H1117

0054561

DEC 2000
RECEIVED

1.0 GENERAL

Bechtel Hanford Inc. (BHI) Sample Delivery Group H1117 was composed of one water sample designated under SAF No. C01-007 with a Project Designation of: 100 KR4 IAM (1 & 2).

The sample was received as stated on the Chain-of-Custody documents. Any discrepancies are noted on the Thermo Retec Sample Receipt Checklist. SDG H1117 (7546) was batched with SDG H1111 (7542).

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

The H-3 matrix spike was associated with SDG H1111 (7542). The H-3 matrix spike had a 93% recovery. No problems were encountered during the course of the analyses.

2.3 Carbon-14 Analyses

The C-14 matrix spike was associated with SDG H1111 (7542). The C-14 matrix spike had a 16% recovery. The activity from sample B10J49 (3.0×10^4 dpm of sample) swamped the added activity from the matrix spike (2,836 dpm of MS). The RPD between sample B10J07 and its sample duplicate was 31%, greater than the 3σ limit of 23%.

2.4 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

12/18/00

RECEIVED
MAR 28 2001
EDMC

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1117

SAMPLE SUMMARY

SDG 7546
Contact Melissa C. Mannion

Client Hanford
Contract TRC-SBB-207925
Case no SDG H1117

CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	LAB SAMPLE ID	SAF NO	CHAIN OF CUSTODY	COLLECTED
B10J07	Hanford Site	WATER		R011028-01	C01-007	C01-007-2	11/01/00 12:06
Method Blank		WATER		R010187-06	C01-007		
Lab Control Sample		WATER		R010187-05	C01-007		
Duplicate (R011028-01)	Hanford Site	WATER		R011028-02	C01-007		11/01/00 12:06

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CS
Version 3.06
Report date 12/18/00

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1117

QC SUMMARY

SDG 7546
Contact Melissa C. Mannion

Client Hanford
Contract TRC-SBB-207925
Case no SDG H1117

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
7542		Method Blank	WATER						R010187-06	7542-006
		Lab Control Sample	WATER						R010187-05	7542-005
7546	C01-007-2	B10J07	WATER				11/02/00	1	R011028-01	7546-001
		Duplicate (R011028-01)	WATER				11/02/00	1	R011028-02	7546-002

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-QS
Version 3.06
Report date 12/18/00

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1117

PREP BATCH SUMMARY

SDG 7546
Contact Melissa C. Mannion

Client Hanford
Contract TRC-SBB-207925
Case no SDG H1117

TEST	MATRIX	METHOD	PREPARATION BATCH	ERROR 2σ %	PLANCHETS ANALYZED CLIENT	MORE	RE	BLANK	LCS	DUP/ORIG	MS/ORIG	QUALIFIERS
Gas Proportional Counting												
82B	WATER	Gross Beta in Water	6962-035	15.0	1			1	1	1/1		
88A	WATER	Gross Alpha in Water	6962-035	20.0	1			1	1	1/1		
Gamma Scan												
GAM	WATER	Gamma Emitters	6962-035	15.0	1			1	1	1/1		
Liquid Scintillation Counting												
C	WATER	Carbon 14 in Water	6962-035	10.0	1			1	1	1/1		
H	WATER	Tritium in Water	6962-035	10.0	1			1	1	1/1		X

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 12/18/00

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1117

WORK SUMMARY

SDG 7546
Contact Melissa C. Mannion

Client Hanford
Contract TRC-SBB-207925
Case no SDG H1117

CLIENT SAMPLE ID / LOCATION / CUSTODY	SAF No	MATRIX	LAB SAMPLE ID / COLLECTED / RECEIVED	PLANCHET	TEST	SUF-FIX	ANALYZED	REVIEWED	BY	METHOD
B10J07			R011028-01	7546-001	82B/82		11/20/00	12/18/00	MCM	Gross Beta in Water
Hanford Site		WATER	11/01/00	7546-001	88A/88		11/21/00	12/18/00	MCM	Gross Alpha in Water
C01-007-2	C01-007		11/02/00	7546-001	C		12/03/00	12/18/00	MCM	Carbon 14 in Water
				7546-001	GAM		11/20/00	12/18/00	MCM	Gamma Emitters
				7546-001	H		11/29/00	12/18/00	MCM	Tritium in Water
Method Blank			R010187-06	7542-006	82B/82		11/20/00	12/14/00	MCM	Gross Beta in Water
		WATER		7542-006	88A/88		11/18/00	12/14/00	MCM	Gross Alpha in Water
	C01-007			7542-006	C		12/03/00	12/14/00	MCM	Carbon 14 in Water
				7542-006	GAM		11/17/00	12/14/00	MCM	Gamma Emitters
				7542-006	H		11/29/00	12/14/00	MCM	Tritium in Water
Lab Control Sample			R010187-05	7542-005	82B/82		11/20/00	12/14/00	MCM	Gross Beta in Water
		WATER		7542-005	88A/88		11/18/00	12/14/00	MCM	Gross Alpha in Water
	C01-007			7542-005	C		12/03/00	12/14/00	MCM	Carbon 14 in Water
				7542-005	GAM		11/17/00	12/14/00	MCM	Gamma Emitters
				7542-005	H		11/28/00	12/14/00	MCM	Tritium in Water
Duplicate (R011028-01)			R011028-02	7546-002	82B/82		11/20/00	12/18/00	MCM	Gross Beta in Water
Hanford Site		WATER	11/01/00	7546-002	88A/88		12/15/00	12/18/00	MCM	Gross Alpha in Water
	C01-007		11/02/00	7546-002	C		12/03/00	12/18/00	MCM	Carbon 14 in Water
				7546-002	GAM		11/21/00	12/18/00	MCM	Gamma Emitters
				7546-002	H		11/29/00	12/18/00	MCM	Tritium in Water

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	1			1	1	1	4
88A/88	C01-007	Gross Alpha in Water	900.0_ALPHABETA_GPC	1			1	1	1	4
C	C01-007	Carbon 14 in Water	C14_CHEM_LSC	1			1	1	1	4
GAM	C01-007	Gamma Emitters	GAMMA_GS	1			1	1	1	4
H	C01-007	Tritium in Water	906.0_H3_LSC	1			1	1	1	4
TOTALS				5			5	5	5	20

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CWS
Version 3.06
Report date 12/18/00

TMA / RICHMOND

SAMPLE DELIVERY GROUP H1117

R010187-06 **Method Blank**

METHOD BLANK

SDG	7546	Client/Case no	Hanford SDG H1117
Contact	Melissa C. Mannion	Contract	TRC-SBB-207925
Lab sample id	R010187-06	Client sample id	Method Blank
Dept sample id	7542-006	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	0.013	0.71	1.5	3.0	U	88A
Gross Beta	12587-47-2	-1.07	1.8	3.2	4.0	U	82B
Tritium	10028-17-8	12.2	110	190	400	U	H
Carbon 14	14762-75-5	-5.26	40	67	200	U	C
Potassium 40	13966-00-2	U		94		U	GAM
Cobalt 60	10198-40-0	U		7.3	25	U	GAM
Cesium 137	10045-97-3	U		8.1	15	U	GAM
Radium 226	13982-63-3	U		15		U	GAM
Radium 228	15262-20-1	U		36		U	GAM
Europium 152	14683-23-9	U		20	50	U	GAM
Europium 154	15585-10-1	U		24	50	U	GAM
Europium 155	14391-16-3	U		18	50	U	GAM
Thorium 228	14274-82-9	U		11		U	GAM
Thorium 232	TH-232	U		36		U	GAM
Uranium 235	15117-96-1	U		31		U	GAM
Uranium 238	U-238	U		1100		U	GAM
Americium 241	14596-10-2	U		25		U	GAM

