H0366-TNU/RECRA

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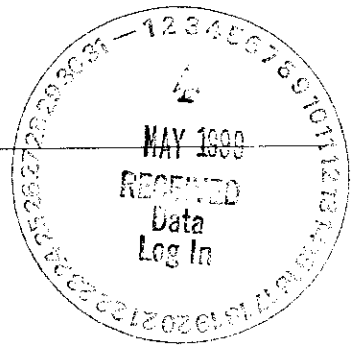


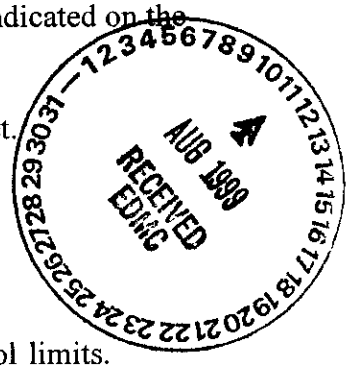
Recra LabNet Philadelphia
Analytical Report

Client : TNU-HANFORD C99-023
RFW# : 9903L527
SDG# : H0366
SAF# : C99-023

W.O. # : 10985-001-001-9999-00
Date Received: 03-24-99

INORGANIC CASE NARRATIVE

1. This narrative covers the analyses of 2 water samples.
2. The samples were prepared and analyzed in accordance with the methods indicated on the attached glossary.
3. Sample holding times as required by the method and/or contract were met.
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% RPD control limit.



for J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory

3-26-99
Date

njp\i03-527

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.

01

WET CHEMISTRY METHODS GLOSSARY FOR ANALYSIS OF WATER SAMPLES

	EPA 600	SW846	OTHER
Acidity	_305.1		
_Alkalinity _Bicarbonate _Carbonate	_310.1		
BOD	_405.1		_5210B (b)
Ion Chromatography:			
_Bromide ✓Chloride ✓Fluoride	✓300.0	_9056	
✓Nitrite ✓Nitrate _Phosphate	✓300.0	_9056	
✓Sulfate _Formate _Acetate _Oxalate	✓300.0	_9056	
Chloride	_325.2	_9251	
Chlorine Residual	_330.5 (mod)		
Cyanide Amenable to Chlorination	_335.2	_9010A	
Cyanide (Total)	_335.2	_9010A _9012	_ILM04.0 (e)
Cyanide, Weak Acid Dissociable			_412 (a) _4500CN-I (b)
COD	_410.4 (mod)		_5220 C (b)
Color	_110.2		
Corrosivity (by Coupon)		_1110 (mod)	
Chromium VI		_7196A	_3500Cr-D (b)
Fluoride	_340.2		
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 Nitrogen _Organic Nitrogen	_351.4		
Total _Organic _Inorganic Carbon	_415.1	_9060	
Oil and Grease	_413.1	_9070	
_pH _pH, Paper	_150.1	_9040A _9041A	
Petroleum Hydrocarbons, Total Recoverable	_418.1		
Phenol	_420.1 _420.2	_9065 _9066	
_Ortho Phosphate _Total Phosphate	_365.2		_4500-P B _C
Salinity			_210A (a) _2520B (b)
Settleable Solids	_160.5		
Sulfide	_376.2 _376.1	_9030A	
Reactive _Cyanide _Sulfide		_Sec 7.3	
Silica	_370.1		
Sulfite	_377.1		
Sulfate	_375.4	_9038	
Specific Conductance	_120.1	_9050	
Specific Gravity			_213E (a)
_TCLP _TCLV		_1311	
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:_____		

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., (1989).

b. Standard Methods for the Examination of Water and Waste, 17 ed., (1983)

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.

