thorium	7 UN2910
<input type="checkbox"/>	Special Form, n.o.s.	7 UN2974
<input type="checkbox"/>	Low Specific Activity, n.o.s.	7 UN2912
<input type="checkbox"/>	n.o.s.	7 UN2982
<input type="checkbox"/>	Fissile, n.o.s.	7 UN2918
<input type="checkbox"/>	Surface Contaminated Object	7 UN2913

EMERGENCY RESPONSE
 Telephone: 509-372-3800
 Emergency Response Guide(s): 161
 Highway Route Controlled Quantity
 Exclusive Use Shipment with instructions
 Placards Applied
 If Rail Specify:
 Fissile Excepted, Grams 1
 Excepted Package Statement

Warning - Fissile Material Controlled Shipment. Do Not Load More Than 11A Packages Per Vehicle. In Loading and Storage Areas, Keep at Least 20 Feet From Other Packages Bearing Radioactive Labels.

11. No. Pkg.	Model Package	COG/Spec	Serial No.	Seal No.	Isotopes	T.L.	Bq/Package	Gr. Wt.
1	Strawfight	N/A	ERC-96027AP	CS-137, Sr-90	N/A	7.8x10 ⁷ Bq	28	
Poly cooler containing sample no. BONREF6 in double poly bags and packed with ice.								
TOTALS							N/A	7.8x10 ⁷ Bq 28

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 David St John On behalf of DOE-RL Date 6/29/98 Organization ERC - AFS Complete Cost Code (Inc. End Function) DB-8250 RNB0W 2800

13. Surface Dose Rate of Package <0.005 or _____ mSv/hr
 Dose Rate @ 1 Meter from Surface of Package <0.005 or _____ mSv/hr
 <0.5 or _____ mrem/hr (N+B Y) <0.5 or _____ mrem/hr (N+B Y)
 Smears of Outer Container <0.41 Bq (22 dpm) & Y/cm²
 <0.04 Bq (2.2 dpm) & /cm²
 <Tbl. 2-2 HSRM Onsite Limits
 TRUCK LOAD OR EXCLUSIVE USE
 Surface <2 mSv/hr (200 mrem) @ 2 meters
 <0.1 mSv/hr (10 mrem) @ Cab
 <0.02 mSv/hr (2 mrem) (Using N+B Y)
 Signature - Radiation Monitoring [Signature] Bldg. 1705 N Survey No. RSP-NA-98-2617 Date 6/29/98

14. TRANSPORTER
 Vehicle Number G13-23803 DRIVER SIGNATURE [Signature]
 RECEIVER SIGNATURE [Signature] Date 6/29/98

15. OFFSITE AUTHORIZATION
 Shipment has been inspected and verified to be in compliance with DOT regulations
 Authorized Signature MG Stum Printed Name M.A. Sams Date 6-29-98

16. AUTHORIZATION FOR SHIPMENT
 AIR TRANSPORT CERTIFICATION N/A
 CARGO AIRCRAFT Cargo Aircraft Only Labels Applied
 PASSENGER AIRCRAFT Ltd Qty Research/Medical Diagnosis Human Medical Research
 Pkg. Dimensions (cm) NA

17. OFFSITE AUTHORIZATION
 Tracking No. RMBH-2518 Date Shipped 6-29-98 Routing CH2M ETA 6-29-98
 Surveyed By NA Date NA Approved for Shipment Offsite [Signature] Date 6/29/98

Figure 1

SAMPLE CHECK-IN LIST

Date/Time Received: 6/29 1500 SG#: W02437
Work Order Number: 806487 + 488 SAF #: B98-078
Shipping Container ID: 96-012 Chain of Custody #: B98-078-03

- 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 5°
- 5. Vermiculite/packing materials is Wet [] Dry []
- 6. Number of samples in shipping container: 4
- 7. Sample holding times exceeded? Yes [] No []

8. Samples have: <input checked="" type="checkbox"/> tape <input type="checkbox"/> hazard labels <input checked="" type="checkbox"/> custody seals <input type="checkbox"/> appropriate sample labels
9. Samples are: <input checked="" type="checkbox"/> in good condition <input type="checkbox"/> leaking <input type="checkbox"/> broken <input type="checkbox"/> have air bubbles