100 KR4 IAM (1 & 2)

QC-BLANK 36578

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	12/18/00

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1117

R010187-05

Lab Control Sample

LAB CONTROL SAMPLE

SDG 7546
Contact Melissa C. Mannion

Client/Case no Hanford SDG H1117
Case no TRC-SBB-207925

Lab sample id R010187-05
Dept sample id 7542-005

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	187	9.9	2.1	3.0		88A	203	8.1	92	71-129	70-130
Gross Beta	204	7.0	2.9	4.0		82B	203	8.1	100	76-124	70-130
Tritium	4480	220	190	400	X	H	4980	200	90	84-116	80-120
Carbon 14	22600	230	86	200		C	25600	1000	88	85-115	80-120
Cobalt 60	924	63	32	25		GAM	948	38	97	75-125	80-120
Cesium 137	970	56	43	15		GAM	1010	40	96	76-124	80-120

100 KR4 IAM (1 & 2)

QC-LCS 36577

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-LCS
Version 3.06
Report date 12/18/00

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1117

R011028-02 B10J07

DUPLICATE

SDG	7546			Client/Case no	Hanford SDG H1117
Contact	Melissa C. Mannion			Case no	TRC-SBB-207925
	DUPLICATE		ORIGINAL		
Lab sample id	R011028-02	Lab sample id	R011028-01	Client sample id	B10J07
Dept sample id	7546-002	Dept sample id	7546-001	Location/Matrix	Hanford Site WATER
		Received	11/02/00	Collected	11/01/00 12:06
				Custody/SAF No	C01-007-2 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 TOT	PROT LIMIT
Gross Alpha	2.06	1.3	1.6	3.0	J	88A	1.39	1.4	2.1	U	39	172	
Gross Beta	4.82	2.1	3.1	4.0		82B	4.62	2.3	3.6		4	104	
Tritium	129	120	200	400	U	H	172	120	190	U	-		
Carbon 14	924	40	45	200		C	1260	45	47		31	23	
Potassium 40	U		300		U	GAM	U		150	U	-		
Cobalt 60	U		20	25	U	GAM	U		8.1	U	-		
Beryllium 7	U		170		U	GAM	80.0	48	60		72	215	
Cesium 137	U		16	15	U	GAM	U		8.7	U	-		
Radium 226	U		40		U	GAM	17.0	12	12		81	222	
Radium 228	U		110		U	GAM	U		38	U	-		
Europium 152	U		50	50	U	GAM	U		22	U	-		
Europium 154	U		38	50	U	GAM	U		24	U	-		
Europium 155	U		46	50	U	GAM	U		19	U	-		
Thorium 228	U		25		U	GAM	U		18	U	-		
Thorium 232	U		110		U	GAM	U		38	U	-		
Uranium 235	U		71		U	GAM	U		31	U	-		
Uranium 238	U		2300		U	GAM	U		1100	U	-		
Americium 241	U		61		U	GAM	U		29	U	-		

100 KR4 IAM (1 & 2)

QC-DUP#1 36677

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DUP
Version	3.06
Report date	12/18/00

TMA/RICHMOND
SAMPLE DELIVERY GROUP H1117

R011028-01 B10J07

DATA SHEET

SDG	7546	Client/Case no	Hanford	SDG H1117	
Contact	Melissa C. Mannion	Contract	TRC-SBB-207925		
Lab sample id	R011028-01	Client sample id	B10J07		
Dept sample id	7546-001	Location/Matrix	Hanford Site	WATER	
Received	11/02/00	Collected	11/01/00 12:06		
		Custody/SAF No	C01-007-2	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	1.39	1.4	2.1	3.0	U	88A
Gross Beta	12587-47-2	4.62	2.3	3.6	4.0		82B
Tritium	10028-17-8	172	120	190	400	U	H
Carbon 14	14762-75-5	1260	45	47	200		C
Potassium 40	13966-00-2	U		150		U	GAM
Cobalt 60	10198-40-0	U		8.1	25	U	GAM
Beryllium 7	BE-7	80.0	48	60			GAM
Cesium 137	10045-97-3	U		8.7	15	U	GAM
Radium 226	13982-63-3	17.0	12	12			GAM
Radium 228	15262-20-1	U		38		U	GAM
Europium 152	14683-23-9	U		22	50	U	GAM
Europium 154	15585-10-1	U		24	50	U	GAM
Europium 155	14391-16-3	U		19	50	U	GAM
Thorium 228	14274-82-9	U		18		U	GAM
Thorium 232	TH-232	U		38		U	GAM
Uranium 235	15117-96-1	U		31		U	GAM
Uranium 238	U-238	U		1100		U	GAM
Americium 241	14596-10-2	U		29		U	GAM

100 KR4 IAM (1 & 2)

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	12/18/00

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1117

Test 82B Matrix WATER
SDG 7546
Contact Melissa C. Mannion

METHOD SUMMARY

GROSS BETA IN WATER
GAS PROPORTIONAL COUNTING

Client Hanford
Contract TRC-SBB-207925
Contract SDG H1117

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 6962-035								
B10J07	R011028-01	82		7546-001	4.62	97.0	2E3	2E3
BLK (QC ID=36578)	R010187-06	82		7542-006	U			
LCS (QC ID=36577)	R010187-05	82		7542-005	ok			
Duplicate (R011028-01)	R011028-02	82		7546-002	ok			
Nominal values and limits from method				RDLs (pCi/L)	4.0			
100 KR4 IAM (1 & 2)						Average 2E3		

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 6962-035	2σ prep error 15.0 % Reference Lab Notebook 6962 pg. 035															
B10J07	R011028-01	82		3.6	0.200			29		100			19	11/17/00	11/20	GRB-110
BLK (QC ID=36578)	R010187-06	82		3.2	0.200			23		100				11/17/00	11/20	GRB-114
LCS (QC ID=36577)	R010187-05	82		2.9	0.200			27		100				11/17/00	11/20	GRB-113
Duplicate (R011028-01) (QC ID=36677)	R011028-02	82		3.1	0.200			35		100			19	11/17/00	11/20	GRB-111
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 FOR 4 SAMPLES
MDA 3.2 ± 0.59
RESIDUE 28 ± 10