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INORGANICS DATA SUMMARY REPORT 04/06/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L527

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

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-002	B0TW90	Chloride by IC	4.4	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	37	MG/L	2.5	10
		Sulfate by IC	47.2	MG/L	2.5	10.0
-004	B0TW92	Chloride by IC	5.6	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	19	MG/L	2.5	10
		Sulfate by IC	24.2	MG/L	2.5	10.0

Recra LabNet - Lionville

INORGANICS METHOD BLANK DATA SUMMARY PAGE 04/06/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L527

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

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK10	99LIC035-MB1	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
		Sulfate by IC	0.25 u	MG/L	0.25	1.0
BLANK10	99LIC036-MB1	Chloride by IC	0.25 u	MG/L	0.25	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

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INORGANICS ACCURACY REPORT 04/06/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L527

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

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR(SPK)
-004	B0TW92	Chloride by IC	14.7	5.6	10.0	90.3	2.0
		Fluoride by IC	19.1	0.00	20.0	95.3	2.0
		Nitrite by IC	9.0	0.25u	10	89.5	2.0
		Nitrate by IC	63	19	50	87.4	10
		Sulfate by IC	67.9	24.2	50.0	87.4	10.0
BLANK10	99LIC035-MB1	Chloride by IC	5.0	0.25u	5.0	99.8	1.0
		Fluoride by IC	10.7	0.50u	10.0	106.6	1.0
		Nitrite by IC	4.9	0.25u	5.0	99.0	1.0
		Nitrate by IC	4.9	0.25u	5.0	97.5	1.0
		Sulfate by IC	4.9	0.25u	5.0	97.8	1.0
BLANK10	99LIC036-MB1	Chloride by IC	5.0	0.25u	5.0	100.8	1.0
		Nitrite by IC	4.9	0.25u	5.0	98.5	1.0
		Nitrate by IC	4.9	0.25u	5.0	97.3	1.0
		Phosphate by IC	5.2	0.25u	5.0	104.5	1.0
		Sulfate by IC	4.9	0.25u	5.0	98.5	1.0

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INORGANICS PRECISION REPORT 04/06/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L527

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

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR(REP)
-004REP	B0TW92	Chloride by IC	5.6	5.9	3.9	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	19	20	1.1	10
		Sulfate by IC	24.2	24.4	0.46	10.0

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNU-HANFORD C99-023

DATE RECEIVED: 03/24/99 RFW LOT # :9903L527

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
B0TW90						
CHLORIDE BY IC	002	W	99LIC035	03/22/99	03/24/99	03/24/99
FLUORIDE BY IC	002	W	99LIC035	03/22/99	03/24/99	03/24/99
NITRITE BY IC	002	W	99LIC035	03/22/99	03/24/99	03/24/99
NITRATE BY IC	002	W	99LIC036	03/22/99	03/25/99	03/25/99
SULFATE BY IC	002	W	99LIC036	03/22/99	03/25/99	03/25/99
B0TW92						
CHLORIDE BY IC	004	W	99LIC035	03/22/99	03/24/99	03/24/99
CHLORIDE BY IC	004 REP	W	99LIC035	03/22/99	03/24/99	03/24/99
CHLORIDE BY IC	004 MS	W	99LIC035	03/22/99	03/24/99	03/24/99
FLUORIDE BY IC	004	W	99LIC035	03/22/99	03/24/99	03/24/99
FLUORIDE BY IC	004 REP	W	99LIC035	03/22/99	03/24/99	03/24/99
FLUORIDE BY IC	004 MS	W	99LIC035	03/22/99	03/24/99	03/24/99
NITRITE BY IC	004	W	99LIC035	03/22/99	03/24/99	03/24/99
NITRITE BY IC	004 REP	W	99LIC035	03/22/99	03/24/99	03/24/99
NITRITE BY IC	004 MS	W	99LIC035	03/22/99	03/24/99	03/24/99
NITRATE BY IC	004	W	99LIC035	03/22/99	03/24/99	03/24/99
NITRATE BY IC	004 REP	W	99LIC035	03/22/99	03/24/99	03/24/99
NITRATE BY IC	004 MS	W	99LIC035	03/22/99	03/24/99	03/24/99
SULFATE BY IC	004	W	99LIC035	03/22/99	03/24/99	03/24/99
SULFATE BY IC	004 REP	W	99LIC035	03/22/99	03/24/99	03/24/99
SULFATE BY IC	004 MS	W	99LIC035	03/22/99	03/24/99	03/24/99
LAB QC:						
CHLORIDE BY IC	MB1	W	99LIC035	N/A	03/24/99	03/24/99
CHLORIDE BY IC	MB1 BS	W	99LIC035	N/A	03/24/99	03/24/99
FLUORIDE BY IC	MB1	W	99LIC035	N/A	03/24/99	03/24/99
FLUORIDE BY IC	MB1 BS	W	99LIC035	N/A	03/24/99	03/24/99
NITRITE BY IC	MB1	W	99LIC035	N/A	03/24/99	03/24/99
NITRITE BY IC	MB1 BS	W	99LIC035	N/A	03/24/99	03/24/99
NITRATE BY IC	MB1	W	99LIC035	N/A	03/24/99	03/24/99
NITRATE BY IC	MB1 BS	W	99LIC035	N/A	03/24/99	03/24/99
NITRITE BY IC	MB1	W	99LIC036	N/A	03/25/99	03/25/99

