RECRA
ENVIRONMENTAL
INC.

Chemical and Environmental Measurement Information

Recra LabNet Philadelphia
Analytical Report

Client: TNU-HANFORD C01-007
RFW#: 0011L264
SDG/SAF#: H1137/C01-007

W.O.#: 10985-001-001-9999-00
Date Received: 11-15-00

METALS CASE NARRATIVE

1. This narrative covers the analyses of 4 water samples.

2. The samples were prepared and analyzed in accordance with methods checked on the attached glossary.

   The ISB for Iron was low in file PS1220D. All samples were rerun for Iron in file PS1222A.

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3. All analyses were performed within the required holding times.

4. The cooler temperature has been recorded on the Chain of Custody.

5. All Initial and Continuing Calibration Verifications (ICV/CCVs) were within the 90-110% control limits (80-120% for Mercury) with the exception of the CCVs for Silver, Barium, Calcium, Sodium, and Strontium in file PS1220D. All samples were rerun for these analytes in file PS1222A. The ending CCVs for Strontium were outside control limits in file PS1221B. All samples were rerun for Strontium in file TA1222C.

6. All Initial and Continuing Calibration Blanks (ICB/CCBs) were within control limits (less than the PQL).

7. All preparation/method blanks (MB) were within method criteria {less than the Practical Quantitation Limit (3X the IDL), MB value less than 5% of the RCRA limit, or samples greater than 20X MB value}. Refer to the Inorganics Method Blank Data Summary.

8. All ICP Interference Check Standards were within control limits.

9. All laboratory control samples (LCS) were within the 80-120% control limits. Refer to form 7.

10. All matrix spike (MS) recoveries were within the 75-125% control limits. Refer to the Inorganics Accuracy Report.

The results presented in this report relate only to the analytical testing and conditions of the samples at receipt and during storage. All pages of this report are integral parts of the analytical data. Therefore, this report should only be reproduced in its entirety of 20 pages.

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11. The duplicate analyses for 2 analytes were outside the 20% Relative Percent Difference (RPD) control limits. Refer to the Inorganics Precision Report.

12. For the purposes of this report, the data has been reported to the Instrument Detection Limit (IDL). Values between the IDL and the Practical Quantitation Limit (PQL) are acquired in a region of less-certain quantification.

13. I certify that this sample data package is in compliance with SOW requirements, both technically and for completeness, 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.

for J. Michael Taylor
VP, Laboratory General Manager
Lionville Laboratory

01-04-01
Date

gmb/m11-264

METALS METHOD GLOSSARY

The following methods are used as reference for the digestion and analysis of samples contained within this Recra Lot#: 0011L264

Leaching Procedure: __1310 __1311 __1312 __Other:_____

CLP Metals __ Digestion and __ Analysis Methods: __ILM03.0 __ILM04.0

Metals Digestion Methods: ✓3005A __3010A __3015 __3020A __3050B __3051 __200.7 __SS17
__Other: _____

Metals Analysis Methods

	SW846		EPA		STD MTD	EPA OSWR	USATHAMA
Aluminum	✓6010B		__200.7				__99
Antimony	✓6010B	__7041 [5]	__200.7	__204.2			__99
Arsenic	__6010B	__7060A [5]	__200.7	__206.2	__3113B		__99
Barium	✓6010B		__200.7				__99
Beryllium	✓6010B		__200.7				__99
Bismuth	__6010B [1]		__200.7 [1]			__1620	__99
Boron	__6010B		__200.7				__99
Cadmium	✓6010B	__7131A [5]	__200.7	__213.2			__99
Calcium	✓6010B		__200.7				__99
Chromium	✓6010B	__7191 [5]	__200.7	__218.2			__SS17
Cobalt	✓6010B		__200.7				__99
Copper	✓6010B	__7211 [5]	__200.7	__220.2			__99
Iron	✓6010B		__200.7				__99
Lead	__6010B	__7421 [5]	__200.7	__239.2	__3113B		__99
Lithium	__6010B	__7430 [4]	__200.7			__1620	__99
Magnesium	✓6010B		__200.7				__99
Manganese	✓6010B		__200.7				__99
Mercury	__7470A [3]	__7471A [3]	__245.1 [2]	__245.5 [2]			__99
Molybdenum	__6010B		__200.7				__99
Nickel	✓6010B		__200.7				__99
Potassium	✓6010B	__7610 [4]	__200.7	__258.1 [4]			__99
Rare Earths	__6010B [1]		__200.7 [1]			__1620	__99
Selenium	__6010B	__7740 [5]	__200.7	__270.2	__3113B		__99
Silicon	__6010B [1]		__200.7			__1620	__99
Silica	__6010B		__200.7			__1620	__99
Silver	✓6010B	__7761 [5]	__200.7	__272.2			__99
Sodium	✓6010B	__7770 [4]	__200.7	__273.1 [4]			__99
Strontium	✓6010B		__200.7				__99
Thallium	__6010B	__7841 [5]	__200.7	__279.2	__200.9		__99
Tin	__6010B		__200.7				__99
Titanium	__6010B		__200.7				__99
Uranium	__6010B [1]		__200.7 [1]			__1620	__99
Vanadium	✓6010B		__200.7				__99
Zinc	✓6010B		__200.7				__99
Zirconium	__6010B [1]		__200.7 [1]			__1620	__99

Other:_____ Method:_____

L-WI-033/M-11/99

METHOD REFERENCES AND DATA QUALIFIERS

DATA QUALIFIERS

U = Indicates that the parameter was not detected at or above the reported limit. The associated numerical value is the sample detection limit.

* = Indicates that the original sample result is greater than 4x the spike amount added.

ABBREVIATIONS

MB = Method or Preparation Blank.
MS = Matrix Spike.
MSD = Matrix Spike Duplicate.
REP = Sample Replicate
LCS = Laboratory Control Sample.
NC = Not calculated.

ANALYTICAL METAL METHODS

1. Not included in the method element list.

2. Modified Hg: Hg1 and Hg2 require less total volume of digestate due to the autosampler analysis. Sample volumes and reagents for mercury determinations in water and soil have been proportionately scaled down to adapt to this semi-automated technique. The sample volume used for water analysis is 33 mL. For soils, 0.1 grams of sample is taken to a final volume of 50 mL (including all reagents).

3. Modified Hg: Hg1 and Hg2 require less total volume of digestate due to the autosampler analysis. Sample volumes and reagents for mercury determinations in water and soil have been proportionately scaled down to adapt to this semi-automated technique. The sample volume used for water analysis is 33 mL. For soils, three 0.1 gram of sample is taken to a final volume of 50 mL (including all reagents).

4. Flame AA.

5. Graphite Furnace AA.

RFW 21-21L-033/N-10/96

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INORGANICS DATA SUMMARY REPORT 01/04/01

CLIENT: TNUHANFORD C01-007 H1137

RECRA LOT #: 0011L264

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT		UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	B10J20 (F)	Silver, Total	2.5	u	UG/L	2.5	1.0
		Aluminum, Total	19.1	u	UG/L	19.1	1.0
		Barium, Total	24.8		UG/L	3.0	1.0
		Beryllium, Total	0.60	u	UG/L	0.60	1.0
		Calcium, Total	51900		UG/L	15.4	1.0
		Cadmium, Total	3.4	u	UG/L	3.4	1.0
		Cobalt, Total	5.6	u	UG/L	5.6	1.0
		Chromium, Total	139		UG/L	4.9	1.0
		Copper, Total	2.6	u	UG/L	2.6	1.0
		Iron, Total	13.4		UG/L	3.8	1.0
		Potassium, Total	2430		UG/L	303	1.0
		Magnesium, Total	8670		UG/L	27.4	1.0
		Manganese, Total	2.3	u	UG/L	2.3	1.0
		Sodium, Total	7070		UG/L	22.9	1.0
		Nickel, Total	12.5	u	UG/L	12.5	1.0
		Antimony, Total	17.0	u	UG/L	17.0	1.0
		Strontium, Total	262		UG/L	5.5	1.0
		Vanadium, Total	5.6		UG/L	4.8	1.0
		Zinc, Total	210		UG/L	2.7	1.0

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INORGANICS DATA SUMMARY REPORT 01/04/01

CLIENT: TNUHANFORD C01-007 H1137 RECRA LOT #: 0011L264

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT		UNITS	REPORTING LIMIT	DILUTION FACTOR
-002	B10J21	Silver, Total	2.5	u	UG/L	2.5	1.0
		Aluminum, Total	19.1	u	UG/L	19.1	1.0
		Barium, Total	25.9		UG/L	3.0	1.0
		Beryllium, Total	0.60	u	UG/L	0.60	1.0
		Calcium, Total	56100		UG/L	15.4	1.0
		Cadmium, Total	3.4	u	UG/L	3.4	1.0
		Cobalt, Total	5.6	u	UG/L	5.6	1.0
		Chromium, Total	149		UG/L	4.9	1.0
		Copper, Total	2.6	u	UG/L	2.6	1.0
		Iron, Total	24.9		UG/L	3.8	1.0
		Potassium, Total	2420		UG/L	303	1.0
		Magnesium, Total	9340		UG/L	27.4	1.0
		Manganese, Total	2.3	u	UG/L	2.3	1.0
		Sodium, Total	7380		UG/L	22.9	1.0
		Nickel, Total	12.5	u	UG/L	12.5	1.0
		Antimony, Total	17.0	u	UG/L	17.0	1.0
		Strontium, Total	275		UG/L	5.5	1.0
		Vanadium, Total	4.8		UG/L	4.8	1.0
		Zinc, Total	280		UG/L	2.7	1.0

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INORGANICS DATA SUMMARY REPORT 01/04/01