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

Sample Custodian/Laboratory: Glidderberg Date: 6/29/98

Telephoned To: _____ On _____ By _____

806487 Chem

806488 Rad

Client Sample Screening Results

30-Jun-98

CLIENT CODE	ID	MATRIX	RECEIVED	DETECTOR	ACQ DATE	SAMPLE	MINUTES	CNTS A	NET CPM A	CNTS B	NET CPM B				
BH1	BONRF6		6/29/1998 3:05:00 PM	QUAD22C	6/30/1998 9:25:01 AM	BONRF6	10	259	25.86	16737	1672.3886				
	01	LIQUID		Bkg:	6/30/1998 2:34:31 AM	BKG	700	28	0.04	918	1.3114286				
Anal Date: 6/30/1998		Tot Sa, Alq: 6.00E-02 ✓		1.00E-01 ✓		Alp: (Dpm/	1.83E+01	(uCV	4.93E-03	(pCV	8.22E+04	± 9.7E+03	CAT	3.0E-04	Lab
Ppt mg: 0.2 ✓		Units: L		ml		Bet; Alq):	3.10E+03	Sa):	8.37E-01	L(g):	1.39E+07	± 1.1E+05	III	3.6E-06	Alq
															Lig

Reviewed 6/30/98 *[Signature]*

well below
licence limits

0043

Collector Rich Mahood	Company Contact Steve Vail	Telephone No. 373-3785	Project Coordinator TRENT, SJ	Data Turnaround <i>24 hr turnaround</i>
Project Designation 105-N Basin - Bulk Water Sampling - Quick Turn	Sampling Location 100N	SAF No. B98-078		
Ice Chest No.	Field Logbook No.	Method of Shipment Hand deliver - government vehicle		
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	Preservation	HNO3 to pH <2	HNO3 to pH <2	None	HCl or H2SO4 to pH <2 Cool	Cool 4C				
	Type of Container	P	P	P	aG	P				
Special Handling and/or Storage Cool 4C	No. of Container(s)	0	1	1	1	1				
	Volume	20ml	20ml	20ml	250ml	500ml				

SAMPLE ANALYSIS		Gross Alpha; Gross Beta	See item (1) in Special Instructions. + Gross B	Activity Scan	TOC - 9060	TSS - 160.2				
		<i>80700301</i>	<i>80700301</i>			<i>80700201</i>				

Sample No.	Matrix *	Sample Date	Sample Time							
B0NRF7	Water	6-30-98	00:00	X	X	X	X	X		

CHAIN OF POSSESSION	Stored overnight in RMA in corridor 22 Airlock with custody seal.	SPECIAL INSTRUCTIONS	Matrix *
Relinquished By Richard Mahood	Date/Time 6/30/98 01:30	Received By Janet Roth	Date/Time 6/30/98 6:00
Relinquished By Janet Roth	Date/Time 6/30/98 13:25	Received By P. Nielson	Date/Time 6/30/98 14:25
Relinquished By P. Nielson	Date/Time 6/30/98 14:40	Received By Karen Schenkling	Date/Time 6/30/98
Relinquished By	Date/Time	Received By	Date/Time
		** Janet Roth or Rich Mahood are to provide direction to the samplers concerning the required turnaround time for each sample. ** The samplers are required to provide the proper turnaround time on each Chain of Custody. (1) Gamma Spectroscopy (Water) (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Antimony-125, Cesium-134), Gross alpha and Gross Beta Quick turnaround, "No" GC on this sample SDG W02437	
			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

0044

POTENTIAL HAZARDS

HEALTH

Radiation presents minimal risk to transport workers, emergency response personnel, and the public during transportation accidents. Packaging durability is related to potential hazards of material.

Low-level radioactive material; very low radiation hazard to people.

Quantity of material presents low radiation hazard if released from package during accident.

Some radioactive materials cannot be detected by commonly available instruments.

Packages do not have RADIOACTIVE I, II, or III labels. Some may have EMPTY labels or may have the word "Radioactive" in the package marking.

If any radioactive contamination occurs, it will be extremely low level.

FIRE OR EXPLOSION

Some of these materials may burn, but most do not ignite readily.

Radioactivity does not change flammability or other properties of materials.