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNU-HANFORD C99-023

DATE RECEIVED: 03/24/99 RFW LOT # :9903L527

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
NITRITE BY IC	MB1 BS	W	99LIC036	N/A	03/25/99	03/25/99
NITRATE BY IC	MB1	W	99LIC036	N/A	03/25/99	03/25/99
NITRATE BY IC	MB1 BS	W	99LIC036	N/A	03/25/99	03/25/99
SULFATE BY IC	MB1	W	99LIC036	N/A	03/25/99	03/25/99
SULFATE BY IC	MB1 BS	W	99LIC036	N/A	03/25/99	03/25/99
SULFATE BY IC	MB1	W	99LIC035	N/A	03/24/99	03/24/99
SULFATE BY IC	MB1 BS	W	99LIC035	N/A	03/24/99	03/24/99

RECRA LabNet Use Only
9903L527

Custody Transfer Record/Lab Work Request

RECRA LabNet

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS

Client TNU Hanford C99-023

Est. Final Proj. Sampling Date

Project # 10955-001-001-0001-00

Project Contact/Phone #

RECRA Project Manager OJ

QC spec Del std TAT 30 day

Date Rec'd 3-24-99 Date Due 4/23/99

Account #

	Liquid	Solid
Refrigerator #		
#/Type Container	1P (ICP Metal: 3; Anions IC: 3)	
Volume	500 (ICP Metal); 500 (Anions IC)	
Preservatives	HNO3 (ICP Metal); – (Anions IC)	

ANALYSES REQUESTED: ORGANIC: VOA, BNA, Pest/PCB, Herb; INORG: ICP Metal, CN, Anions IC

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	MS	MSD	Matrix	Date Collected	Time Collected	ICP Metal (MERRATC)	Anions IC (INGC)
001	B0TW89	✓	✓	W	3-22-99	1211	✓	
2	90			W	3-22-99	1211		✓
3	91			W	3-22-99	1015	✓	
4	92			W	3-22-99	1015		✓

Special Instructions: SAF#C99-023 SDG#H0366

DATE/REVISIONS:
1. INGC①= ICCL, ICFL, ICNO2, ICNO3, ICSO4
2. Met①= Al, Sb, Ba, Be, Cd, Ca, Cr, Cu, Co,
3. Fe, Mg, Mn, Ni, K, Ag, Na, Sr, V, Zn
4.
5.
6.

RECRA LabNet Use Only

Samples were:
1) Shipped ✓ or Hand Delivered
Airbill # 806247160119
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'l (Y) or N
Cooler Temp 4.2 C

Relinquished by	Received by	Date	Time
Fed Ex	[signature]	3-24-99	0930

Relinquished by	Received by	Date	Time

ORIGINAL REWRITTEN

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

PNNL

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

11636

C.O.C. # C99-023-11

Page 1 of 1

Collector AG RIZZO	Contact/Requester JH KESSNER	Telephone No. (509) 375-4688 MSIN FAX
SAF No. C99-023	Sampling Origin HANFORD SITE	Purchase Order/Charge Code
Project Title 100NR2IAM(1) GW MONITORING, MARCH 1999	Logbook No. WM-SML H21, PAGE 93	Ice Chest No. SML 593 Temp. cool 4°C
Shipped To (Lab) TMA/RECRA	Method of Shipment GOVT. VEHICLE	Bill of Lading/Air Bill No. 4235795 23622 2.9
Protocol CERCLA	Data Turnaround 45 Days	Offsite Property No.