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 12/18/00

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1117

Test 88A Matrix WATER
SDG 7546
Contact Melissa C. Mannion

METHOD SUMMARY

GROSS ALPHA IN WATER
GAS PROPORTIONAL COUNTING

Client Hanford
Contract TRC-SBB-207925
Contract SDG H1117

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	PLANCHET	Gross Alpha	
Preparation batch 6962-035						
B10J07	R011028-01	88		7546-001	U	
BLK (QC ID=36578)	R010187-06	88		7542-006	U	
LCS (QC ID=36577)	R010187-05	88		7542-005	ok	
Duplicate (R011028-01)	R011028-02	88		7546-002	ok	J
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 6962-035 2σ prep error 20.0 % Reference Lab Notebook 6962 pg. 035																
B10J07	R011028-01	88		2.1	0.200			27		100			20	11/18/00	11/21	GRB-110
BLK (QC ID=36578)	R010187-06	88		1.5	0.200			25		100				11/18/00	11/18	GRB-116
LCS (QC ID=36577)	R010187-05	88		2.1	0.200			28		100				11/18/00	11/18	GRB-115
Duplicate (R011028-01) (QC ID=36677)	R011028-02	88		1.6	0.200			26		100			44	11/18/00	12/15	GRB-110
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 4 SAMPLES
MDA 1.8 ± 0.64
RESIDUE 26 ± 3

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 12/18/00

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1117

Test GAM Matrix WATER
SDG 7546
Contact Melissa C. Mannion

METHOD SUMMARY

GAMMA EMITTERS
GAMMA SCAN

Client Hanford
Contract TRC-SBB-207925
Contract SDG H1117

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	PLANCHET	Cobalt 60		Cesium 137	
Preparation batch 6962-035								
B10J07	R011028-01			7546-001	U		U	
BLK (QC ID=36578)	R010187-06			7542-006	U		U	
LCS (QC ID=36577)	R010187-05			7542-005	ok		ok	
Duplicate (R011028-01)	R011028-02			7546-002	-	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 6962-035 2σ prep error 15.0 % Reference Lab Notebook 6962 pg. 035																
B10J07	R011028-01			8.7	0.500					300			19	11/16/00	11/20	01,04,00
BLK (QC ID=36578)	R010187-06			8.1	0.500					308				11/16/00	11/17	01,04,00
LCS (QC ID=36577)	R010187-05			43	0.500					308				11/16/00	11/17	01,03,00
Duplicate (R011028-01) (QC ID=36677)	R011028-02			16	0.500					277			20	11/16/00	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 4 SAMPLES
MDA 19 ± 33
YIELD ____ ± ____

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 12/18/00

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1117

METHOD SUMMARY

CARBON 14 IN WATER

LIQUID SCINTILLATION COUNTING

Test C Matrix WATER
SDG 7546
Contact Melissa C. Mannion

Client Hanford
Contract TRC-SBB-207925
Contract SDG H1117

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	PLANCHET	Carbon 14
Preparation batch 6962-035					
B10J07	R011028-01			7546-001	1260
BLK (QC ID=36578)	R010187-06			7542-006	U
LCS (QC ID=36577)	R010187-05			7542-005	ok
Duplicate (R011028-01)	R011028-02			7546-002	OUT
Nominal values and limits from method 100 KR4 IAN (1 & 2)				RDLs (pCi/L)	200

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 6962-035	2σ prep error 10.0 %				Reference Lab Notebook 6962 pg. 035											
B10J07	R011028-01			47	0.0300			100		100			32	11/29/00	12/03	LSC-004
BLK (QC ID=36578)	R010187-06			67	0.0200			100		100				11/29/00	12/03	LSC-004
LCS (QC ID=36577)	R010187-05			86	0.0200			100		60				11/29/00	12/03	LSC-004
Duplicate (R011028-01) (QC ID=36677)	R011028-02			45	0.0300			100		100			32	11/29/00	12/03	LSC-004
Nominal values and limits from method				200	0.0200					50			180			

PROCEDURES	REFERENCE	C14_CHEM_LSC
	CP-241	Carbon-14 in Aqueous Samples, rev 2

AVERAGES ± 2 SD FOR 4 SAMPLES
MDA 61 ± 39
YIELD 100 ± 0

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 12/18/00

Test H Matrix WATER
SDG 7546
Contact Melissa C. Mannion

TMA/RICHMOND

SAMPLE DELIVERY GROUP H1117

METHOD SUMMARY

TRITIUM IN WATER

LIQUID SCINTILLATION COUNTING

Client Hanford
Contract TRC-SBB-207925
Contract SDG H1117

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	PLANCHET	Tritium	
Preparation batch 6962-035						
B10J07	R011028-01			7546-001	U	
BLK (QC ID=36578)	R010187-06			7542-006	U	
LCS (QC ID=36577)	R010187-05			7542-005	ok	X
Duplicate (R011028-01)	R011028-02			7546-002	-	U
Nominal values and limits from method				RDLs (pCi/L)	400	
100 KR4 IAM (1 & 2)						

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 6962-035	2σ prep error 10.0 %				Reference Lab Notebook 6962 pg. 035											
B10J07	R011028-01			190	0.0100			100		100			28	11/28/00	11/29	LSC-006
BLK (QC ID=36578)	R010187-06			190	0.0100			100		100				11/28/00	11/29	LSC-006
LCS (QC ID=36577)	R010187-05			190	0.0100			100		100				11/28/00	11/28	LSC-006
Duplicate (R011028-01) (QC ID=36677)	R011028-02			200	0.0100			100		100			28	11/28/00	11/29	LSC-006
Nominal values and limits from method				400	0.0100					25			180			

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

AVERAGES ± 2 SD FOR 4 SAMPLES
MDA 190 ± 10
YIELD 100 ± 0

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 12/18/00

PNNL

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. # C01-007-2

Page 1 of 1

Collector J. G. HOGAN	Contact/Requester JH KESSNER	Telephone No. (509) 375-4688 MSIN FAX
SAF No. C01-007	Sampling Origin HANFORD SITE H1117 (7546)	Purchase Order/Charge Code
Project Title 100 KR4 IAM (1 & 2)	Logbook No. WM-SAWS-H39	Ice Chest No. PLUG 50 lbs Temp.
Shipped To (Lab) TMA/RECRA	Method of Shipment GOVT. VEHICLE	Bill of Lading/Air Bill No. 4235795402 24
Protocol CERCLA	Data Turnaround 45 Days	Offsite Property No. W01 00021

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
B10J06 (F)		W	11-1-00	1206	1x500-mL G/P	ICP Metals - 6010A RCRA GW	HNO3 to pH <2
B10J07		W			1x500-mL G/P	ICP Metals - 6010A RCRA GW FOR RECRA	HNO3 to pH <2
B10J07		W			1x500-mL P	IC Anions - 300.0	Cool 4C
B10J07		W			1x20-mL P	Activity Scan	None
B10J07		W			2x1000-mL G/P	Gross Alpha	HNO3 to pH <2
B10J07		W			2x1000-mL G/P	Gross Beta	HNO3 to pH <2
B10J07		W			1x1000-mL G/P	Carbon-14	None
B10J07		W			1x1000-mL G/P	Gamma Spectroscopy(Water)	HNO3 to pH <2
B10J07		W			1x250-mL P	Tritium - H3	None