PUBLIC SAFETY

CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.

Priorities for rescue, life-saving, first aid, and control of fire and other hazards are higher than the priority for measuring radiation levels.

Radiation Authority must be notified of accident conditions, and is usually responsible for radiological decisions.

Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions.

Stay upwind.

Keep unauthorized personnel away.

Detain or isolate uninjured persons or equipment suspected to be contaminated; delay decontamination and cleanup until instructions are received from Radiation Authority.

PROTECTIVE CLOTHING

Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters protective clothing will provide adequate protection.

EVACUATION

Large Spill

Consider initial downwind evacuation for at least 100 meters (330 feet).

Fire

When a large quantity of this material is involved in a major fire, consider an initial evacuation distance of 300 meters (1000 feet) in all directions.

PG 2 of 2

EMERGENCY RESPONSE

FIRE

- Presence of radioactive material will not change effectiveness of fire control techniques.
- Move containers from fire area if you can do it without risk.
- Do not move damaged packages; move undamaged packages out of fire zone.

Small Fires

- Dry chemical, CO₂, water spray or regular foam.

Large Fires

- Water spray, fog (flooding amounts).

SPILL OR LEAK

- Do not touch damaged packages or spilled material.

Liquid Spills

- Cover with sand, earth or other noncombustible absorbent material.
- Cover powder spill with plastic sheet or tarp to minimize spreading.

FIRST AID

- Medical problems take priority over radiological concerns.
- Use first aid treatment according to the nature of the injury.
- Do not delay care and transport of a seriously injured person.
- Apply artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Injured persons who contacted released material may be a minor contamination problem to contacted persons, equipment and facilities.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, 7, UN 2910

THIS PACKAGE CONFORMS TO THE CONDITIONS AND LIMITATIONS SPECIFIED IN 49 CFR 173.421 FOR RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, UN 2910

U.S. DEPARTMENT OF ENERGY, RICHLAND WA.
BY RUST FEDERAL SERVICES HANFORD
P.O. BOX 1970, 2355 STEVENS DRIVE
RICHLAND, WA 99352

0095

Data Representative of HES NO.

BONK F7

SDG NU	SAMP NUM	METHOD NAME	CON ID	CON LONG NAME	VALUE	RP	ANAL U	LAB	EDD FI
W02318	BONKT2	GADGPC	12587-46-1	Gross alpha	8440		PC/L		W02318
W02318	BONKT2	GADGPC	12587-46-1	Gross alpha	8440		PC/L		W02318
W02318	BONKT2	GAMMAHI	10045-97-3	Cesium-137	2520000		PC/L		W02318
W02318	BONKT2	GAMMAHI	10045-97-3	Cesium-137	2560000		PC/L		W02318
W02318	BONKT2	GAMMAHI	10198-40-0	Cobalt-60	8440		PC/L	U	W02318
W02318	BONKT2	GAMMAHI	10198-40-0	Cobalt-60	5650		PC/L		W02318
W02318	BONKT2	GAMMAHI	13987-70-9	Cesium-134	4450		PC/L	U	W02318
W02318	BONKT2	GAMMAHI	13987-70-9	Cesium-134	1670		PC/L	U	W02318
W02318	BONKT2	GAMMAHI	14234-35-6	Antimony-125	8500		PC/L	U	W02318
W02318	BONKT2	GAMMAHI	14234-35-6	Antimony-125	5660		PC/L	U	W02318
W02318	BONKT2	GAMMAHI	14391-16-3	Europium-155	10700		PC/L	U	W02318
W02318	BONKT2	GAMMAHI	14391-16-3	Europium-155	2420		PC/L	U	W02318
W02318	BONKT2	GAMMAHI	14596-10-2	Americium-241	3480		PC/L	U	W02318
W02318	BONKT2	GAMMAHI	14596-10-2	Americium-241	4710		PC/L	U	W02318
W02318	BONKT2	GAMMAHI	14683-23-9	Europium-152	7880		PC/L	U	W02318
W02318	BONKT2	GAMMAHI	14683-23-9	Europium-152	2000		PC/L	U	W02318
W02318	BONKT2	GAMMAHI	15585-10-1	Europium-154	705		PC/L	U	W02318
W02318	BONKT2	GAMMAHI	15585-10-1	Europium-154	387		PC/L	U	W02318
W02318	BONKT2	GAMMAHI	U-238	Uranium-238	277000		PC/L	U	W02318
W02318	BONKT2	GAMMAHI	U-238	Uranium-238	277000		PC/L	U	W02318
W02318	BONKT2	GBDFC	12587-47-2	Gross beta	24100000		PC/L		W02318
W02318	BONKT2	GBDFC	12587-47-2	Gross beta	24100000		PC/L		W02318