POSSIBLE SAMPLE HAZARDS/REMARKS
** **

SPECIAL INSTRUCTIONS Hold Time Total Activity Exemption: Yes ☒ No ☐
FAX copies of QES & TMA log-in to DL Stewart (372-1704) & JH Kessner (372-9487)

Sample No.	Lab ID	*	Date	Time	No/Type Container	Sample Analysis	Preservative
B0TW89 (F)		W	3-22-99	1211	1x500-mL G/P	ICP Metals - 6010A RCRA GW	HNO3 to pH <2
B0TW90		W			1x500-mL P	IC Anions - 300.0 (Chloride, Fluoride, Nitrate, Nitrite, Sulfate)	Cool 4C
B0TW90		W			1x20-mL P	Activity Scan	None
B0TW90		W			1x1000-mL G/P	Gross Beta	HNO3 to pH <2
B0TW90		W			2x1000-mL G/P	Strontium-89,90 -- Sr-90	HNO3 to pH <2
B0TW90		W			1x250-mL P	Tritium - H3	None

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
AG RIZZO [signature]	1220 MAR 22 1999	K. YOUNG [signature]	1220 MAR 22 1999
K. YOUNG	1421 MAR 22 1999	Fed Ex	3-22-99
Fed Ex	3-23-99 11:00	[signature] JR Close	3-23-99 11:00
Delect		[signature]	3/24/99 0930

Matrix *

S = Soil	SE = Sediment	SO = Solid	SL = Sludge
W = Water	O = Oil	A = Air	DS = Drum Solid
DL = Drum Liquid	T = Tissue	WI = Wipe	L = Liquid
V = Vegetation	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.# C99-023-13
	HEIS	Page 1 of 1

Collector AG RIZZO	Contact/Requester JH KESSNER	Telephone No. (509) 375-4688 MSIN FAX
SAF No. C99-023	Sampling Origin HANFORD SITE	Purchase Order/Charge Code
Project Title 100NR2IAM(1) GW MONITORING, MARCH 1999	Logbook No. WM-SMC # 21, PAGE 93	Ice Chest No. SMC 593 Temp. Cool/4°C
Shipped To (Lab) TMA/RECRA	Method of Shipment GOVT. VEHICLE	Bill of Lading/Air Bill No. 4235 7952 3622
Protocol CERCLA	Data Turnaround 45 Days	Offsite Property No.

POSSIBLE SAMPLE HAZARDS/REMARKS

** **

SPECIAL INSTRUCTIONS Hold Time Total Activity Exemption: Yes ☒ No ☐

FAX copies of QES & TMA log-in to DL Stewart (372-1704) & JH Kessner (372-9487)

Sample No.	Lab ID	*	Date	Time	No/Type Container	Sample Analysis	Preservative
B0TW91 (F)		W	3-22-99	1016	1x500-mL G/P	ICP Metals - 6010A RCRA GW	HNO3 to pH <2
B0TW92		W	↓	↓	1x500-mL P	IC Anions - 300.0 (Chloride, Fluoride, Nitrate, Nitrite, Sulfate)	Cool 4C
B0TW92		W	↓	↓	1x20-mL P	Activity Scan	None
B0TW92		W	↓	↓	1x1000-mL G/P	Gross Beta	HNO3 to pH <2
B0TW92		W	↓	↓	1x1000-mL G/P	Gamma Spectroscopy(Water)	HNO3 to pH <2
B0TW92		W	↓	↓	2x1000-mL G/P	Strontium-89,90 -- Sr-90	HNO3 to pH <2
B0TW92		W	↓	↓	1x250-mL P	Tritium - H3	None