CLIENT: TNUHANFORD C01-007 H1137 RECRA LOT #: 0011L264

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT		UNITS	REPORTING LIMIT	DILUTION FACTOR
-003	B10J22 (F)	Silver, Total	2.5	u	UG/L	2.5	1.0
		Aluminum, Total	19.1	u	UG/L	19.1	1.0
		Barium, Total	18.5		UG/L	3.0	1.0
		Beryllium, Total	0.60	u	UG/L	0.60	1.0
		Calcium, Total	57500		UG/L	15.4	1.0
		Cadmium, Total	3.4	u	UG/L	3.4	1.0
		Cobalt, Total	5.6	u	UG/L	5.6	1.0
		Chromium, Total	4.9	u	UG/L	4.9	1.0
		Copper, Total	2.6	u	UG/L	2.6	1.0
		Iron, Total	69.3		UG/L	3.8	1.0
		Potassium, Total	2070		UG/L	303	1.0
		Magnesium, Total	12100		UG/L	27.4	1.0
		Manganese, Total	104		UG/L	2.3	1.0
		Sodium, Total	4630		UG/L	22.9	1.0
		Nickel, Total	12.5	u	UG/L	12.5	1.0
		Antimony, Total	17.0	u	UG/L	17.0	1.0
		Strontium, Total	288		UG/L	5.5	1.0
		Vanadium, Total	4.8	u	UG/L	4.8	1.0
		Zinc, Total	19.9		UG/L	2.7	1.0

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INORGANICS DATA SUMMARY REPORT 01/04/01

CLIENT: TNUHANFORD C01-007 H1137 RECRA LOT #: 0011L264

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT		UNITS	REPORTING LIMIT	DILUTION FACTOR
-004	B10J23	Silver, Total	2.5	u	UG/L	2.5	1.0
		Aluminum, Total	92.7		UG/L	19.1	1.0
		Barium, Total	22.8		UG/L	3.0	1.0
		Beryllium, Total	0.60	u	UG/L	0.60	1.0
		Calcium, Total	53700		UG/L	15.4	1.0
		Cadmium, Total	3.4	u	UG/L	3.4	1.0
		Cobalt, Total	5.6	u	UG/L	5.6	1.0
		Chromium, Total	39.0		UG/L	4.9	1.0
		Copper, Total	2.6	u	UG/L	2.6	1.0
		Iron, Total	3060		UG/L	3.8	1.0
		Potassium, Total	2330		UG/L	303	1.0
		Magnesium, Total	11200		UG/L	27.4	1.0
		Manganese, Total	194		UG/L	2.3	1.0
		Sodium, Total	4510		UG/L	22.9	1.0
		Nickel, Total	12.5	u	UG/L	12.5	1.0
		Antimony, Total	17.0	u	UG/L	17.0	1.0
		Strontium, Total	276		UG/L	5.5	1.0
		Vanadium, Total	4.8	u	UG/L	4.8	1.0
		Zinc, Total	37.7		UG/L	2.7	1.0

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INORGANICS METHOD BLANK DATA SUMMARY PAGE 01/04/01

CLIENT: TNUHANFORD C01-007 H1137

RECRA LOT #: 0011L264

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT		UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK1	99L1811-MB1	Silver, Total	2.5	u	UG/L	2.5	1.0
		Aluminum, Total	19.1	u	UG/L	19.1	1.0
		Barium, Total	3.0	u	UG/L	3.0	1.0
		Beryllium, Total	0.60	u	UG/L	0.60	1.0
		Calcium, Total	47.1		UG/L	15.4	1.0
		Cadmium, Total	3.4	u	UG/L	3.4	1.0
		Cobalt, Total	5.6	u	UG/L	5.6	1.0
		Chromium, Total	4.9	u	UG/L	4.9	1.0
		Copper, Total	2.6	u	UG/L	2.6	1.0
		Iron, Total	8.4		UG/L	3.8	1.0
		Potassium, Total	331		UG/L	303	1.0
		Magnesium, Total	29.3		UG/L	27.4	1.0
		Manganese, Total	2.3	u	UG/L	2.3	1.0
		Sodium, Total	107		UG/L	22.9	1.0
		Nickel, Total	12.5	u	UG/L	12.5	1.0
		Antimony, Total	17.0	u	UG/L	17.0	1.0
		Strontium, Total	5.5	u	UG/L	5.5	1.0
		Vanadium, Total	4.8	u	UG/L	4.8	1.0
		Zinc, Total	2.7	u	UG/L	2.7	1.0

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INORGANICS ACCURACY REPORT 01/04/01

CLIENT: TNUHANFORD C01-007 H1137 RECRA LOT #: 0011L264

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR(SPK)
-001	B10J20 (F)	Silver, Total	47.4	2.5 u	50.0	94.8	1.0
		Aluminum, Total	1720	19.1 u	2000	86.1	1.0
		Barium, Total	1970	24.8	2000	97.3	1.0
		Beryllium, Total	42.8	0.60u	50.0	85.6	1.0
		Calcium, Total	75800	51900	25000	95.7	1.0
		Cadmium, Total	46.6	3.4 u	50.0	93.2	1.0
		Cobalt, Total	447	5.6 u	500	89.4	1.0
		Chromium, Total	315	139	200	87.8	1.0
		Copper, Total	243	2.6 u	250	97.2	1.0
		Iron, Total	984	13.4	1000	97.1	1.0
		Potassium, Total	24600	2430	25000	88.8	1.0
		Magnesium, Total	31100	8670	25000	89.9	1.0
		Manganese, Total	438	2.3 u	500	87.7	1.0
		Sodium, Total	31900	7070	25000	99.5	1.0
		Nickel, Total	448	12.5 u	500	89.6	1.0
		Antimony, Total	461	17.0 u	500	92.2	1.0
		Strontium, Total	1230	262	1000	96.7	1.0
		Vanadium, Total	430	5.6	500	85.0	1.0
		Zinc, Total	658	210	500	89.7	1.0

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INORGANICS PRECISION REPORT 01/04/01

CLIENT: TNUHANFORD C01-007 H1137 RECRA LOT #: 0011L264

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR(REP)
-001REP	B10J20 (F)	Silver, Total	2.5 u	2.5 u	NC	1.0
		Aluminum, Total	19.1 u	19.1 u	NC	1.0
		Barium, Total	24.8	25.4	2.4	1.0
		Beryllium, Total	0.60u	0.60u	NC	1.0
		Calcium, Total	51900	54400	4.7	1.0
		Cadmium, Total	3.4 u	3.4 u	NC	1.0
		Cobalt, Total	5.6 u	5.6 u	NC	1.0
		Chromium, Total	139	142	2.1	1.0
		Copper, Total	2.6 u	2.6 u	NC	1.0
		Iron, Total	13.4	7.6	55.2	1.0
		Potassium, Total	2430	2320	4.8	1.0
		Magnesium, Total	8670	9120	5.1	1.0
		Manganese, Total	2.3 u	2.3 u	NC	1.0
		Sodium, Total	7070	7420	4.8	1.0
		Nickel, Total	12.5 u	12.5 u	NC	1.0
		Antimony, Total	17.0 u	17.0 u	NC	1.0
		Strontium, Total	262	276	5.2	1.0
		Vanadium, Total	5.6	4.8 u	~~NC~~ 200	1.0
		Zinc, Total	210	215	2.5	1.0

yf
1/4/01

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INORGANICS LABORATORY CONTROL STANDARDS REPORT 01/04/01

CLIENT: TNUHANFORD C01-007 H1137 RECRA LOT #: 0011L264

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	SPIKED AMOUNT	UNITS	%RECOV
LCS1	99L1811-LC1	Silver, LCS	512	500	UG/L	102.4
		Aluminum, LCS	4900	5000	UG/L	98.0
		Barium, LCS	5140	5000	UG/L	102.9
		Beryllium, LCS	236	250	UG/L	94.6
		Calcium, LCS	24300	25000	UG/L	97.1
		Cadmium, LCS	245	250	UG/L	98.0
		Cobalt, LCS	2430	2500	UG/L	97.2
		Chromium, LCS	475	500	UG/L	95.0
		Copper, LCS	1290	1250	UG/L	103.0
		Iron, LCS	5230	5000	UG/L	104.5
		Potassium, LCS	24100	25000	UG/L	96.3
		Magnesium, LCS	24100	25000	UG/L	96.5
		Manganese, LCS	718	750	UG/L	95.7
		Sodium, LCS	26000	25000	UG/L	104.0
		Nickel, LCS	1920	2000	UG/L	96.1
		Antimony, LCS	2890	3000	UG/L	96.3
		Strontium, LCS	5520	5000	UG/L	110.3
		Vanadium, LCS	2380	2500	UG/L	95.3
		Zinc, LCS	967	1000	UG/L	96.7

RECRA LabNet Use Only
CO11L2L4

Custody Transfer Record/Lab Work Request

Page 1 of 1

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS

RECRA LabNet

Client: TNU-Hanford C01-007
Est. Final Proj. Sampling Date:
Project #: 10985-001001-9999-00
Project Contact/Phone #:
RECRA Project Manager: OJ
QC: Spec Del: Std TAT: 30 day
Date Rec'd: 11-15-00 (11-15-00) Date Due: 12-15-00
Account #:

		A	B
Refrigerator #		5	5
#/Type Container	Liquid	1P	1P
	Solid		
Volume	Liquid	500	500
	Solid		
Preservatives		HNO3	-

ANALYSES REQUESTED →

ORGANIC				INORG	
VOA	BNA	Pest/PCB	Herb	Metal	CN

MATRIX CODES:
S - Soil
SE - Sediment
SO - Solid
SL - Sludge
W - Water
O - Oil
A - Air
DS - Drum Solids
DL - Drum Liquids
L - EP/TCLP Leachate
WI - Wipe
X - Other
F - Fish

Lab ID	Client ID/Description	Matrix QC Chosen (✓) MS	MSD	Matrix	Date Collected	Time Collected	RECRA LabNet Use Only: Metal (1)	IC (1)
001	B10J20 (F)			W	11-9-00	1046	✓	
002	1					1	✓	✓
003	2 (F)					0928	✓	
004	3						✓	✓

Special Instructions: Saf C01-007

Run Matrix QC

DATE/REVISIONS:

Met (1) 1. Al, Ag, Ba, Br, Ca, Cd, Cr, Co, Cu, Fe, K, Mg,
1 2. Mn, Ni, Na, Sb, Sr, V, Zn
IC (1) 3. Br, Cl, Fl, NO2, NO3, PO4, SO4
4.
5.
6.