$\beta = Sr-90$

Note: Two values reported for each isotope because re-run of sample requested with lengthened count time to obtain Co-60 value.

Per R. Weiss
5/5/98

BONKT2 used as representative of N-Basin water

1. SHIP FROM U.S. DEPT. OF ENERGY C/O
 Company BHI - Hanford
 Address 100-N Basin
 City, State, Zip Richland, wa 99352
 Contact David St. John
 Phone (509) 376-8540

RADIOACTIVE SHIPMENT RECORD 103870³
Page 1 of 2

Ship Prepaid Collect
 Via Motor Air Pgr UPS
 Rail Air Cargo Site Carrier

SHIPMENT AUTHORIZATION NUMBER

2. SHIP TO
 Company Quanterra
 Address 2800 George Wash Way
 City, State, Zip Richland wa 99352
 Attention Karen Actenberg
 Phone (509) 375-3131

Markings Applied
 Radioactive - LSA
 Radioactive - SCO Type A
 Type B with teflon
 LSA Description

For Normal Form only
 Identify
 Physical Form Liquid Gas
 Solid
 Chemical Form Elemental
 Metal Nitrate
 Oxide Mixture
 Other

5. HM Proper Shipping Name: _____ Radioactive Material, _____

<input type="checkbox"/>	excepted package - empty packaging	7	UN2910
<input type="checkbox"/>	excepted package - instruments or articles	7	UN2910
<input checked="" type="checkbox"/>	excepted package - limited quantity of material	7	UN2910
<input type="checkbox"/>	excepted package - articles manufactured from natural or depleted uranium or natural thorium	7	UN2910
<input type="checkbox"/>	Special Form, n.o.s.	7	UN2974
<input type="checkbox"/>	Low Specific Activity, n.e.s.	7	UN2912
<input type="checkbox"/>	n.o.s.	7	UN2982
<input type="checkbox"/>	Fissile, n.o.s.	7	UN2918
<input type="checkbox"/>	Surface Contaminated Object	7	UN2913

Labels Applied
 Empty
 Radioactive White - I
 Radioactive Yellow - II
 Radioactive Yellow - III
 Subsidiary Hazard

EMERGENCY RESPONSE
 Telephone 509-373-3800
 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

Warning - Fissile Material Controlled Shipment. Do Not Load More Than NA 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	ENL22D	Tap	CS-137, Sr-90	NA	7.8 x 10 ² Bq	23
Poly cooler containing sample BDNREF in double bag and packed on wet ice								
(Shipper may describe package in detail on one of the unused lines above)							TOTALS	N/A 7.8 x 10 ² Bq 23

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 David St. John On behalf of DOE-RL Date 6/30/98 Organization ERC-AES Complete Cost Code (Inc. End Function) DB 8250

13. Surface Dose Rate of Package <0.005 or _____ mSv/hr
 Dose Rate @ 1 Meter from Surface of Package <0.005 or _____ mSv/hr
 <0.5 or _____ mrem/hr (N+B Y) <0.5 or _____ mrem/hr (N+B Y)

Smears of Outer Container
 <0.41 Bq (22 dpm) B & Y /cm²
 <0.04 Bq (22 dpm) a /cm²
 <Tbl. 2-2 HSRM 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+B Y)

Signature - Radiation Monitoring Rod Brown Bldg. 105 N Survey No. NB-98-2719 Date 6-30-98

14. TRANSPORTER DRIVER SIGNATURE David St. John VEHICLE NUMBER 66323803

RECEIVER SIGNATURE Karen Actenberg DATE 6-30-98

15. OFFSITE AUTHORIZATION
 Shipment has been inspected and verified to be in compliance with DOT regulations
 Authorized Signature M.A. Sams Printed Name M.A. SAMS Date 6-30-98