Relinquished By (Print)	Sign	Date/Time	Received By (Print)	Sign	Date/Time
J. G. HOGAN	J Hogan	11-1-00 1310	FED EX		11-01-00
FED EXPRESS		11/02/00	E. Segura		11/02/00

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: 11/02/00 10:AM

Ice chest # or description	PLUG					
Thermometer: time in	11:50					
Thermometer: time out	12:50					
Thermometer reading	4°C					
Thermometer number	2132					
Correction factor	NONE					
Actual temperature*						
Custody seals on ice chest intact?	NO					
Custody seals dated ?	—					
Custody seals signed?	—					
Custody seals on samples?	Yes					
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 11-02-00 10:AM

CoC No. C01-007-2

Container I.D. No. PLUG 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: 2
7. Number of containers per sample: PLEASE REFER (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. Degner Date: 11-02-00 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 H1117

DATE RECEIVED: 11/07/00 RFW LOT # :0011L168

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
B10J06 (F)						
SILVER, TOTAL	001	W	99L1807	11/01/00	12/13/00	12/16/00
SILVER, TOTAL	001 REP	W	99L1807	11/01/00	12/13/00	12/16/00
SILVER, TOTAL	001 MS	W	99L1807	11/01/00	12/13/00	12/16/00
ALUMINUM, TOTAL	001	W	99L1807	11/01/00	12/13/00	12/16/00
ALUMINUM, TOTAL	001 REP	W	99L1807	11/01/00	12/13/00	12/16/00
ALUMINUM, TOTAL	001 MS	W	99L1807	11/01/00	12/13/00	12/16/00
BARIUM, TOTAL	001	W	99L1807	11/01/00	12/13/00	12/16/00
BARIUM, TOTAL	001 REP	W	99L1807	11/01/00	12/13/00	12/16/00
BARIUM, TOTAL	001 MS	W	99L1807	11/01/00	12/13/00	12/16/00
BERYLLIUM, TOTAL	001	W	99L1807	11/01/00	12/13/00	12/16/00
BERYLLIUM, TOTAL	001 REP	W	99L1807	11/01/00	12/13/00	12/16/00
BERYLLIUM, TOTAL	001 MS	W	99L1807	11/01/00	12/13/00	12/16/00
CALCIUM, TOTAL	001	W	99L1807	11/01/00	12/13/00	12/16/00
CALCIUM, TOTAL	001 REP	W	99L1807	11/01/00	12/13/00	12/16/00
CALCIUM, TOTAL	001 MS	W	99L1807	11/01/00	12/13/00	12/16/00
CADMIUM, TOTAL	001	W	99L1807	11/01/00	12/13/00	12/16/00
CADMIUM, TOTAL	001 REP	W	99L1807	11/01/00	12/13/00	12/16/00
CADMIUM, TOTAL	001 MS	W	99L1807	11/01/00	12/13/00	12/16/00
COBALT, TOTAL	001	W	99L1807	11/01/00	12/13/00	12/16/00
COBALT, TOTAL	001 REP	W	99L1807	11/01/00	12/13/00	12/16/00
COBALT, TOTAL	001 MS	W	99L1807	11/01/00	12/13/00	12/16/00
CHROMIUM, TOTAL	001	W	99L1807	11/01/00	12/13/00	12/16/00
CHROMIUM, TOTAL	001 REP	W	99L1807	11/01/00	12/13/00	12/16/00
CHROMIUM, TOTAL	001 MS	W	99L1807	11/01/00	12/13/00	12/16/00
COPPER, TOTAL	001	W	99L1807	11/01/00	12/13/00	12/16/00
COPPER, TOTAL	001 REP	W	99L1807	11/01/00	12/13/00	12/16/00
COPPER, TOTAL	001 MS	W	99L1807	11/01/00	12/13/00	12/16/00
IRON, TOTAL	001	W	99L1807	11/01/00	12/13/00	12/16/00
IRON, TOTAL	001 REP	W	99L1807	11/01/00	12/13/00	12/16/00
IRON, TOTAL	001 MS	W	99L1807	11/01/00	12/13/00	12/16/00
POTASSIUM, TOTAL	001	W	99L1807	11/01/00	12/13/00	12/16/00
POTASSIUM, TOTAL	001 REP	W	99L1807	11/01/00	12/13/00	12/16/00
POTASSIUM, TOTAL	001 MS	W	99L1807	11/01/00	12/13/00	12/16/00
MAGNESIUM, TOTAL	001	W	99L1807	11/01/00	12/13/00	12/16/00
MAGNESIUM, TOTAL	001 REP	W	99L1807	11/01/00	12/13/00	12/16/00

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNUHANFORD C01-007 H1117

DATE RECEIVED: 11/07/00 RFW LOT # :0011L168

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
MAGNESIUM, TOTAL	001 MS	W	99L1807	11/01/00	12/13/00	12/16/00
MANGANESE, TOTAL	001	W	99L1807	11/01/00	12/13/00	12/16/00
MANGANESE, TOTAL	001 REP	W	99L1807	11/01/00	12/13/00	12/16/00
MANGANESE, TOTAL	001 MS	W	99L1807	11/01/00	12/13/00	12/16/00
SODIUM, TOTAL	001	W	99L1807	11/01/00	12/13/00	12/16/00
SODIUM, TOTAL	001 REP	W	99L1807	11/01/00	12/13/00	12/16/00
SODIUM, TOTAL	001 MS	W	99L1807	11/01/00	12/13/00	12/16/00
NICKEL, TOTAL	001	W	99L1807	11/01/00	12/13/00	12/16/00
NICKEL, TOTAL	001 REP	W	99L1807	11/01/00	12/13/00	12/16/00
NICKEL, TOTAL	001 MS	W	99L1807	11/01/00	12/13/00	12/16/00
ANTIMONY, TOTAL	001	W	99L1807	11/01/00	12/13/00	12/16/00
ANTIMONY, TOTAL	001 REP	W	99L1807	11/01/00	12/13/00	12/16/00
ANTIMONY, TOTAL	001 MS	W	99L1807	11/01/00	12/13/00	12/16/00
STRONTIUM, TOTAL	001	W	99L1807	11/01/00	12/13/00	12/16/00
STRONTIUM, TOTAL	001 REP	W	99L1807	11/01/00	12/13/00	12/16/00
STRONTIUM, TOTAL	001 MS	W	99L1807	11/01/00	12/13/00	12/16/00
VANADIUM, TOTAL	001	W	99L1807	11/01/00	12/13/00	12/16/00
VANADIUM, TOTAL	001 REP	W	99L1807	11/01/00	12/13/00	12/16/00
VANADIUM, TOTAL	001 MS	W	99L1807	11/01/00	12/13/00	12/16/00
ZINC, TOTAL	001	W	99L1807	11/01/00	12/13/00	12/16/00
ZINC, TOTAL	001 REP	W	99L1807	11/01/00	12/13/00	12/16/00
ZINC, TOTAL	001 MS	W	99L1807	11/01/00	12/13/00	12/16/00
B10J07						
SILVER, TOTAL	002	W	99L1807	11/01/00	12/13/00	12/16/00
ALUMINUM, TOTAL	002	W	99L1807	11/01/00	12/13/00	12/16/00
BARIUM, TOTAL	002	W	99L1807	11/01/00	12/13/00	12/16/00
BERYLLIUM, TOTAL	002	W	99L1807	11/01/00	12/13/00	12/16/00
CALCIUM, TOTAL	002	W	99L1807	11/01/00	12/13/00	12/16/00
CADMIUM, TOTAL	002	W	99L1807	11/01/00	12/13/00	12/16/00
COBALT, TOTAL	002	W	99L1807	11/01/00	12/13/00	12/16/00
CHROMIUM, TOTAL	002	W	99L1807	11/01/00	12/13/00	12/16/00
COPPER, TOTAL	002	W	99L1807	11/01/00	12/13/00	12/16/00
IRON, TOTAL	002	W	99L1807	11/01/00	12/13/00	12/16/00
POTASSIUM, TOTAL	002	W	99L1807	11/01/00	12/13/00	12/16/00
MAGNESIUM, TOTAL	002	W	99L1807	11/01/00	12/13/00	12/16/00
MANGANESE, TOTAL	002	W	99L1807	11/01/00	12/13/00	12/16/00