RECRA LabNet Use Only

Samples were:
1) Shipped ✓ or Hand Delivered
Airbill # See below
2) Ambient or Chilled
3) Received in Good Condition (Y) or N
4) Labels Indicate Properly Preserved (Y) or N
5) Received Within Holding Times Y or (N) NO2 NO3

COC Tape was:
1) Present on Outer Package (Y) or N
2) Unbroken on Outer Package (Y) or N
3) Present on Sample (Y) or N
4) Unbroken on Sample (Y) or N
COC Record Present Upon Sample Rec'd (Y) or N
Cooler Temp 5.5 °C

Relinquished by	Received by	Date	Time
FedEx	TBroppel	11-15-00	1000

Relinquished by	Received by	Date	Time
COMPOSITE WASTE	ORIGINAL REWRITTEN		

Discrepancies Between Samples Labels and COC Record? Y or (N)
NOTES:
965 9505 152

PNNL	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST Chem SOG H1137	C.O.C. # C01-007-41 Page 1 of 1

Collector: JG Hogan	Contact/Requester: JH KESSNER	Telephone No.: (509) 375-4688 MSIN FAX
SAF No.: C01-007	Sampling Origin: HANFORD SITE	Purchase Order/Charge Code
Project Title: 100 KR4 IAM (1 & 2)	Logbook No.: WM-SHWS-1439	Ice Chest No.: SM1-222 Temp.
Shipped To (Lab): TMA/RECRA	Method of Shipment: GOVT. VEHICLE	Bill of Lading/Air Bill No.: 4235 7954 0463
Protocol: CERCLA	Data Turnaround: 45 Days	Offsite Property No.

POSSIBLE SAMPLE HAZARDS/REMARKS
** **

SPECIAL INSTRUCTIONS Hold Time Total Activity Exemption: Yes ☑ No ☐
Submit deliverables & invoices to JH Kessner
FAX TMA log-in to JH Kessner (372-9487) & DL Stewart (372-1704)

Sample No.	Lab ID	*	Date	Time	No/Type Container	Sample Analysis	Preservative
B10J20 (F) ✓		W	11/1/00	1046	1x500-mL G/P ✓	ICP Metals - 6010A RCRA GW ✓ ✓	HNO3 to pH <2
B10J21 ✓		W			1x500-mL G/P ✓	ICP Metals - 6010A RCRA GW ✓ ✓	HNO3 to pH <2
B10J21 ✓		W			1x500-mL P ✓	IC Anions - 300.0 ✓	Cool 4C
B10J21 ✓		W			1x20-mL P	Activity Scan ✓	None
B10J21 ✓		W			2x1000-mL G/P	Gross Alpha ✓	HNO3 to pH <2
B10J21 ✓		W			2x1000-mL G/P	Gross Beta ✓	HNO3 to pH <2
B10J21 ✓		W			1x1000-mL G/P	Gamma Spectroscopy(Water) ✓	HNO3 to pH <2
B10J21 ✓		W	✓	✓	1x250-mL P	Tritium - H3 ✓	None

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
JG Hogan		Hogan	NOV 09 2000 1415	Fed EX			11/09/00
FED. EXPRESS			11/10/00 10:Am	B. Seguro			11/10/00 10:Am
JR Cerse		JC Cerse	11-14-00 11:00	Fed Ex			11-14-00
FedEx		11-15-00	1000	Thoppel		11-15-00	1000

Matrix *

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

FINAL SAMPLE DISPOSITION — Disposal Method (e.g., Return to customer, per lab procedure, used in process) — Disposed By — Date/Time

PNNL	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST Chem SOG H1137	C.O.C. # C01-007-37 Page 1 of 1

Collector: R.T SICKLE	Contact/Requester: JH KESSNER	Telephone No.: (509) 375-4688 MSIN FAX
SAF No.: C01-007	Sampling Origin: HANFORD SITE	Purchase Order/Charge Code
Project Title: 100 KR4 IAM (1 & 2)	Logbook No.: WM-SAWS-H38	Ice Chest No.: SMC222 Temp.
Shipped To (Lab): TMA/RECRA	Method of Shipment: GOVT. VEHICLE	Bill of Lading/Air Bill No.: 4235 7954 0463
Protocol: CERCLA	Data Turnaround: 45 Days	Offsite Property No.

POSSIBLE SAMPLE HAZARDS/REMARKS
** **

SPECIAL INSTRUCTIONS Hold Time Total Activity Exemption: Yes ☑ No ☐
Submit deliverables & invoices to JH Kessner
FAX TMA log-in to JH Kessner (372-9487) & DL Stewart (372-1704)

Sample No.	Lab ID	*	Date	Time	No/Type Container	Sample Analysis	Preservative
B10J22 (F) ✓		W	11/9/00	0928	1x500-mL G/P ✓	ICP Metals - 6010A RCRA GW ✓	HNO3 to pH <2
B10J23 ✓		W			1x500-mL G/P ✓	ICP Metals - 6010A RCRA GW ✓	HNO3 to pH <2
B10J23 ✓		W			1x500-mL P ✓	IC Anions - 300.0 ✓	Cool 4C
B10J23 ✓		W			1x20-mL P	Activity Scan ✓	None
B10J23 ✓		W			2x1000-mL G/P	Gross Alpha ✓	HNO3 to pH <2
B10J23 ✓		W			2x1000-mL G/P	Gross Beta ✓	HNO3 to pH <2
B10J23 ✓		W			1x1000-mL G/P	Gamma Spectroscopy(Water) ✓	HNO3 to pH <2
B10J23 ✓		W			1x250-mL P	Tritium - H3 ✓	None

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
R.T SICKLE	[signature]		11-09-00 1415	Fed Ex			11/09/00
FED- EXPRESS			11/10/00 10 Am	E. Seguro			11/10/00 10 Am
JR Cr...	[signature]		11-14-00 1600	Fed Ex			11-14-00
Fed Ex			11-15-00 1000	T Keppel			11-15-00 1000

Matrix *

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

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process)	Disposed By	Date/Time

20

H1137

1.0 GENERAL

Bechtel Hanford Inc. (BHI) Sample Delivery Group H1137 was composed of two water samples designated under SAF No. C01-007 with a Project Designation of: 100 KR4 IAM (1 & 2).

The samples were received as stated on the Chain-of-Custody documents. Any discrepancies are noted on the Eberline Services Sample Receipt Checklist.

2.0 ANALYSIS NOTES

2.1 Gross Alpha and Gross Beta Analyses

No problems were encountered during the course of the analyses.

2.2 Tritium Analyses

No problems were encountered during the course of the analyses.

2.3 Gamma Spectroscopy Analyses

No problems were encountered during the course of the analyses.

Case Narrative Certification Statement

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

Melissa Mannion
Melissa C. Mannion
Program Manager

1/8/01
Date

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1137

SAMPLE SUMMARY

SDG 7561
Contact Melissa C. Mannion

Client Hanford
Contract TRC-SBB-207925
Case no SDG H1137

CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	LAB SAMPLE ID	SAF NO	CHAIN OF CUSTODY	COLLECTED
B10J21	Hanford Site	WATER		R011097-01	C01-007	C01-007-41	11/09/00 10:46
B10J23	Hanford Site	WATER		R011097-02	C01-007	C01-007-37	11/09/00 09:28
Method Blank		WATER		R011097-04	C01-007		
Lab Control Sample		WATER		R011097-03	C01-007		
Duplicate (R011097-02)	Hanford Site	WATER		R011097-05	C01-007		11/09/00 09:28
Spike (R011097-02)	Hanford Site	WATER		R011097-06	C01-007		11/09/00 09:28

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CS
Version 3.06
Report date 01/08/01

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1137

QC SUMMARY

SDG 7561
Contact Melissa C. Mannion

Client Hanford
Contract TRC-SBB-207925
Case no SDG H1137

QC BATCH	CHAIN OF CUSTODY	CLIENT SAMPLE ID	MATRIX	% SOLIDS	SAMPLE AMOUNT	BASIS AMOUNT	DAYS SINCE RECEIVED	DAYS SINCE COLL	LAB SAMPLE ID	DEPARTMENT SAMPLE ID
7561	C01-007-37	B10J23	WATER				11/10/00	1	R011097-02	7561-002
	C01-007-41	B10J21	WATER				11/10/00	1	R011097-01	7561-001
		Method Blank	WATER						R011097-04	7561-004
		Lab Control Sample	WATER						R011097-03	7561-003
		Duplicate (R011097-02)	WATER				11/10/00	1	R011097-05	7561-005
		Spike (R011097-02)	WATER				11/10/00	1	R011097-06	7561-006

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-QS
Version 3.06
Report date 01/08/01

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1137

SDG 7561
Contact Melissa C. Mannion

PREP BATCH SUMMARY

Client Hanford
Contract TRC-SBB-207925
Case no SDG H1137

TEST	MATRIX	METHOD	PREPARATION ERROR BATCH	2σ %	PLANCHETS ANALYZED CLIENT	MORE	RE	BLANK	LCS	DUP/ORIG	MS/ORIG	QUALIFIERS
Gas Proportional Counting												
82B	WATER	Gross Beta in Water	6962-098	15.0	2			1	1	1/1		
88A	WATER	Gross Alpha in Water	6962-098	20.0	2			1	1	1/1		
Gamma Scan												
GAM	WATER	Gamma Emitters	6962-098	15.0	2			1	1	1/1		
Liquid Scintillation Counting												
H	WATER	Tritium in Water	6962-098	10.0	2			1	1	1/1	1/1	

Duplicates and Matrix Spikes are those with original (Client) sample in this Sample Delivery Group.
Blank and LCS planchets are those in the same preparation batch as some Client, Duplicate or Spike sample.