16. AUTHORIZATION FOR SHIPMENT
 AIR TRANSPORT CERTIFICATION N/A
 CARGO AIRCRAFT Cargo Aircraft Only Labels Applied Ltd Qty <3 T.I.
 PASSENGER AIRCRAFT Research/Medical Diagnosis Human Medical Research
 Pkg. Dimensions (cm) NA

17. OFFSITE AUTHORIZATION
 Tracking No. RMBH 2636 Date Shipped 6-30-98 Routing CH2M ETA 6-30-98
 Surveyed By NA Date NA Approved for Shipment Offsite M.A. Sams Date 6-30-98

1. SHIP FROM U.S. DEPT. OF ENERGY C/O
 Company BHE - Hanford
 Address 100-N Basin
 City, State, Zip Richland, wa 99352
 Contact David St. John
 Phone (509) 376-8540

RADIOACTIVE SHIPMENT RECORD 103870³
 Page 1 of 2
 Ship Prepaid Collect 4.
 Via Motor Air Pgr UPS
 Rail Air Cargo Site Carrier
 SHIPMENT AUTHORIZATION NUMBER _____

2. SHIP TO
 Company Quanterra
 Address 2800 George Wash Way
 City, State, Zip Richland, wa 99352
 Attention Karen Arsenburg
 Phone (509) 375-3131

Markings Applied 5.
 Radioactive - LSA
 Radioactive - SCO
 Type A
 Type B with trefoil
 LSA Description 6.
 LSA-I
 LSA-II
 LSA-III
 SCO-I
 SCO-II
 Label Applied 10.
 Empty
 Radioactive White - I
 Radioactive Yellow - II
 Radioactive Yellow - III
 Subsidiary Hazard
 For Normal Form only 7.
 Identify
 Physical Form Liquid Gas
 Solid
 Chemical Form Elemental
 Metal Nitrate
 Oxide Mixture
 Other

5. HM Proper Shipping Name: _____ Radioactive Material:

<input type="checkbox"/>	excepted package - empty packaging	7	UN2910
<input type="checkbox"/>	excepted package - instruments or articles	7	UN2910
<input checked="" type="checkbox"/>	excepted package - limited quantity of material	7	UN2910
<input type="checkbox"/>	excepted package - articles manufactured from natural or depleted uranium or natural thorium	7	UN2910
<input type="checkbox"/>	Special Form, n.o.s.	7	UN2974
<input type="checkbox"/>	Low Specific Activity, a.o.s.	7	UN2912
<input type="checkbox"/>	n.o.s.	7	UN2982
<input type="checkbox"/>	Fissile, n.o.s.	7	UN2918
<input type="checkbox"/>	Surface Contaminated Object	7	UN2913

EMERGENCY RESPONSE 9.
 Telephone: 509-373-3800
 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

Warning - Fissile Material Controlled Shipment. Do Not Load More Than NA 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	ENL22D	Tape	CS-137, Sr-90	NA	7.8 x 10 ⁷	23
Poly cooler containing sample. BONREF in double bag and packed on wet ice.									
								TOTALS	NA 7.8 x 10 ⁷ 23

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 David St. John On behalf of DOE-RL Date 6/30/98 Organization ERC-AES Complete Cost Code (Inc. End Function) DB 8250

13. Surface Dose Rate of Package <0.005 or _____ mSv/hr
 Dose Rate @ 1 Meter from Surface of Package <0.005 or _____ mSv/hr
 Smears of Outer Container <0.41 Bq (22 dpm) β & γ /cm²
 <0.04 Bq (2.2 dpm) α /cm²
 <TRM 2-2 HSRM Onsite Limits
 TRUCK LOAD OR EXCLUSIVE USE
 Surface <2 mSv/hr (200 mrem/hr)
 @ 2 meters <0.1 mSv/hr (10 mrem/hr)
 @ Cab <0.02 mSv/hr (2 mrem/hr) or sleeper (Using N+B Y)

Signature - Radiation Monitoring Rad Jones Bldg. 105N Survey No. NB-98-2719 Date 6-30-98