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNUHANFORD C01-007 H1117

DATE RECEIVED: 11/07/00 RFW LOT # :0011L168

CLIENT ID. /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
SODIUM, TOTAL	002	W	99L1807	11/01/00	12/13/00	12/16/00
NICKEL, TOTAL	002	W	99L1807	11/01/00	12/13/00	12/16/00
ANTIMONY, TOTAL	002	W	99L1807	11/01/00	12/13/00	12/16/00
STRONTIUM, TOTAL	002	W	99L1807	11/01/00	12/13/00	12/16/00
VANADIUM, TOTAL	002	W	99L1807	11/01/00	12/13/00	12/16/00
ZINC, TOTAL	002	W	99L1807	11/01/00	12/13/00	12/16/00

LAB QC:

SILVER LABORATORY	LC1 BS	W	99L1807	N/A	12/13/00	12/16/00
SILVER, TOTAL	MB1	W	99L1807	N/A	12/13/00	12/16/00
ALUMINUM LABORTORY	LC1 BS	W	99L1807	N/A	12/13/00	12/16/00
ALUMINUM, TOTAL	MB1	W	99L1807	N/A	12/13/00	12/16/00
BARIUM LABORATORY	LC1 BS	W	99L1807	N/A	12/13/00	12/16/00
BARIUM, TOTAL	MB1	W	99L1807	N/A	12/13/00	12/16/00
BERYLLIUM LABORATORY	LC1 BS	W	99L1807	N/A	12/13/00	12/16/00
BERYLLIUM, TOTAL	MB1	W	99L1807	N/A	12/13/00	12/16/00
CALCIUM LABORATORY	LC1 BS	W	99L1807	N/A	12/13/00	12/16/00
CALCIUM, TOTAL	MB1	W	99L1807	N/A	12/13/00	12/16/00
CADMIUM LABORATORY	LC1 BS	W	99L1807	N/A	12/13/00	12/16/00
CADMIUM, TOTAL	MB1	W	99L1807	N/A	12/13/00	12/16/00
COBALT LABORATORY	LC1 BS	W	99L1807	N/A	12/13/00	12/16/00
COBALT, TOTAL	MB1	W	99L1807	N/A	12/13/00	12/16/00
CHROMIUM LABORATORY	LC1 BS	W	99L1807	N/A	12/13/00	12/16/00
CHROMIUM, TOTAL	MB1	W	99L1807	N/A	12/13/00	12/16/00
COPPER LABORATORY	LC1 BS	W	99L1807	N/A	12/13/00	12/16/00
COPPER, TOTAL	MB1	W	99L1807	N/A	12/13/00	12/16/00
IRON LABORATORY	LC1 BS	W	99L1807	N/A	12/13/00	12/16/00
IRON, TOTAL	MB1	W	99L1807	N/A	12/13/00	12/16/00
POTASSIUM LABORATORY	LC1 BS	W	99L1807	N/A	12/13/00	12/16/00
POTASSIUM, TOTAL	MB1	W	99L1807	N/A	12/13/00	12/16/00
MAGNESIUM LABORATORY	LC1 BS	W	99L1807	N/A	12/13/00	12/16/00
MAGNESIUM, TOTAL	MB1	W	99L1807	N/A	12/13/00	12/16/00
MANGANESE LABORATORY	LC1 BS	W	99L1807	N/A	12/13/00	12/16/00
MANGANESE, TOTAL	MB1	W	99L1807	N/A	12/13/00	12/16/00
SODIUM LABORATORY	LC1 BS	W	99L1807	N/A	12/13/00	12/16/00
SODIUM, TOTAL	MB1	W	99L1807	N/A	12/13/00	12/16/00
NICKEL LABORATORY	LC1 BS	W	99L1807	N/A	12/13/00	12/16/00

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNUHANFORD C01-007 H1117

DATE RECEIVED: 11/07/00 RFW LOT # :0011L168

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
NICKEL, TOTAL	MB1	W	99L1807	N/A	12/13/00	12/16/00
ANTIMONY LABORATORY	LC1 BS	W	99L1807	N/A	12/13/00	12/16/00
ANTIMONY, TOTAL	MB1	W	99L1807	N/A	12/13/00	12/16/00
STRONTIUM LCS STANDA	LC1 BS	W	99L1807	N/A	12/13/00	12/16/00
STRONTIUM, TOTAL	MB1	W	99L1807	N/A	12/13/00	12/16/00
VANADIUM LABORATORY	LC1 BS	W	99L1807	N/A	12/13/00	12/16/00
VANADIUM, TOTAL	MB1	W	99L1807	N/A	12/13/00	12/16/00
ZINC LABORATORY	LC1 BS	W	99L1807	N/A	12/13/00	12/16/00
ZINC, TOTAL	MB1	W	99L1807	N/A	12/13/00	12/16/00

RECRA
ENVIRONMENTAL
INC.

Chemical and Environmental Measurement Information

Recra LabNet Philadelphia
Analytical Report

Client: TNU-HANFORD C01-007
RFW#: 0011L168
SDG/SAF#: H1117/C01-007

W.O.#: 10985-001-001-9999-00
Date Received: 11-07-00

METALS CASE NARRATIVE

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

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

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). The CCV for Strontium was outside control limits in file PS1216A. All samples were rerun for Strontium in file PS1216B.

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.

11. The duplicate analyses for 5 analytes were outside the 20% Relative Percent Difference (RPD) control limits. Refer to the Inorganics Precision 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 16 pages.

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.