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-PBS
Version 3.06
Report date 01/08/01

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1137

WORK SUMMARY

SDG 7561
Contact Melissa C. Mannion

Client Hanford
Contract TRC-SBB-207925
Case no SDG H1137

CLIENT SAMPLE ID / LOCATION / CUSTODY	SAF No	MATRIX	LAB SAMPLE ID / COLLECTED / RECEIVED	PLANCHET	TEST	SUF-FIX	ANALYZED	REVIEWED	BY	METHOD
B10J21			R011097-01	7561-001	82B/82		11/28/00	01/08/01	MCM	Gross Beta in Water
Hanford Site		WATER	11/09/00	7561-001	88A/88		12/29/00	01/08/01	MCM	Gross Alpha in Water
C01-007-41	C01-007		11/10/00	7561-001	GAM		11/20/00	01/08/01	MCM	Gamma Emitters
				7561-001	H		12/11/00	01/08/01	MCM	Tritium in Water
B10J23			R011097-02	7561-002	82B/82		11/28/00	01/08/01	MCM	Gross Beta in Water
Hanford Site		WATER	11/09/00	7561-002	88A/88		12/29/00	01/08/01	MCM	Gross Alpha in Water
C01-007-37	C01-007		11/10/00	7561-002	GAM		11/20/00	01/08/01	MCM	Gamma Emitters
				7561-002	H		12/11/00	01/08/01	MCM	Tritium in Water
Method Blank			R011097-04	7561-004	82B/82		11/28/00	01/08/01	MCM	Gross Beta in Water
		WATER		7561-004	88A/88		12/29/00	01/08/01	MCM	Gross Alpha in Water
	C01-007			7561-004	GAM		11/21/00	01/08/01	MCM	Gamma Emitters
				7561-004	H		12/11/00	01/08/01	MCM	Tritium in Water
Lab Control Sample			R011097-03	7561-003	82B/82		11/28/00	01/08/01	MCM	Gross Beta in Water
		WATER		7561-003	88A/88		01/08/01	01/08/01	MCM	Gross Alpha in Water
	C01-007			7561-003	GAM		11/20/00	01/08/01	MCM	Gamma Emitters
				7561-003	H		12/11/00	01/08/01	MCM	Tritium in Water
Duplicate (R011097-02)			R011097-05	7561-005	82B/82		11/28/00	01/08/01	MCM	Gross Beta in Water
Hanford Site		WATER	11/09/00	7561-005	88A/88		12/29/00	01/08/01	MCM	Gross Alpha in Water
	C01-007		11/10/00	7561-005	GAM		11/21/00	01/08/01	MCM	Gamma Emitters
				7561-005	H		12/11/00	01/08/01	MCM	Tritium in Water
Spike (R011097-02)			R011097-06	7561-006	H		12/11/00	01/08/01	MCM	Tritium in Water
Hanford Site		WATER	11/09/00							
	C01-007		11/10/00							

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CWS
Version 3.06
Report date 01/08/01

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1137

SDG 7561
Contact Melissa C. Mannion

WORK SUMMARY, cont.

Client Hanford
Contract TRC-SBB-207925
Case no SDG H1137

COUNTS OF TESTS BY SAMPLE TYPE

TEST	SAF No	METHOD	REFERENCE	CLIENT	MORE	RE	BLANK	LCS	DUP	SPIKE	TOTAL
82B/82	C01-007	Gross Beta in Water	900.0_ALPHABETA_GPC	2			1	1	1		5
88A/88	C01-007	Gross Alpha in Water	900.0_ALPHABETA_GPC	2			1	1	1		5
GAM	C01-007	Gamma Emitters	GAMMA_GS	2			1	1	1		5
H	C01-007	Tritium in Water	906.0_H3_LSC	2			1	1	1	1	6
TOTALS				8			4	4	4	1	21

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CWS
Version 3.06
Report date 01/08/01

TMA / RICHMOND

SAMPLE DELIVERY GROUP H1137

R011097-04 **Method Blank**

METHOD BLANK

SDG	7561	Client/Case no	Hanford	SDG_H1137	
Contact	Melissa C. Mannion	Contract	TRC-SBB-207925		
Lab sample id	R011097-04	Client sample id	Method Blank		
Dept sample id	7561-004	Material/Matrix		WATER	
		SAF No	C01-007		

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Gross Alpha	12587-46-1	-0.421	0.87	1.8	3.0	U	88A
Gross Beta	12587-47-2	-0.987	2.0	3.5	4.0	U	82B
Tritium	10028-17-8	-32.1	220	380	400	U	H
Potassium 40	13966-00-2	U		220		U	GAM
Cobalt 60	10198-40-0	U		13	25	U	GAM
Cesium 137	10045-97-3	U		11	15	U	GAM
Radium 226	13982-63-3	U		20		U	GAM
Radium 228	15262-20-1	U		47		U	GAM
Europium 152	14683-23-9	U		26	50	U	GAM
Europium 154	15585-10-1	U		33	50	U	GAM
Europium 155	14391-16-3	U		34	50	U	GAM
Thorium 228	14274-82-9	U		16		U	GAM
Thorium 232	TH-232	U		47		U	GAM
Uranium 235	15117-96-1	U		45		U	GAM
Uranium 238	U-238	U		1300		U	GAM
Americium 241	14596-10-2	U		81		U	GAM

100 KR4 IAM (1 & 2)

QC-BLANK 36650

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	01/08/01

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1137

R011097-03

Lab Control Sample

LAB CONTROL SAMPLE

SDG 7561
Contact Melissa C. Mannion

Client/Case no Hanford SDG H1137
Case no TRC-SBB-207925

Lab sample id R011097-03
Dept sample id 7561-003

Client sample id Lab Control Sample
Material/Matrix WATER
SAF No C01-007

ANALYTE	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST	ADDED pCi/L	2σ ERR pCi/L	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Gross Alpha	96.6	7.5	1.7	3.0		88A	100	4.0	97	68-132	70-130
Gross Beta	110	5.1	2.8	4.0		82B	110	4.4	100	76-124	70-130
Tritium	9050	450	390	400		H	9340	370	97	83-117	80-120
Cobalt 60	509	33	20	25		GAM	472	19	108	73-127	80-120
Cesium 137	597	30	24	15		GAM	554	22	108	74-126	80-120

100 KR4 IAM (1 & 2)

QC-LCS 36649

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-LCS
Version 3.06
Report date 01/08/01

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1137

R011097-05 B10J23

DUPLICATE

SDG	7561			Client/Case no	Hanford SDG H1137
Contact	Melissa C. Mannion			Case no	TRC-SBB-207925
	DUPLICATE		ORIGINAL		
Lab sample id	R011097-05	Lab sample id	R011097-02	Client sample id	B10J23
Dept sample id	7561-005	Dept sample id	7561-002	Location/Matrix	Hanford Site WATER
		Received	11/10/00	Collected	11/09/00 09:28
				Custody/SAF No	C01-007-37 C01-007

ANALYTE	DUPLICATE pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST	ORIGINAL pCi/L	2σ ERR (COUNT)	MDA pCi/L	QUALI-FIERS	RPD %	3σ PROT TOT LIMIT
Gross Alpha	-0.260	0.95	1.9	3.0	U	88A	1.06	1.5	2.5	U	-	
Gross Beta	87.8	7.0	5.3	4.0		82B	87.9	4.8	3.2		0	35
Tritium	508	130	200	400		H	443	130	190		14	62
Potassium 40	U		250		U	GAM	U		260	U	-	
Cobalt 60	U		17	25	U	GAM	U		13	U	-	
Cesium 137	U		13	15	U	GAM	U		15	U	-	
Radium 226	U		34		U	GAM	29.3	20	25		15	190
Radium 228	U		58		U	GAM	U		61	U	-	
Europium 152	U		38	50	U	GAM	U		36	U	-	
Europium 154	U		45	50	U	GAM	U		42	U	-	
Europium 155	U		35	50	U	GAM	U		42	U	-	
Thorium 228	U		19		U	GAM	U		26	U	-	
Thorium 232	U		58		U	GAM	U		61	U	-	
Uranium 235	U		56		U	GAM	U		52	U	-	
Uranium 238	U		2000		U	GAM	U		2300	U	-	
Americium 241	U		49		U	GAM	U		96	U	-	

100 KR4 IAM (1 & 2)

QC-DUP#2 36651

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DUP
Version	3.06
Report date	01/08/01

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1137

R011097-06 B10J23

MATRIX SPIKE

SDG 7561		Client/Case no Hanford	SDG H1137
Contact Melissa C. Mannion		Case no TRC-SBB-207925	
MATRIX SPIKE	ORIGINAL		
Lab sample id R011097-06	Lab sample id R011097-02	Client sample id B10J23	
Dept sample id 7561-006	Dept sample id 7561-002	Location/Matrix Hanford Site	WATER
	Received 11/10/00	Collected 11/09/00 09:28	
		Custody/SAF No C01-007-37	C01-007

ANALYTE	SPIKE pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST	ADDED pCi/L	2σ ERR pCi/L	ORIGINAL pCi/L	2σ ERR (COUNT)	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Tritium	17600	410	210	400		H	18000	720	443	130	95	84-116	60-140

100 KR4 IAM (1 & 2)

QC-MS#2 36652

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-MS
Version 3.06
Report date 01/08/01

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1137

R011097-01 B10J21

DATA SHEET

SDG	7561	Client/Case no	Hanford SDG H1137
Contact	Melissa C. Mannion	Contract	TRC-SBB-207925
Lab sample id	R011097-01	Client sample id	B10J21
Dept sample id	7561-001	Location/Matrix	Hanford Site WATER
Received	11/10/00	Collected	11/09/00 10:46
		Custody/SAF No	C01-007-41 C01-007

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Gross Alpha	12587-46-1	0.150	1.0	2.0	3.0	U	88A
Gross Beta	12587-47-2	17.7	2.6	2.9	4.0		82B
Tritium	10028-17-8	392	130	190	400	J	H
Potassium 40	13966-00-2	U		330		U	GAM
Cobalt 60	10198-40-0	U		18	25	U	GAM
Cesium 137	10045-97-3	U		17	15	U	GAM
Radium 226	13982-63-3	33.6	28	37		U	GAM
Radium 228	15262-20-1	U		76		U	GAM
Europium 152	14683-23-9	U		43	50	U	GAM
Europium 154	15585-10-1	U		55	50	U	GAM
Europium 155	14391-16-3	U		42	50	U	GAM
Thorium 228	14274-82-9	U		23		U	GAM
Thorium 232	TH-232	U		76		U	GAM
Uranium 235	15117-96-1	U		66		U	GAM
Uranium 238	U-238	U		1900		U	GAM
Americium 241	14596-10-2	U		59		U	GAM