14. TRANSPORTER Vehicle Number 66323803 DRIVER SIGNATURE [Signature] RECEIVER SIGNATURE Karen Arsenburg Date 6-30-98

15. OFFSITE AUTHORIZATION
 Shipment has been inspected and verified to be in compliance with DOT regulations
 Authorized Signature [Signature] Printed Name M.A. SAMLS Date 6-30-98

16. AUTHORIZATION FOR SHIPMENT
 AIR TRANSPORT CERTIFICATION N/A
 CARGO AIRCRAFT Cargo Aircraft Only Labels Applied Ltd Qty <3 T.I.
 PASSENGER AIRCRAFT Research/Medical Diagnosis Human Medical Research
 Pkg. Dimensions (cm) NA

17. OFFSITE AUTHORIZATION
 Tracking No. RMBH 2636 Date Shipped 6-30-98 Routing CH2M ETA 6-30-98
 Surveyed By NA Date NA Approved for Shipment Offsite [Signature] Date 6-30-98

Figure 1

SAMPLE CHECK-IN LIST

Date/Time Received: 6-30-98 1440 SG#: U002437
Work Order Number: 80700201 SAF #: B98-078
Shipping Container ID: not marked Chain of Custody #: B98-078-04

- 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: 4
- 7. Sample holding times exceeded? Yes [] No []

8. Samples have: <input checked="" type="checkbox"/> tape <input checked="" type="checkbox"/> custody seals <input type="checkbox"/> hazard labels <input type="checkbox"/> appropriate sample labels

9. Samples are: <input checked="" type="checkbox"/> in good condition <input type="checkbox"/> broken <input type="checkbox"/> leaking <input type="checkbox"/> 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: 6-30-98

Telephoned To: _____ On: _____ By: _____

Client Sample Screening Results

01-Jul-98

CLIENT CODE	ID	MATRIX	RECEIVED	DETECTOR	ACQ DATE	SAMPLE	MINUTES	CNTS A	NET CPM A	CNTS B	NET CPM B	
BH1	B0NRF7		6/30/1998 2:40:00 AM	QUAD22A	7/1/1998 8:02:01 AM	B0NRF7	10	333	33.2342857	19533	1952.0186	
		LIQUID		Bkg:	7/1/1998 2:44:08 AM	BKG	700	46	0.06571429	897	1.2814286	
Anl Date: 7/1/1998		Tot Sa, Alq: 6.00E-02 ✓		, 1.00E-01 ✓		Alp: (Dpm/ 4.05E+01	(uCV 1.10E-02	(pCV 1.83E+05	± 1.4E+04	CAT	1.4E-04	Lab
Ppt mg: 0 ✓		Units: L		, ml		Bet; Alq): 3.61E+03	Sa): 9.75E-01	L(g): 1.63E+07	± 1.2E+05	III	3.1E-06	Alq Lig

Reviewed 7/1/98

WELL below Licence Limits

0051

1 Jul 98
6-26-98

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

25-Jun-1998
Page 1

CUSTOMER: BHG

SAMPLE DELIVERY GROUP

W02437

MATRIX : WATER

B98-078

BATCH NUMBER

06413

GES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
--------	-----	---------	-------------	----------

1)		80641301	BHG	BONRF5
		<u>J0641318</u>		

15
25

ACTIONS (Initial & Date)

1) INITIATED

JH 6/25/98

5) COUNTING/MEASUREMENT LAB

6/25/98

SOP(S) #

RCR0001

SOP(S) #

MICR0001

2) PREP LAB RECEIVED

6-25-98 OR

6) DATA REVIEWED AND ANALYTICAL PREP STORED

SOP(S) # RCR0001-1

MIC 6-26-98

SOP(S) #

RCR0002

3) SAMPLE REMAINDER STORED

6-25-98 OR

SOP(S) #

RCR0001

4) SEPARATION LAB RECEIVED

SOP(S) #

7

REV2

24 HR
TAT

Del 98
7-1-98

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

30-JUN-1998
Page 1

CUSTOMER: BHQ

SAMPLE DELIVERY GROUP

W02437

MATRIX : WATER

B98-078

BATCH NUMBER

06-488

QES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
--------	-----	---------	-------------	----------

1)	80648801	BHQ	BONRF6	
-----	----------	-----	--------	--

JD64881X

15
25

ACTIONS (Initial & Date)