J. Michael Taylor
VP, Laboratory General Manager
Lionville Laboratory

gmb/m11-168

12-22-00
Date

METALS METHOD GLOSSARY

The following methods are used as reference for the digestion and analysis of samples contained within this Recra Lot#: 0011468

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

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 12/19/00

CLIENT: TNUHANFORD C01-007 H1117 RECRA LOT #: 0011L168

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

SAMPLE	SITE ID	ANALYTE	RESULT		UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	B10J06 (F)	Silver, Total	2.5	u	UG/L	2.5	1.0
		Aluminum, Total	63.2		UG/L	19.1	1.0
		Barium, Total	14.6		UG/L	3.0	1.0
		Beryllium, Total	0.60	u	UG/L	0.60	1.0
		Calcium, Total	25900		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	52.2		UG/L	3.8	1.0
		Potassium, Total	3900		UG/L	303	1.0
		Magnesium, Total	5480		UG/L	27.4	1.0
		Manganese, Total	2.3	u	UG/L	2.3	1.0
		Sodium, Total	9110		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	132		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

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 12/19/00

CLIENT: TNUHANFORD C01-007 H1117 RECRA LOT #: 0011L168

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

SAMPLE	SITE ID	ANALYTE	RESULT		UNITS	REPORTING LIMIT	DILUTION FACTOR
-002	B10J07	Silver, Total	2.5	u	UG/L	2.5	1.0
		Aluminum, Total	1120		UG/L	19.1	1.0
		Barium, Total	26.8		UG/L	3.0	1.0
		Beryllium, Total	0.60	u	UG/L	0.60	1.0
		Calcium, Total	25800		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	17.0		UG/L	4.9	1.0
		Copper, Total	4.0		UG/L	2.6	1.0
		Iron, Total	1900		UG/L	3.8	1.0
		Potassium, Total	3940		UG/L	303	1.0
		Magnesium, Total	5550		UG/L	27.4	1.0
		Manganese, Total	29.4		UG/L	2.3	1.0
		Sodium, Total	9070		UG/L	22.9	1.0
		Nickel, Total	17.4		UG/L	12.5	1.0
		Antimony, Total	17.0		UG/L	17.0	1.0
		Strontium, Total	96.2		UG/L	5.5	1.0
		Vanadium, Total	4.8	u	UG/L	4.8	1.0
		Zinc, Total	12.6		UG/L	2.7	1.0

Recra LabNet - Lionville

INORGANICS METHOD BLANK DATA SUMMARY PAGE 12/19/00

CLIENT: TNUHANFORD C01-007 H1117 RECRA LOT #: 0011L168

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

SAMPLE	SITE ID	ANALYTE	RESULT		UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK1	99L1807-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	15.4	u	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	7.1		UG/L	3.8	1.0
		Potassium, Total	303	u	UG/L	303	1.0
		Magnesium, Total	28.3		UG/L	27.4	1.0
		Manganese, Total	2.3	u	UG/L	2.3	1.0
		Sodium, Total	27.3		UG/L	22.9	1.0
		Nickel, Total	12.5	u	UG/L	12.5	1.0
		Antimony, Total	21.7		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

Recra LabNet - Lionville

INORGANICS ACCURACY REPORT 12/19/00

CLIENT: TNUHANFORD C01-007 H1117 RECRA LOT #: 0011L168

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

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR(SPK)
-001	B10J06 (F)	Silver, Total	46.7	2.5 u	50.0	93.4	1.0
		Aluminum, Total	1960	63.2	2000	94.6	1.0
		Barium, Total	1900	14.6	2000	94.4	1.0
		Beryllium, Total	48.1	0.60u	50.0	96.2	1.0
		Calcium, Total	50600	25900	25000	98.7	1.0
		Cadmium, Total	48.6	3.4 u	50.0	97.2	1.0
		Cobalt, Total	484	5.6 u	500	96.9	1.0
		Chromium, Total	198	4.9 u	200	99.2	1.0
		Copper, Total	237	2.6 u	250	94.8	1.0
		Iron, Total	1000	52.2	1000	94.9	1.0
		Potassium, Total	28200	3900	25000	97.2	1.0
		Magnesium, Total	29700	5480	25000	97.0	1.0
		Manganese, Total	483	2.3 u	500	96.5	1.0
		Sodium, Total	33000	9110	25000	95.7	1.0
		Nickel, Total	484	12.5 u	500	96.8	1.0
		Antimony, Total	522	17.0 u	500	104.5	1.0
		Strontium, Total	1110	132	1000	97.5	1.0
		Vanadium, Total	483	4.8 u	500	96.5	1.0
		Zinc, Total	479	2.7 u	500	95.7	1.0

Recra LabNet - Lionville

INORGANICS PRECISION REPORT 12/19/00

CLIENT: TNUHANFORD C01-007 H1117 RECRA LOT #: 0011L168

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

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD		DILUTION FACTOR(REP)
-001REP	B10J06 (F)	Silver, Total	2.5 u	2.5 u	NC		1.0
		Aluminum, Total	63.2	41.1	42.4		1.0
		Barium, Total	14.6	14.6	0.00		1.0
		Beryllium, Total	0.60u	0.60u	NC		1.0
		Calcium, Total	25900	25500	1.5		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	4.9 u	4.9 u	NC		1.0
		Copper, Total	2.6 u	2.6 u	NC		1.0
		Iron, Total	52.2	57.0	8.8		1.0
		Potassium, Total	3900	3740	4.2		1.0
		Magnesium, Total	5480	5380	1.9		1.0
		Manganese, Total	2.3 u	2.3 u	NC		1.0
		Sodium, Total	9110	8970	1.5		1.0
		Nickel, Total	12.5 u	13.4	~~NC~~	200	1.0
		Antimony, Total	17.0 u	17.0 u	NC		1.0
		Strontium, Total	132	107	20.7		1.0
		Vanadium, Total	4.8 u	5.2	~~NC~~	200	1.0
		Zinc, Total	2.7 u	4.5	~~NC~~	200	1.0

Recra LabNet - Lionville

INORGANICS LABORATORY CONTROL STANDARDS REPORT 12/19/00

CLIENT: TNUHANFORD C01-007 H1117 RECRA LOT #: 0011L168

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

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	SPIKED AMOUNT	UNITS	%RECOV
LCS1	99L1807-LC1	Silver, LCS	496	500	UG/L	99.2
		Aluminum, LCS	5080	5000	UG/L	101.5
		Barium, LCS	4920	5000	UG/L	98.4
		Beryllium, LCS	248	250	UG/L	99.3
		Calcium, LCS	25400	25000	UG/L	101.8
		Cadmium, LCS	254	250	UG/L	101.6
		Cobalt, LCS	2550	2500	UG/L	102.0
		Chromium, LCS	505	500	UG/L	101.0
		Copper, LCS	1230	1250	UG/L	98.7
		Iron, LCS	5060	5000	UG/L	101.1
		Potassium, LCS	25000	25000	UG/L	100.1
		Magnesium, LCS	25000	25000	UG/L	100.2
		Manganese, LCS	756	750	UG/L	100.8
		Sodium, LCS	24600	25000	UG/L	98.3
		Nickel, LCS	2030	2000	UG/L	101.7
		Antimony, LCS	3060	3000	UG/L	102.0
		Strontium, LCS	4580	5000	UG/L	91.7
		Vanadium, LCS	2500	2500	UG/L	99.9
		Zinc, LCS	1000	1000	UG/L	100.4