100 KR4 IAM (1 & 2)

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	01/08/01

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1137

R011097-02 B10J23

DATA SHEET

SDG	7561	Client/Case no	Hanford SDG_H1137
Contact	Melissa C. Mannion	Contract	TRC-SBB-207925
Lab sample id	R011097-02	Client sample id	B10J23
Dept sample id	7561-002	Location/Matrix	Hanford Site WATER
Received	11/10/00	Collected	11/09/00 09:28
		Custody/SAF No	C01-007-37 C01-007

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Gross Alpha	12587-46-1	1.06	1.5	2.5	3.0	U	88A
Gross Beta	12587-47-2	87.9	4.8	3.2	4.0		82B
Tritium	10028-17-8	443	130	190	400		H
Potassium 40	13966-00-2	U		260		U	GAM
Cobalt 60	10198-40-0	U		13	25	U	GAM
Cesium 137	10045-97-3	U		15	15	U	GAM
Radium 226	13982-63-3	29.3	20	25			GAM
Radium 228	15262-20-1	U		61		U	GAM
Europium 152	14683-23-9	U		36	50	U	GAM
Europium 154	15585-10-1	U		42	50	U	GAM
Europium 155	14391-16-3	U		42	50	U	GAM
Thorium 228	14274-82-9	U		26		U	GAM
Thorium 232	TH-232	U		61		U	GAM
Uranium 235	15117-96-1	U		52		U	GAM
Uranium 238	U-238	U		2300		U	GAM
Americium 241	14596-10-2	U		96		U	GAM

100 KR4 IAM (1 & 2)

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	01/08/01

```
@PJ@PJL USTATUS JOB = ON
@PJL USTATUS PAGE = OFF
@PJL USTATUS DEVICE = ON
@PJL USTATUS TIMED = 0
```

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1137

Test 82B Matrix WATER	Client Hanford
SDG 7561	Contract TRC-SBB-207925
Contact Melissa C. Mannion	Contract SDG H1137

METHOD SUMMARY

GROSS BETA IN WATER

GAS PROPORTIONAL COUNTING

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	PLANCHET	1: Gross Beta	2: Sum, Beta Emitters	RESULT RATIO (%) 2÷1	2σ
Preparation batch 6962-098								
B10J21	R011097-01	82		7561-001	17.7			
B10J23	R011097-02	82		7561-002	87.9	29.3	33	23
BLK (QC ID=36650)	R011097-04	82		7561-004	U			
LCS (QC ID=36649)	R011097-03	82		7561-003	ok			
Duplicate (R011097-02)	R011097-05	82		7561-005	ok			
Nominal values and limits from method				RDLs (pCi/L)	4.0			
100 KR4 IAM (1 & 2)						Average	33	

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	MDA pCi/L	ALIQ L	PREP FAC	DILU-TION	RESID mg	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	PREPARED	ANAL-YZED	DETECTOR
Preparation batch 6962-098 2σ prep error 15.0 % Reference Lab Notebook 6962 pg. 098																
B10J21	R011097-01	82		2.9	0.200			41		100			19	11/23/00	11/28	GRB-113
B10J23	R011097-02	82		3.2	0.200			47		100			19	11/23/00	11/28	GRB-114
BLK (QC ID=36650)	R011097-04	82		3.5	0.200			22		100				11/23/00	11/28	GRB-116
LCS (QC ID=36649)	R011097-03	82		2.8	0.200			22		100				11/23/00	11/28	GRB-115
Duplicate (R011097-02) (QC ID=36651)	R011097-05	82		5.3	0.200			47		49			19	11/23/00	11/28	GRB-110
Nominal values and limits from method				4.0	0.200			5-250		100			180			

PROCEDURES	REFERENCE	900.0_ALPHABETA_GPC
	CP-120	Gross Alpha and Gross Beta in Water, rev 3

AVERAGES ± 2 SD	MDA	3.5	±	2.0
FOR 5 SAMPLES	RESIDUE	36	±	26

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-CMS
Version	3.06
Report date	01/08/01

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1137

Test 88A Matrix WATER
SDG 7561
Contact Melissa C. Mannion

METHOD SUMMARY

GROSS ALPHA IN WATER
GAS PROPORTIONAL COUNTING

Client Hanford
Contract TRC-SBB-207925
Contract SDG H1137

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	PLANCHET	Gross Alpha	
Preparation batch 6962-098						
B10J21	R011097-01	88		7561-001	U	
B10J23	R011097-02	88		7561-002	U	
BLK (QC ID=36650)	R011097-04	88		7561-004	U	
LCS (QC ID=36649)	R011097-03	88		7561-003	ok	
Duplicate (R011097-02)	R011097-05	88		7561-005	-	U
Nominal values and limits from method 100 KR4 IAM (1 & 2)				RDLs (pCi/L)	3.0	

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	MDA pCi/L	ALIQ L	PREP FAC	DILU-TION	RESID mg	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	PREPARED	ANAL-YZED	DETECTOR
Preparation batch 6962-098	2σ prep error 20.0 % Reference Lab Notebook 6962 pg. 098															
B10J21	R011097-01	88		2.0	0.200			44		100			50	11/28/00	12/29	GRB-113
B10J23	R011097-02	88		2.5	0.200			46		100			50	11/28/00	12/29	GRB-115
BLK (QC ID=36650)	R011097-04	88		1.8	0.200			27		100				11/28/00	12/29	GRB-105
LCS (QC ID=36649)	R011097-03	88		1.7	0.200			26		100				11/28/00	01/08	GRB-105
Duplicate (R011097-02) (QC ID=36651)	R011097-05	88		1.9	0.200			47		100			50	11/28/00	12/29	GRB-106
Nominal values and limits from method				3.0	0.200			5-250		100			180			

PROCEDURES REFERENCE 900.0_ALPHABETA_GPC
CP-120 Gross Alpha and Gross Beta in Water, rev 3

AVERAGES ± 2 SD FOR 5 SAMPLES
MDA 2.0 ± 0.62
RESIDUE 38 ± 21

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 01/08/01

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1137

Test GAM Matrix WATER
SDG 7561
Contact Melissa C. Mannion

METHOD SUMMARY

GAMMA EMITTERS
GAMMA SCAN

Client Hanford
Contract TRC-SBB-207925
Contract SDG H1137

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	PLANCHET	Cobalt 60		Cesium 137	
Preparation batch 6962-098								
B10J21	R011097-01			7561-001	U		U	
B10J23	R011097-02			7561-002	U		U	
BLK (QC ID=36650)	R011097-04			7561-004	U		U	
LCS (QC ID=36649)	R011097-03			7561-003	ok		ok	
Duplicate (R011097-02)	R011097-05			7561-005	-	U	-	U
Nominal values and limits from method 100 KR4 IAM (1 & 2)				RDLs (pCi/L)	25		15	

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	MAX MDA pCi/L	ALIQ L	PREP FAC	DILU-TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	PREPARED	ANAL-YZED	DETECTOR
Preparation batch 6962-098 2σ prep error 15.0 % Reference Lab Notebook 6962 pg. 098																
B10J21	R011097-01			17	0.500					314			11	11/20/00	11/20	01,03,00
B10J23	R011097-02			15	0.500					314			11	11/20/00	11/20	MB,05,00
BLK (QC ID=36650)	R011097-04			11	0.500					458				11/20/00	11/21	MB,05,00
LCS (QC ID=36649)	R011097-03			24	0.500					314				11/20/00	11/20	MB,07,00
Duplicate (R011097-02) (QC ID=36651)	R011097-05			13	0.500					457			12	11/20/00	11/21	01,03,00
Nominal values and limits from method				15	0.500					100			180			

PROCEDURES	REFERENCE	GAMMA_GS
	CP-100	Ge(Li) Preparation for Commercial Samples, rev 2

AVERAGES ± 2 SD FOR 5 SAMPLES
MDA 16 ± 10
YIELD ____ ± ____

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 01/08/01

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1137

Test H	Matrix WATER
SDG 7561	
Contact Melissa C. Mannion	

METHOD SUMMARY

TRITIUM IN WATER

LIQUID SCINTILLATION COUNTING

Client Hanford	
Contract TRC-SBB-207925	
Contract SDG H1137	

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	PLANCHET	Tritium	
Preparation batch 6962-098						
B10J21	R011097-01			7561-001	392	J
B10J23	R011097-02			7561-002	443	
BLK (QC ID=36650)	R011097-04			7561-004	U	
LCS (QC ID=36649)	R011097-03			7561-003	ok	
Duplicate (R011097-02)	R011097-05			7561-005	ok	
Spike (R011097-02)	R011097-06			7561-006	ok	
Nominal values and limits from method 100 KR4 IAM (1 & 2)				RDLs (pCi/L)	400	

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	MDA pCi/L	ALIQ L	PREP FAC	DILU-TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	PREPARED	ANAL-YZED	DETECTOR
Preparation batch 6962-098	2σ prep error 10.0 % Reference Lab Notebook 6962 pg. 098															
B10J21	R011097-01			190	0.0500			20		100			32	12/08/00	12/11	LSC-006
B10J23	R011097-02			190	0.0500			20		100			32	12/08/00	12/11	LSC-006
BLK (QC ID=36650)	R011097-04			380	0.0500			10		100				12/08/00	12/11	LSC-006
LCS (QC ID=36649)	R011097-03			390	0.0500			10		100				12/08/00	12/11	LSC-006
Duplicate (R011097-02) (QC ID=36651)	R011097-05			200	0.0500			20		100			32	12/08/00	12/11	LSC-006
Spike (R011097-02) (QC ID=36652)	R011097-06			210	0.0500			18		100			32	12/08/00	12/11	LSC-006
Nominal values and limits from method				400	0.0500					25			180			

PROCEDURES	REFERENCE	906.0_H3_LSC
	CP-210	Tritium in Water Samples by Distillation, rev 3

AVERAGES ± 2 SD FOR 6 SAMPLES	MDA 260	±	190
	YIELD 16	±	10

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-CMS
Version	3.06
Report date	01/08/01

PNNL	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. # C01-007-41
		Page 1 of 1

Collector: JG HOGAN	Contact/Requester: JH KESSNER	Telephone No.: (509) 375-4688 MSIN FAX
SAF No.: C01-007	Sampling Origin: HANFORD SITE H1137 (7561)	Purchase Order/Charge Code
Project Title: 100 KR4 IAM (1 & 2)	Logbook No.: WM-SHWS-1439	Ice Chest No.: SM1-222 Temp.
Shipped To (Lab): TMA/RECRA	Method of Shipment: GOVT. VEHICLE	Bill of Lading/Air Bill No.: 4235 7954 0463
Protocol: CERCLA	Data Turnaround: 45 Days	Offsite Property No.