1) INITIATED

JH 6/30/98

5) COUNTING/MEASUREMENT LAB

6/30/98

SOP(S) #

RD 7800

SOP(S) #

RK4R0007

2) PREP LAB RECEIVED

6-30-98

6) DATA REVIEWED AND ANALYTICAL PREP STORED

7-1-98
MK62 7-1-98

SOP(S) #

RK4R0017-1

SOP(S) #

RK4R0002
REV 2

3) SAMPLE REMAINDER STORED

6-30-98

SOP(S) #

~

4) SEPARATION LAB RECEIVED

SOP(S) #

7

Add on

86125

CS134

Am 211HP

24 HR
Tat

*Decl
7-2-98*

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

1-Jul-1998
Page 1

CUSTOMER: BHQ

SAMPLE DELIVERY GROUP

W02437

MATRIX : WATER

BATCH NUMBER

7-003

QES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
--------	-----	---------	-------------	----------

1)	B0700301	BHQ	BONRF7	
-----	----------	-----	--------	--

J0200316

7 15 25

ACTIONS (Initial & Date)

1) INITIATED

KDE 7-1-98

5) COUNTING/MEASUREMENT LAB

7/1/98

SOP(S) #

RD2800

SOP(S) #

RICHRD0007

2) PREP LAB RECEIVED

7-1-98

6) DATA REVIEWED AND ANALYTICAL PREP STORED

JCF 298

SOP(S) #

RCHRS017-1

SOP(S) #

RICHRC0002

3) SAMPLE REMAINDER STORED

7-1-98

SOP(S) #

NA

4) SEPARATION LAB RECEIVED

7

SOP(S) #

7

BOHE

BHOF 003

7/1/98

0060 195.91 ± 1.2024

0037 196.65 ± 3.3809

EW52 1402.2 ± 56.204

EW2

Addon

BTJ

Sb125

Cs134

Am241

BOHE 004

0060 196.02 ± 1.2031

0037 196.50 ± 3.3784

EW152 1405.5 ± 56.390

*Due
6-26-98*

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

25-Jun-1998
Page 1

CUSTOMER: BHQ

SAMPLE DELIVERY GROUP

W02437

MATRIX : WATER

B98-078

BATCH NUMBER

06-413

QES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
1)		80641301	BHQ	BONRF5
		<u>50641318</u>		
		<u>15</u>		
		<u>25</u>		

ACTIONS (Initial & Date)

1) INITIATED _____
SOP(S) # _____

5) COUNTING/MEASUREMENT LAB pd 25/kr rd/25/kr
SOP(S) # RICHRC0002

2) PREP LAB RECEIVED 6-25-98 oe
SOP(S) # RICHRC5014-0

6) DATA REVIEWED AND ANALYTICAL PREP STORED ATK 6-26-98
SOP(S) # RICHRC0002

3) SAMPLE REMAINDER STORED 6-25-98 oe
SOP(S) # na

4) SEPARATION LAB RECEIVED 7
SOP(S) # _____

24 HR

TAT

Jul 98
7-1-

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

30-Jun-1998
Page 1

CUSTOMER: BHQ

SAMPLE DELIVERY GROUP

W02437

MATRIX : WATER

B98-078

BATCH NUMBER

00-488

QES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
=====				
<u>IS-EQED098</u>	<u>30.1593</u>	<u>0.26967</u>		
1) 80648801	BHQ	BONRIF6		
=====				
<u>15</u>	<u>23</u>	<u>EQED097</u>	<u>30.2517</u>	<u>0.27049</u>
=====				

ACTIONS (Initial & Date)

1) INITIATED

JH 6/30/98

5) COUNTING/MEASUREMENT LAB

6/30/98

SOP(S) #

RD2800

SOP(S) #

RICHR00003

2) PREP LAB RECEIVED

6-30-98 on
REC'D 5016-1

6) DATA REVIEWED AND ANALYTICAL PREP STORED

JK 7-1-98

SOP(S) #

REC'D 5014-0

SOP(S) #

RICHR00002
REV 2

3) SAMPLE REMAINDER STORED

6-30-98 on

SOP(S) #

~

4) SEPARATION LAB RECEIVED

SOP(S) #

f

24 HR
TAT

Del
7-2-98

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

1-Jul-1998

Page 1

CUSTOMER: BHQ

SAMPLE DELIVERY GROUP

W02437

MATRIX : WATER

BATCH NUMBER

7-003

QES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
=====				
1S - EWED101		30291	0.27085	
1) 80700301		BHQ	BONRF7	
307003 1S				
=====				
EWED102		30.119	0.26931	
=====				