RECRA LabNet Use Only
0011L168

Custody Transfer Record/Lab Work Request

Page 1 of 1

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS

RECRA LabNet

Client: TNU-HANFORD SAF C01-007
Est. Final Proj. Sampling Date:
Project #: 10985-001-001-9999-00
Project Contact/Phone #:
RECRA Project Manager: QJ
QC: Spec Del: Std TAT: 30 day
Date Rec'd: 11-7-00 Date Due: 12-7-00
Account #:

		A	B
Refrigerator #		S	S
#/Type Container	Liquid	1PL	1PL
	Solid		
Volume	Liquid	500	500
	Solid		
Preservatives		HNO3	—
ANALYSES REQUESTED	ORGANIC: VOA, BNA, Pest/PCB, Herb	INORG: Metal	INORG: CN

RECRA LabNet Use Only

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	Metal	CN	IC
001	B10T06 (F)			W	11/1/00	1206	1		1
002	1 7			1	1		1		1

Special Instructions: SAF C01-007

Run matrix QC

DATE/REVISIONS:
Mrt(1) 1. Al, Ag, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg,
1 2. Mn, Ni, Na, Sb, Sr, V, Zn
IC(1) 3. Cl, Fl, Br, 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

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. 4.2 °C

Relinquished by	Received by	Date	Time
[illegible]	[illegible]	11/1/00	0930

Relinquished by	Received by	Date	Time
COMPOSITE WASTE	ORIGINAL REWRITTEN		

Discrepancies Between Samples Labels and COC Record? Y or N
NOTES:
8214 8983 0592

PNNL

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

CHEM SOG H1117

C.O.C. # C01-007-2

Page 1 of 1

Collector J. G. 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. PLUG 50 lbs Temp.
Shipped To (Lab) TMA/RECRA	Method of Shipment GOVT. VEHICLE	Bill of Lading/Air Bill No. 423579540224
Protocol CERCLA	Data Turnaround 45 Days	Offsite Property No. W01 00021

POSSIBLE SAMPLE HAZARDS/REMARKS
** **

SPECIAL INSTRUCTIONS Hold Time
Submit deliverables & invoices to JH Kessner
FAX TMA log-in to JH Kessner (372-9487) & DL Stewart (372-1704)

Total Activity Exemption: Yes ☑ No ☐

Sample No.	Lab ID	*	Date	Time	No/Type Container	Sample Analysis	Preservative
B10J06 (F) ✓		W	11-1-00	1206	1x500-mL G/P ✓	ICP Metals - 6010A RCRA GW ✓	HNO3 to pH <2
B10J07 ✓		W			1x500-mL G/P ✓	ICP Metals - 6010A RCRA GW ✓ FOR RECRA	HNO3 to pH <2
B10J07 ✓		W			1x500-mL P ✓	IC Anions - 300.0 ✓	Cool 4C
B10J07 ✓		W			1x20-mL P	Activity Scan ✓	None
B10J07 ✓		W			2x1000-mL G/P	Gross Alpha ✓	HNO3 to pH <2
B10J07 ✓		W			2x1000-mL G/P	Gross Beta ✓	HNO3 to pH <2
B10J07 ✓		W			1x1000-mL G/P	Carbon-14 ✓	None
B10J07 ✓		W			1x1000-mL G/P	Gamma Spectroscopy(Water) ✓	HNO3 to pH <2
B10J07 ✓		W			1x250-mL P	Tritium - H3 ✓	None

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
J. G. HOGAN		J Hogan	11-1-00 1310	FED EX			11-01-00
FED EX DRESS			11/02/00	E. Peguro			11/02/00
JR Corso		JR Corso	11-6-00 1610	Fed Ex			11-6-00
Fed Ex			11/7/00 0930	Vicki Hennig			11/7/00 0930

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

4-2

JAN 2001
RECEIVED

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNUHANFORD C01-007 H1117

DATE RECEIVED: 11/07/00 RFW LOT # :0011L168

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
B10J07						
BROMIDE BY IC	002	W	00LIC072	11/01/00	11/16/00	11/16/00
BROMIDE BY IC	002 REP	W	00LIC072	11/01/00	11/16/00	11/16/00
BROMIDE BY IC	002 MS	W	00LIC072	11/01/00	11/16/00	11/16/00
CHLORIDE BY IC	002	W	00LIC072	11/01/00	11/16/00	11/16/00
CHLORIDE BY IC	002 REP	W	00LIC072	11/01/00	11/16/00	11/16/00
CHLORIDE BY IC	002 MS	W	00LIC072	11/01/00	11/16/00	11/16/00
FLUORIDE BY IC	002	W	00LIC072	11/01/00	11/16/00	11/16/00
FLUORIDE BY IC	002 REP	W	00LIC072	11/01/00	11/16/00	11/16/00
FLUORIDE BY IC	002 MS	W	00LIC072	11/01/00	11/16/00	11/16/00
NITRITE BY IC	002	W	00LIC072	11/01/00	11/16/00	11/16/00
NITRITE BY IC	002 REP	W	00LIC072	11/01/00	11/16/00	11/16/00
NITRITE BY IC	002 MS	W	00LIC072	11/01/00	11/16/00	11/16/00
NITRATE BY IC	002	W	00LIC072	11/01/00	11/16/00	11/16/00
NITRATE BY IC	002 REP	W	00LIC072	11/01/00	11/16/00	11/16/00
NITRATE BY IC	002 MS	W	00LIC072	11/01/00	11/16/00	11/16/00
PHOSPHATE BY IC	002	W	00LIC072	11/01/00	11/16/00	11/16/00
PHOSPHATE BY IC	002 REP	W	00LIC072	11/01/00	11/16/00	11/16/00
PHOSPHATE BY IC	002 MS	W	00LIC072	11/01/00	11/16/00	11/16/00
SULFATE BY IC	002	W	00LIC072	11/01/00	11/16/00	11/16/00
SULFATE BY IC	002 REP	W	00LIC072	11/01/00	11/16/00	11/16/00
SULFATE BY IC	002 MS	W	00LIC072	11/01/00	11/16/00	11/16/00

LAB QC:

BROMIDE BY IC	MB1	W	00LIC072	N/A	11/16/00	11/16/00
BROMIDE BY IC	MB1 BS	W	00LIC072	N/A	11/16/00	11/16/00
CHLORIDE BY IC	MB1	W	00LIC072	N/A	11/16/00	11/16/00
CHLORIDE BY IC	MB1 BS	W	00LIC072	N/A	11/16/00	11/16/00
FLUORIDE BY IC	MB1	W	00LIC072	N/A	11/16/00	11/16/00
FLUORIDE BY IC	MB1 BS	W	00LIC072	N/A	11/16/00	11/16/00
NITRITE BY IC	MB1	W	00LIC072	N/A	11/16/00	11/16/00
NITRITE BY IC	MB1 BS	W	00LIC072	N/A	11/16/00	11/16/00
NITRATE BY IC	MB1	W	00LIC072	N/A	11/16/00	11/16/00
NITRATE BY IC	MB1 BS	W	00LIC072	N/A	11/16/00	11/16/00
PHOSPHATE BY IC	MB1	W	00LIC072	N/A	11/16/00	11/16/00

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNUHANFORD C01-007 H1117

DATE RECEIVED: 11/07/00 RFW LOT # :0011L168

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
PHOSPHATE BY IC	MB1 BS	W	00LIC072	N/A	11/16/00	11/16/00
SULFATE BY IC	MB1	W	00LIC072	N/A	11/16/00	11/16/00
SULFATE BY IC	MB1 BS	W	00LIC072	N/A	11/16/00	11/16/00

RECRA
ENVIRONMENTAL
INC.