POSSIBLE SAMPLE HAZARDS/REMARKS
** **

SPECIAL INSTRUCTIONS Hold Time — Total Activity Exemption: Yes ☑ No ☐
Submit deliverables & invoices to JH Kessner
FAX TMA log-in to JH Kessner (372-9487) & DL Stewart (372-1704)

Sample No.	Lab ID	*	Date	Time	No/Type Container	Sample Analysis	Preservative
B10J20 (F) ✓		W	11/1/00	1046	1x500-mL G/P	ICP Metals - 6010A RCRA GW ✓	HNO3 to pH <2
B10J21 ✓		W			1x500-mL G/P	ICP Metals - 6010A RCRA GW ✓	HNO3 to pH <2
B10J21 ✓		W			1x500-mL P	IC Anions - 300.0 ✓	Cool 4C
B10J21 ✓		W			1x20-mL P	Activity Scan ✓	None
B10J21 ✓		W			2x1000-mL G/P	Gross Alpha ✓	HNO3 to pH <2
B10J21 ✓		W			2x1000-mL G/P	Gross Beta ✓	HNO3 to pH <2
B10J21 ✓		W			1x1000-mL G/P	Gamma Spectroscopy(Water) ✓	HNO3 to pH <2
B10J21 ✓		W	✓	✓	1x250-mL P	Tritium - H3 ✓	None

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
JG HOGAN	J Hogan		NOV 09 2000 1415	Fed EX			11/09/00
FED- EXPRESS			11/10/00 10:Am	E. Seguro			11/10/00 10:Am

Matrix *

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

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process)	Disposed By	Date/Time

PNNL

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. # C01-007-37

Collector: R.T SICKLE	Contact/Requester: JH KESSNER	Telephone No.: (509) 375-4688 MSIN FAX
SAF No.: C01-007	Sampling Origin: HANFORD SITE H1137 (7561)	Purchase Order/Charge Code
Project Title: 100 KR4 IAM (1 & 2)	Logbook No.: WM-SAWS-H38	Ice Chest No.: SMC222 Temp.
Shipped To (Lab): TMA/RECRA	Method of Shipment: GOVT. VEHICLE	Bill of Lading/Air Bill No.: 4235 7454 0463
Protocol: CERCLA	Data Turnaround: 45 Days	Offsite Property No.

POSSIBLE SAMPLE HAZARDS/REMARKS
** **

SPECIAL INSTRUCTIONS Hold Time Total Activity Exemption: Yes ☑ No ☐
Submit deliverables & invoices to JH Kessner
FAX TMA log-in to JH Kessner (372-9487) & DL Stewart (372-1704)

Sample No.	Lab ID	*	Date	Time	No/Type Container	Sample Analysis	Preservative
B10J22 (F) ✓		W	11/9/00	0928	1x500-mL G/P ✓	ICP Metals - 6010A RCRA GW ✓	HNO3 to pH <2
B10J23 ✓		W			1x500-mL G/P ✓	ICP Metals - 6010A RCRA GW ✓	HNO3 to pH <2
B10J23 ✓		W			1x500-mL P ✓	IC Anions - 300.0 ✓	Cool 4C
B10J23 ✓		W			1x20-mL P	Activity Scan ✓	None
B10J23 ✓		W			2x1000-mL G/P	Gross Alpha ✓	HNO3 to pH <2
B10J23 ✓		W			2x1000-mL G/P	Gross Beta ✓	HNO3 to pH <2
B10J23 ✓		W			1x1000-mL G/P	Gamma Spectroscopy(Water) ✓	HNO3 to pH <2
B10J23 ✓		W			1x250-mL P	Tritium - H3 ✓	None

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
R.T SICKLE			11-09-00 14:15	Fed Ex			11/09/00
FED-EXPRESS			11/10/00 10 am	E. Degnan			11/10/00 10 AM

Matrix *

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

FINAL SAMPLE DISPOSITION: Disposal Method (e.g., Return to customer, per lab procedure, used in process) Disposed By Date/Time

ThermoRetec
Richmond Laboratory

Analytical Services

ICE CHEST RECEIPT LOG

Use one form per shipment. Refer to Thermometer Correction Log for correction factor.

Customer: (WMTS) BECHTEL HANFORD (PNNL) Date: 11-10-00 10:AM

Ice chest # or description	SMC-222					
Thermometer: time in	9:45					
Thermometer: time out	11:15					
Thermometer reading	4°C					
Thermometer number	2132					
Correction factor	NONE					
Actual temperature*	—					
Custody seals on ice chest intact?	Yes					
Custody seals dated ?	Yes					
Custody seals signed?	Yes					
Custody seals on samples?	NO					
Ice chest scanned for activity?	Yes					

* Temperature is in degrees centigrade.

Technician:_____

Comments:_____

ThermoRetec
Richmond Laboratory

Analytical Services

SAMPLE RECEIPT CHECKLIST

SAMPLE RECEIPT

Client: (WMTS) BECHTEL HANFORD (PNNL) Date/Time received 11/10/00 10:AM

CoC No. C01-007-41

Container I.D. No. SML-222 Requested TAT (Days) 45 P.O. Received Yes [ ] No [✓]

INSPECTION

1. Custody seals on shipping container intact? Yes [✓] No [ ] N/A [ ]
2. Custody seals on shipping container dated & signed? Yes [✓] No [ ] N/A [ ]
3. Custody seals on sample containers intact? Yes [✓] No [ ] N/A [ ]
4. Custody seals on sample containers dated & signed? Yes [✓] No [ ] N/A [ ]
5. Cooler Temperature: _____ Packing material is: Wet [ ] Dry [✓]
6. Number of samples in shipping container: 4
7. Number of containers per sample: check (Or see CoC _____)
8. Paperwork agrees with samples? Yes [✓] No [ ]
9. Samples have: Tape [ ] Hazard labels [ ] Rad labels [ ] Appropriate sample labels [✓]
10. Samples are: In good condition [✓] Leaking [ ] Broken Container [ ] Missing [ ]
11. Describe any anomalies: _____
13. Was P.M. notified of any anomalies? Yes [ ] No [ ] Date _____
14. Received by E. Segura Date: 11/10/00 Time: 10:AM

Customer Sample No.	cpm	mr/hr	Customer Sample No.	Cpm	mr/hr

Ion Chamber Ser. No. _____ Calibration date _____

Survey Meter Ser No. _____ Calibration date _____

JAN 2001
RECEIVED

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNUHANFORD C01-007 H1137

DATE RECEIVED: 11/15/00 RFW LOT # :0011L264

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
B10J21						
BROMIDE BY IC	002	W	00LIC075	11/09/00	11/28/00	11/28/00
BROMIDE BY IC	002 REP	W	00LIC075	11/09/00	11/28/00	11/28/00
BROMIDE BY IC	002 MS	W	00LIC075	11/09/00	11/28/00	11/28/00
CHLORIDE BY IC	002	W	00LIC075	11/09/00	11/28/00	11/28/00
CHLORIDE BY IC	002 REP	W	00LIC075	11/09/00	11/28/00	11/28/00
CHLORIDE BY IC	002 MS	W	00LIC075	11/09/00	11/28/00	11/28/00
FLUORIDE BY IC	002	W	00LIC075	11/09/00	11/28/00	11/28/00
FLUORIDE BY IC	002 REP	W	00LIC075	11/09/00	11/28/00	11/28/00
FLUORIDE BY IC	002 MS	W	00LIC075	11/09/00	11/28/00	11/28/00
NITRITE BY IC	002	W	00LIC075	11/09/00	11/28/00	11/28/00
NITRITE BY IC	002 REP	W	00LIC075	11/09/00	11/28/00	11/28/00
NITRITE BY IC	002 MS	W	00LIC075	11/09/00	11/28/00	11/28/00
NITRATE BY IC	002	W	00LIC075	11/09/00	11/28/00	11/28/00
NITRATE BY IC	002 REP	W	00LIC075	11/09/00	11/28/00	11/28/00
NITRATE BY IC	002 MS	W	00LIC075	11/09/00	11/28/00	11/28/00
PHOSPHATE BY IC	002	W	00LIC075	11/09/00	11/28/00	11/28/00
PHOSPHATE BY IC	002 REP	W	00LIC075	11/09/00	11/28/00	11/28/00
PHOSPHATE BY IC	002 MS	W	00LIC075	11/09/00	11/28/00	11/28/00
SULFATE BY IC	002	W	00LIC075	11/09/00	11/28/00	11/28/00
SULFATE BY IC	002 REP	W	00LIC075	11/09/00	11/28/00	11/28/00
SULFATE BY IC	002 MS	W	00LIC075	11/09/00	11/28/00	11/28/00
B10J23						
BROMIDE BY IC	004	W	00LIC075	11/09/00	11/28/00	11/28/00
CHLORIDE BY IC	004	W	00LIC075	11/09/00	11/28/00	11/28/00
FLUORIDE BY IC	004	W	00LIC075	11/09/00	11/28/00	11/28/00
NITRITE BY IC	004	W	00LIC075	11/09/00	11/28/00	11/28/00
NITRATE BY IC	004	W	00LIC075	11/09/00	11/28/00	11/28/00
PHOSPHATE BY IC	004	W	00LIC075	11/09/00	11/28/00	11/28/00
SULFATE BY IC	004	W	00LIC075	11/09/00	11/28/00	11/28/00