ACTIONS (Initial & Date)

1) INITIATED

AKA 7-1-98

5) COUNTING/MEASUREMENT LAB

7/1/98

SOP(S) #

RD2800

SOP(S) #

RIKRD0003

2) PREP LAB RECEIVED

7-1-98

6) DATA REVIEWED AND ANALYTICAL PREP STORED

SOP(S) # RIKRC50140

AKA 7-2-98

SOP(S) #

RIKRC0002
REV2

3) SAMPLE REMAINDER STORED

7-1-98

SOP(S) #

NA

4) SEPARATION LAB RECEIVED

SOP(S) #

|

Dal
6-26-98

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

CUSTOMER: BHQ

SAMPLE DELIVERY GROUP

W02437

MATRIX : WATER

B98-078

BATCH NUMBER

06-413

GES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
1)		80641301	BHQ	BONRF5
		<u>J0641318</u>		
		<u>7</u>		
		<u>IS</u>		
		<u>25</u>		

ACTIONS (Initial & Date)

1) INITIATED

JH62598
R02800

SOP(S) #

5) COUNTING/MEASUREMENT LAB

16/25/98
44402203

SOP(S) #

2) PREP LAB RECEIVED

6-25-98 OR

SOP(S) # RICHC50140

6) DATA REVIEWED AND ANALYTICAL PREP STORED

17/6-26-98
RICHC5002REV2

SOP(S) #

3) SAMPLE REMAINDER STORED

6-25-98 OR

SOP(S) # NA

4) SEPARATION LAB RECEIVED

7

SOP(S) #

24 HR

TAT

Paul
7-1-98

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

30-Jun-1998
Page 1

CUSTOMER: BHQ

SAMPLE DELIVERY GROUP

W02437

MATRIX : WATER

B98-078

BATCH NUMBER

06-488

QES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
IS-90A684		30.226 ± 0.3721		
1) B0648801		BHQ	BONRF6	
J064881B				
IS				
25		90A685	30.218 ± 0.3711	

ACTIONS (Initial & Date)

1) INITIATED

JH 6/30/98
R07800

SOP(S) #

5) COUNTING/MEASUREMENT LAB

6/30/98

SOP(S) #

RICHRO0003

2) PREP LAB RECEIVED

6-30-98
RCHRS 5016-1
5014-0

SOP(S) #

6) DATA REVIEWED AND ANALYTICAL PREP STORED

JPK 7-1-98

SOP(S) #

RICHRC0002

3) SAMPLE REMAINDER STORED

6-30-98

SOP(S) #

4) SEPARATION LAB RECEIVED

SOP(S) #

24 KHR
TAM

Due 7-2-98

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

1-Jul-1998

Page 1

CUSTOMER: BHQ

SAMPLE DELIVERY GROUP

W02437

MATRIX : WATER

BATCH NUMBER

7-003

GES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
<u>1S</u>	<u>EWAU686</u>	<u>30.378 ± 0.37910</u>		
1)	B0700301	BHQ	BONRF7	
	<u>J07003 1B</u>			

<u>1S</u>	<u>EWAU687</u>	<u>30.233 ± 0.37230</u>		
-----------	----------------	-------------------------	--	--

ACTIONS (Initial & Date)

1) INITIATED

AP 7-1-98

5) COUNTING/MEASUREMENT LAB

7/1/98

SOP(S) #

RD2800

SOP(S) #

RICHARD0003

2) PREP LAB RECEIVED

7-1-98

6) DATA REVIEWED AND ANALYTICAL PREP STORED

AP 7-2-98

SOP(S) #

RICHARD 504-0

SOP(S) #

RICHARD0002

3) SAMPLE REMAINDER STORED

7-1-98

SOP(S) #

~u

4) SEPARATION LAB RECEIVED

7

SOP(S) #