Chemical and Environmental Measurement Information

Recra LabNet Philadelphia
Analytical Report

Client : TNU-HANFORD C01-007 H1117
RFW# : 0011L168

W.O. # : 10985-001-001-9999-00
Date Received: 11-07-00

INORGANIC CASE NARRATIVE

1. This narrative covers the analyses of 1 water sample.

2. The sample was 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.

J. Michael Taylor
VP, Laboratory General Manager
Lionville Laboratory

12-25-00
Date

njp\i11-168

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 12 pages.

208 Welsh Pool Road • Lionville, PA 19341-1333 • (610) 280-3000 • Fax (610) 280-3041

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 H1117 RECRA LOT #: 0011L168

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

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-002	B10J07	Bromide by IC	0.25 u	MG/L	0.25	1.0
		Chloride by IC	2.4	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	0.53	MG/L	0.25	1.0
		Phosphate by IC	0.30	MG/L	0.25	1.0
		Sulfate by IC	9.5	MG/L	0.25	1.0

Recra LabNet - Lionville

INORGANICS METHOD BLANK DATA SUMMARY PAGE 12/06/00

CLIENT: TNUHANFORD C01-007 H1117 RECRA LOT #: 0011L168

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

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK10	00LIC072-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 H1117 RECRA LOT #: 0011L168

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

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR(SPK)
-002	B10J07	Bromide by IC	5.2	0.00	5.0	103.7	1.0
		Chloride by IC	8.0	2.4	5.0	110.9	1.0
		Fluoride by IC	11.6	0.38	10.0	112.2	1.0
		Nitrite by IC	5.2	0.25u	5.0	104.9	1.0
		Nitrate by IC	5.6	0.53	5.0	102.4	1.0
		Phosphate by IC	5.1	0.30	5.0	97.0	1.0
		Sulfate by IC	36.4	9.5	25.0	107.6	5.0
BLANK10	00LIC072-MB1	Bromide by IC	4.8	0.25u	5.0	96.7	1.0
		Chloride by IC	4.8	0.25u	5.0	95.5	1.0
		Fluoride by IC	10.6	0.50u	10.0	106.1	1.0
		Nitrite by IC	5.0	0.25u	5.0	99.8	1.0
		Nitrate by IC	4.9	0.25u	5.0	97.7	1.0
		Phosphate by IC	4.9	0.25u	5.0	98.7	1.0
		Sulfate by IC	4.8	0.25u	5.0	95.7	1.0

Recra LabNet - Lionville

INORGANICS PRECISION REPORT 12/06/00

CLIENT: TNUHANFORD C01-007 H1117

RECRA LOT #: 0011L168

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

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR(REP)
-002REP	B10J07	Bromide by IC	0.25u	0.25u	NC	1.0
		Chloride by IC	2.4	2.4	0.62	1.0
		Fluoride by IC	0.50u	0.50u	NC	1.0
		Nitrite by IC	0.25u	0.25u	NC	1.0
		Nitrate by IC	0.53	0.51	2.7	1.0
		Phosphate by IC	0.30	0.25u	NC	1.0
		Sulfate by IC	9.5	9.6	0.41	1.0

RECRA LabNet Use Only
0011L168

Custody Transfer Record/Lab Work Request

Page 1 of 1

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS

RECRA LabNet

Client: TNU-HANFord SAF 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: 11-7-00 Date Due: 12-7-00
Account #:

		A	B
Refrigerator #		S	S
#/Type Container	Liquid	1PL	1PL
	Solid		
Volume	Liquid	500	500
	Solid		
Preservatives		HNO3	—
ANALYSES REQUESTED		ORGANIC: VOA, BNA, Pest/PCB, Herb	INORG: Metal, CN, IC Rad/NS

RECRA LabNet Use Only

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	Met (1)	IC (1)
001	B10J06 (F)			W	11/1/00	1206	1	
002	⊥ 7			⊥	⊥		1	1

Special Instructions: Saf C01-007

Run Matrix QC

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

RECRA LabNet Use Only

Samples were:
1) Shipped ✓ or Hand Delivered
Airbill # Sel 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 (TR 11/2/00) 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. 4.2 °C

Relinquished by	Received by	Date	Time
Fed Ex	V. Hennig	11/7/00	0930

Relinquished by	Received by	Date	Time
COMPOSITE WASTE		ORIGINAL! REMOVED	

Discrepancies Between Samples Labels and COC Record? Y or N
NOTES: 8214 8983 0592

PNNL

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

CHEMSOG 41117

C.O.C. # C01-007-2

Page 1 of 1

Collector J. G. 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. PLUG 50 lbs Temp.
Shipped To (Lab) TMA/RECRA	Method of Shipment GOVT. VEHICLE	Bill of Lading/Air Bill No. 4235795402 24
Protocol CERCLA	Data Turnaround 45 Days	Offsite Property No. W01 00021

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
B10J06 (F)		W	11-1-00	1206	1x500-mL G/P	ICP Metals - 6010A RCRA GW	HNO3 to pH <2
B10J07		W			1x500-mL G/P	ICP Metals - 6010A RCRA GW FOR RECRA	HNO3 to pH <2
B10J07		W			1x500-mL P	IC Anions - 300.0	Cool 4C
B10J07		W			1x20-mL P	Activity Scan	None
B10J07		W			2x1000-mL G/P	Gross Alpha	HNO3 to pH <2
B10J07		W			2x1000-mL G/P	Gross Beta	HNO3 to pH <2
B10J07		W			1x1000-mL G/P	Carbon-14	None
B10J07		W			1x1000-mL G/P	Gamma Spectroscopy(Water)	HNO3 to pH <2
B10J07		W			1x250-mL P	Tritium - H3	None

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
	J. G. HOGAN	J Hogan	11-1-00 1310	FED EX			11-01-00
FED EXPRESS			11/02/00	E. Segura			11/02/00
JR Corso		JR Corso	11-6-00 1610	Fed Ex			11-6-00
Fed Ex			11/7/00 0930	Vicki Hennig			11/7/00 0930

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

4-2

Thermo NUtech

CHAIN OF CUSTODY

ORD # R0-11-035

11/02/00 14:33:56

WORK ID: SAF C01-007 SDG H1117

RCVD: 11/02/00 DUE: 12/17/00

KEEP: 12/17/01 DISP: S

DASH	SAMPLE IDENTIFICATION	STORED	TESTS		
01A	B10J06(F)	RECRA	DISPOS	E011	
02A	B10J07	RECRA	DISPOS	E011	E260
02B	B10J07 MS	RECRA	E011	E260	
02C	B10J07 DUP	RECRA	E011	E260	

RELEASED BY	DATE	TRANSFERRED TO	DATE	RECEIVED BY	DATE
[illegible]	11-6-00	Fed Ex	11-6-00		