LAB QC:

BROMIDE BY IC	MB1	W	00LIC075	N/A	11/28/00	11/28/00

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNUHANFORD C01-007 H1137

DATE RECEIVED: 11/15/00 RFW LOT # :0011L264

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
BROMIDE BY IC	MB1 BS	W	00LIC075	N/A	11/28/00	11/28/00
CHLORIDE BY IC	MB1	W	00LIC075	N/A	11/28/00	11/28/00
CHLORIDE BY IC	MB1 BS	W	00LIC075	N/A	11/28/00	11/28/00
FLUORIDE BY IC	MB1	W	00LIC075	N/A	11/28/00	11/28/00
FLUORIDE BY IC	MB1 BS	W	00LIC075	N/A	11/28/00	11/28/00
NITRITE BY IC	MB1	W	00LIC075	N/A	11/28/00	11/28/00
NITRITE BY IC	MB1 BS	W	00LIC075	N/A	11/28/00	11/28/00
NITRATE BY IC	MB1	W	00LIC075	N/A	11/28/00	11/28/00
NITRATE BY IC	MB1 BS	W	00LIC075	N/A	11/28/00	11/28/00
PHOSPHATE BY IC	MB1	W	00LIC075	N/A	11/28/00	11/28/00
PHOSPHATE BY IC	MB1 BS	W	00LIC075	N/A	11/28/00	11/28/00
SULFATE BY IC	MB1	W	00LIC075	N/A	11/28/00	11/28/00
SULFATE BY IC	MB1 BS	W	00LIC075	N/A	11/28/00	11/28/00

RECRA
ENVIRONMENTAL
INC.

Chemical and Environmental Measurement Information

Recra LabNet Philadelphia
Analytical Report

Client : TNU-HANFORD C01-007 H1137
RFW# : 0011L264

W.O. # : 10985-001-001-9999-00
Date Received: 11-15-00

INORGANIC CASE NARRATIVE

1. This narrative covers the analyses of 2 water samples.

2. The samples were prepared and analyzed in accordance with the method checked on the attached glossary.

3. Sample holding times as required by the method and/or contract were met with the exception of Nitrate, Nitrite and Phosphate which were received past hold.

4. The cooler temperature was recorded on the chain-of-custody.

5. The method blanks were within method criteria.

6. The Laboratory Control Samples (LCS) were within the laboratory control limits.

7. The matrix spike recoveries were within the 75-125% control limits.

8. The replicate analyses were within the 20% Relative Percent Difference (RPD) control limit.

9. I certify that this sample data package is in compliance with SOW requirements, both technically and for completeness, 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.

Pat G

J. Michael Taylor
VP, Laboratory General Manager
Lionville Laboratory

01-03-01
Date

njp\il1-264

The results presented in this report relate only to the analytical testing and conditions of the samples at receipt and during storage. All pages of this report are integral parts of the analytical data. Therefore, this report should only be reproduced in its entirety of 13 pages.

Recra LabNet Philadelphia

WET CHEMISTRY

METHODS GLOSSARY FOR WATER SAMPLE ANALYSIS

	EPA /600	SW846	OTHER
Acidity	___ 305.1		
___Alkalinity ___Bicarbonate ___Carbonate	___ 310.1		
BOD	___ 405.1		___ 5210B (b)
Ion Chormatography:			
✓ Bromide ✓ Chloride ✓ Fluoride	✓ 300.0	___ 9056	
✓ Nitrate ✓ Nitrite ✓ Phosphate	✓ 300.0	___ 9056	
✓ Sulfate ___Formate ___Acetate ___Oxalate	✓ 300.0	___ 9056	
Chloride	___ 325.2	___ 9251	
Chorine, Residual	___ 330.5 (mod)		
Cyanide, Amenable to Chorination	___ 335.2	___ 9010B	
Cyanide, Total	___ 335.2	___ 9010B ___ 9014	___ ILMO4.0 (e)
Cyanide, Weak Acid Dissociable		___	___ 412 (a) ___ 4500CN-I (b
COD	___ 410.4(mod)		___ 5220C (b)
Color	___ 110.2		
Corrosivity by Coupon		___ 1110(mod)	
Chromium VI		___ 7196A	___ 3500Cr-D (b)
Fluoride	___ 340.2		___ 4500-FC
Hardness, Calcium	___ 215.2		
Hardness, Total	___ 130.2		
Iodide			___ ASTM D19P202 (1)
Surfactant	___ 425.1		
___Nitrate-Nitrite ___Nitrate ___Nitrite	___ 353.2		
Ammonia	___ 350.3		
Total___ Kjeldahl ___ Organic Nitrogen	___ 351.4		
Total___ Organic ___ Inorganic Carbon	___ 415.1	___ 9060	
Oil & Grease	___ 413.1	___ 9070	
___ pH ____ pH; paper	___ 150.1	___ 9040B ___ 9041A	
Petroleum Hydrocarbons, Total Recoverable	___ 418.1		
Phenol	___ 420.1 ___ 420.2	___ 9065 ___ 9066	
___Ortho ___Total Phosphate	___ 365.2		___ 4500-P B ___ C
Salinity			___ 210A (a) ___ 2520 (b)
Settleable Solids	___ 160.5		
Sulfide	___ 376.1 ___ 376.2	___ 9030B/9034 (acid soluble)	
Reactive ___Cyanide ___Sulfide		___ Section 7.3 (__9014__9030B)	
Silica	___ 370.1		
Sulfite	___ 377.1		
Sulfate	___ 375.4	___ 9038	
Specific Conductance	___ 120.1	___ 9050A	
Specific Gravity			___ D5057-90 ___ 213E (a)
Synthetic Precipitation Leach	___ 1312		
Total ___Dissolved __Suspended ___Solids	160 ___.1 ___.2 ___.3		
Total Organic Halides	___ 450.1	___ 9020B	
Turbidity	___ 180.1		
Volatile Solids:			
__Total __Dissolved __Suspended	___ 160.4		

Other: **Method:**

L-WI-034/A-02/00

Recra LabNet Philadelphia
METHOD REFERENCES AND DATA QUALIFIERS

DATA QUALIFIERS

U = Indicates that the parameter was not detected at or above the reported limit. The associated numerical value is the sample detection limit.

* = Indicates that the original sample result is greater than 4x the spike amount added.

ABBREVIATIONS

MB = Method or Preparation Blank.
MS = Matrix Spike.
MSD = Matrix Spike Duplicate.
REP = Sample Replicate
LC = Laboratory Control Sample.
NC = Not calculated.

A suffix of -R, -S, or -T following these codes indicate a replicate, spike or sample duplicate analysis respectively.

ANALYTICAL WET CHEMISTRY METHODS

1. ASTM Standard Methods.

2. USEPA Methods for Chemical Analysis of Water and Wastes (USEPA 600/4-79-020).

3. Test Methods for Evaluating Solid Waste (USEPA SW-846).

a. Standard Methods for the Examination of Water and Waste, 16 ed, (1983).

b. Standard Methods for the Examination of Water and Waste, 17 ed, (1989)/18ed (1992).

c. Method of Soil Analysis, Part 1, Physical and Mineralogical Methods, 2nd ed, (1986).

d. Method of Soil Analysis, Part 2, Chemical and Microbiological Properties, Am. Soc. Agron., Madison, WI (1965).

e. USEPA Contract Laboratory Program, Statement of Work for Inorganic Analysis.

f. Code of Federal Regulations.

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 12/06/00

CLIENT: TNUHANFORD C01-007 H1137

RECRA LOT #: 0011L264

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-002	B10J21	Bromide by IC	0.50 u	MG/L	0.50	2.0
		Chloride by IC	16.4	MG/L	0.50	2.0
		Fluoride by IC	1.0 u	MG/L	1.0	2.0
		Nitrite by IC	0.50 u	MG/L	0.50	2.0
		Nitrate by IC	19	MG/L	2.5	10
		Phosphate by IC	0.50 u	MG/L	0.50	2.0
		Sulfate by IC	68.0	MG/L	2.5	10.0
-004	B10J23	Bromide by IC	0.50 u	MG/L	0.50	2.0
		Chloride by IC	15.7	MG/L	0.50	2.0
		Fluoride by IC	1.0 u	MG/L	1.0	2.0
		Nitrite by IC	0.50 u	MG/L	0.50	2.0
		Nitrate by IC	30	MG/L	2.5	10
		Phosphate by IC	0.50 u	MG/L	0.50	2.0
		Sulfate by IC	84.6	MG/L	2.5	10.0

Recra LabNet - Lionville

INORGANICS METHOD BLANK DATA SUMMARY PAGE 12/06/00

CLIENT: TNUHANFORD C01-007 H1137 RECRA LOT #: 0011L264

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK10	00LIC075-MB1	Bromide by IC	0.25 u	MG/L	0.25	1.0
		Chloride by IC	0.25 u	MG/L	0.25	1.0
		Fluoride by IC	0.50 u	MG/L	0.50	1.0
		Nitrite by IC	0.25 u	MG/L	0.25	1.0
		Nitrate by IC	0.25 u	MG/L	0.25	1.0
		Phosphate by IC	0.25 u	MG/L	0.25	1.0
		Sulfate by IC	0.25 u	MG/L	0.25	1.0

Recra LabNet - Lionville

INORGANICS ACCURACY REPORT 12/06/00

CLIENT: TNUHANFORD C01-007 H1137 RECRA LOT #: 0011L264

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR(SPK)
-002	B10J21	Bromide by IC	24.3	0.37	25.0	95.6	5.0
		Chloride by IC	40.6	16.4	25.0	97.0	5.0
		Fluoride by IC	53.7	0.00	50.0	107.4	5.0
		Nitrite by IC	26	0.50u	25	102.4	5.0
		Nitrate by IC	120	19	100	98.0	20
		Phosphate by IC	24.2	0.50u	25.0	96.9	5.0
		Sulfate by IC	170	68.0	100	101.8	20.0
BLANK10	00LIC075-MB1	Bromide by IC	4.8	0.25u	5.0	96.8	1.0
		Chloride by IC	4.9	0.25u	5.0	98.0	1.0
		Fluoride by IC	10.7	0.50u	10.0	107.0	1.0
		Nitrite by IC	5.0	0.25u	5.0	99.2	1.0
		Nitrate by IC	4.9	0.25u	5.0	98.1	1.0
		Phosphate by IC	5.0	0.25u	5.0	99.5	1.0
		Sulfate by IC	4.8	0.25u	5.0	96.7	1.0

Recra LabNet - Lionville

INORGANICS PRECISION REPORT 12/06/00

CLIENT: TNUHANFORD C01-007 H1137 RECRA LOT #: 0011L264

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR(REP)
-002REP	B10J21	Bromide by IC	0.50u	0.50u	NC	2.0
		Chloride by IC	16.4	16.2	1.1	2.0
		Fluoride by IC	1.0 u	1.0 u	NC	2.0
		Nitrite by IC	0.50u	0.50u	NC	2.0
		Nitrate by IC	19	18	3.1	10
		Phosphate by IC	0.50u	0.50u	NC	2.0
		Sulfate by IC	68.0	67.3	1.0	10.0

RECRA LabNet Use Only
C011L264

Custody Transfer Record/Lab Work Request

Page 1 of 1

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS

RECRA LabNet

Client: TNU-Hanford C01-007
Est. Final Proj. Sampling Date:
Project #: 10985-001-001-9999-00
Project Contact/Phone #:
RECRA Project Manager: OJ
QC: Spec Del: Std TAT: 30 day
Date Rec'd: ~~12~~ 11-15-00 (TK 11-15-00) Date Due: 12-15-00
Account #:

		A	B
Refrigerator #		5	5
#/Type Container	Liquid	1P	1P
	Solid		
Volume	Liquid	500	500
	Solid		
Preservatives		HNO3	-

ANALYSES REQUESTED →

Lab ID	Client ID/Description	Matrix QC Chosen (✓) MS	MSD	Matrix	Date Collected	Time Collected	ORGANIC VOA	BNA	Pest/PCB	Herb	INORG Metal	CN	RECRA LabNet Use Only Met①	IC①
001	B10J20 (F)			W	11-9-00	1046					✓			
002	1										✓		✓	
003	2 (F)					0928					✓			
004	3										✓		✓	

MATRIX CODES:
S - Soil
SE - Sediment
SO - Solid
SL - Sludge
W - Water
O - Oil
A - Air
DS - Drum Solids
DL - Drum Liquids
L - EP/TCLP Leachate
WI - Wipe
X - Other
F - Fish

Special Instructions: Saf C01-007

Run Matrix QC

DATE/REVISIONS:
Met① 1. Al, Ag, Ba, Br, Ca, Cd, Cr, Co, Cu, Fe, K, Mg,
2. Mn, Ni, Na, Sb, Sr, V-, Zn
IC① 3. Br, Cl, Fl, NO2, NO3, PO4, SO4
4.
5.
6.

RECRA LabNet Use Only

Samples were:
1) Shipped ✓ or Hand Delivered
Airbill # See below
2) Ambient or Chilled
3) Received in Good Condition Y or N
4) Labels Indicate Properly Preserved Y or N
5) Received Within Holding Times Y or N (NO2 NO3 PO4)

COC Tape was:
1) Present on Outer Package Y or N
2) Unbroken on Outer Package Y or N
3) Present on Sample Y or N
4) Unbroken on Sample Y or N
COC Record Present Upon Sample Rec't Y or N
Cooler Temp. 5.5 °C

Relinquished by	Received by	Date	Time
FedEx	TKeppel	11-15-00	1000

Relinquished by	Received by	Date	Time
COMPOSITE	ORIGINAL		

Discrepancies Between Samples Labels and COC Record? Y or N
NOTES:
965 9505 152

PNNL	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST Chem SOG H1137	C.O.C. # C01-007-41 Page 1 of 1

Collector: JG Hogan	Contact/Requester: JH KESSNER	Telephone No.: (509) 375-4688 MSIN FAX
SAF No.: C01-007	Sampling Origin: HANFORD SITE	Purchase Order/Charge Code
Project Title: 100 KR4 IAM (1 & 2)	Logbook No.: WM-SAWS-H39	Ice Chest No.: SM1-222 Temp.
Shipped To (Lab): TMA/RECRA	Method of Shipment: GOVT. VEHICLE	Bill of Lading/Air Bill No.: 4235 7954 0463
Protocol: CERCLA	Data Turnaround: 45 Days	Offsite Property No.

POSSIBLE SAMPLE HAZARDS/REMARKS
** **

SPECIAL INSTRUCTIONS Hold Time Total Activity Exemption: Yes ☑ No ☐
Submit deliverables & invoices to JH Kessner
FAX TMA log-in to JH Kessner (372-9487) & DL Stewart (372-1704)

Sample No.	Lab ID	*	Date	Time	No/Type Container	Sample Analysis	Preservative
B10J20 (F) ✓		W	11/9/00	1046	1x500-mL G/P ✓	ICP Metals - 6010A RCRA GW ✓ ✓	HNO3 to pH <2
B10J21 ✓		W			1x500-mL G/P ✓	ICP Metals - 6010A RCRA GW ✓ ✓	HNO3 to pH <2
B10J21 ✓		W			1x500-mL P ✓	IC Anions - 300.0 ✓	Cool 4C
B10J21 ✓		W			1x20-mL P	Activity Scan ✓	None
B10J21 ✓		W			2x1000-mL G/P	Gross Alpha ✓	HNO3 to pH <2
B10J21 ✓		W			2x1000-mL G/P	Gross Beta ✓	HNO3 to pH <2
B10J21 ✓		W			1x1000-mL G/P	Gamma Spectroscopy(Water) ✓	HNO3 to pH <2
B10J21 ✓		W			1x250-mL P	Tritium - H3 ✓	None

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
JG Hogan		Hogan	NOV 09 2000 1415	Fed EX			11/09/00
FED. EXPRESS			11/10/00 10:Am	E. Seguro			11/10/00 10:Am
JR Corse		JC Corse	11-14-00 11:00	Fed Ex			11-14-00
Fed Ex		11-15-00	1000	Thoppel		11-15-00	1000

Matrix *

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

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process)	Disposed By	Date/Time

PNNL	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST Chem SOG H1137	C.O.C. # C01-007-37 Page 1 of 1

Collector: R.T SICKLE	Contact/Requester: JH KESSNER	Telephone No.: (509) 375-4688 MSIN FAX
SAF No.: C01-007	Sampling Origin: HANFORD SITE	Purchase Order/Charge Code
Project Title: 100 KR4 IAM (1 & 2)	Logbook No.: WM-SAWS-H38	Ice Chest No.: SMC222 Temp.
Shipped To (Lab): TMA/RECRA	Method of Shipment: GOVT. VEHICLE	Bill of Lading/Air Bill No.: 4235 7954 0463
Protocol: CERCLA	Data Turnaround: 45 Days	Offsite Property No.

POSSIBLE SAMPLE HAZARDS/REMARKS
" "

SPECIAL INSTRUCTIONS Hold Time Total Activity Exemption: Yes ☑ No ☐
Submit deliverables & invoices to JH Kessner
FAX TMA log-in to JH Kessner (372-9487) & DR. Stewart (372-1704)

Sample No.	Lab ID	*	Date	Time	No/Type Container	Sample Analysis	Preservative
B10J22 (F) ✓		W	11/9/00	0928	1x500-mL G/P ✓	ICP Metals - 6010A RCRA GW ✓	HNO3 to pH <2
B10J23 ✓		W			1x500-mL G/P ✓	ICP Metals - 6010A RCRA GW ✓	HNO3 to pH <2
B10J23 ✓		W			1x500-mL P ✓	IC Anions - 300.0 ✓	Cool 4C
B10J23 ✓		W			1x20-mL P	Activity Scan ✓	None
B10J23 ✓		W			2x1000-mL G/P	Gross Alpha ✓	HNO3 to pH <2
B10J23 ✓		W			2x1000-mL G/P	Gross Beta ✓	HNO3 to pH <2
B10J23 ✓		W			1x1000-mL G/P	Gamma Spectroscopy(Water) ✓	HNO3 to pH <2
B10J23 ✓		W			1x250-mL P	Tritium - H3 ✓	None

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
R.T SICKLE	11-09-00 14:15	Fed Ex	11/09/00
FED-EXPRESS	11/10/00 10 am	E. Aragaro	11/10/00 10 AM
JRC	11-14-00 10:00	Fed Ex	11-14-00
Fed Ex	11-15-00 1000	Thoppel	11-15-00 1000

Matrix *

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

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process)	Disposed By	Date/Time

PAGE 1 Thermo NUtech CHAIN OF CUSTODY ORD # R0-11-101

11/10/00 14:53:17 WORK ID: SAF C01-007 SDG H1137

RCVD: 11/10/00 DUE: 12/25/00 KEEP: 12/25/01 DISP: S

DASH	SAMPLE IDENTIFICATION	STORED	TESTS		
01A	B10J20(F)	RECRA	DISPOS	E011	
02A	B10J21	RECRA	DISPOS	E011	E260
02B	B10J21 MS	RECRA	E011	E260	
02C	B10J21 DUP	RECRA	E011	E260	
03A	B10J22(F)	RECRA	DISPOS	E011	
04A	B10J23	RECRA	DISPOS	E011	E260

RELEASED BY	DATE	TRANSFERRED TO	DATE	RECEIVED BY	DATE
[illegible]	11-14-00	Fed Ex	11-14-00		
FedEx	11-15-00	Recra	11-15-00	[illegible]	11-15-00