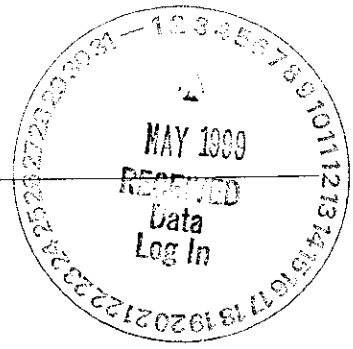
Relinquished By	Date/Time	Received By	Date/Time
Print AG RIZZO Sign [signature]	1220 MAR 2 2 1999	Print K.J. Young Sign [signature]	1220 3-22-99
[signature]	3-22-99 1421	Fed Ex	3-22-99
Fed Ex	3-23-99 11:00	DC Corso JR Corso	3-23-99 11:00
[signature]		[signature]	3/24/99 0930

Matrix *

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

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

RECRA
LabNet
a division of Recra Environmental, Inc.
Virtual Laboratories Everywhere



Recra LabNet Philadelphia
Analytical Report

Client : TNU HANFORD C99-023
RFW# : 9903L527
SDG/SAF# : H0366/C99-023

W.O.# : 10985-001-001-0001-00
Date Received: 03-24-99

METALS CASE NARRATIVE

1. This narrative covers the analyses of 2 water samples

2. 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.

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

7. The preparation/method blanks for 4 analytes were outside method criteria {less than the Practical Quantitation Limit (3X the IDL) or samples greater than 20X MB value}. Refer to the Inorganics Method Blank Data Summary.

   a.) The MB results for Barium, Copper, Potassium, and Zinc were greater than the Practical Quantitation Limit (PQL) {3 x the (IDL) Instrument Detection Level} and all samples for Copper, Potassium, and Zinc and sample B0TW91 for Barium read less than 20 times the MB concentration. However, no corrective action criteria for MBs were provided in SW846 method 6010B. The sample results were reported herein "uncorrected" for the levels found in the MB.

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

9. All laboratory control samples (LCS) were within the laboratory control limits. Refer to the Inorganics Laboratory Control Standards Report.

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

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

11. All MSs and MSDs were within the 20% Relative Percent Difference (RPD) control limits. Refer to the Inorganics Matrix Spike Duplicate Report.

12. The duplicate analyses for 3 analytes were outside the 20% Relative Percent Difference (RPD) control limits. Refer to the Inorganics Precision Report.

13. 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.

Pat E

J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory

1-5-99
Date

mld/m03-527

METALS METHOD GLOSSARY

The following methods are used as reference for the digestion and analysis of samples contained within this Recra Lot#: 9903L527

Leaching Procedure: __1310 __1311 __1312 __Other:_____

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

Metals Digestion Methods: ✓3005A __3010A __3015 __3020A __3050A __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:_____

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.

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 04/05/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L527

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

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	B0TW89	Silver, Total	0.90 u	UG/L	0.90	1.0
		Aluminum, Total	17.8 u	UG/L	17.8	1.0
		Barium, Total	31.8	UG/L	0.10	1.0
		Beryllium, Total	0.10 u	UG/L	0.10	1.0
		Calcium, Total	44600	UG/L	6.8	1.0
		Cadmium, Total	0.40 u	UG/L	0.40	1.0
		Cobalt, Total	0.60 u	UG/L	0.60	1.0
		Chromium, Total	3.6	UG/L	0.60	1.0
		Copper, Total	3.8	UG/L	0.90	1.0
		Iron, Total	17.9 u	UG/L	17.9	1.0
		Potassium, Total	2500	UG/L	11.8	1.0
		Magnesium, Total	7910	UG/L	6.2	1.0
		Manganese, Total	0.20 u	UG/L	0.20	1.0
		Sodium, Total	3680	UG/L	3.3	1.0
		Nickel, Total	1.1 u	UG/L	1.1	1.0
		Antimony, Total	2.3 u	UG/L	2.3	1.0
		Strontium, Total	223	UG/L	0.10	1.0
		Vanadium, Total	4.8	UG/L	0.60	1.0
		Zinc, Total	6.4	UG/L	0.80	1.0

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 04/05/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L527

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

SAMPLE	SITE ID	ANALYTE	RESULT		UNITS	REPORTING LIMIT	DILUTION FACTOR
-003	B0TW91	Silver, Total	0.90	u	UG/L	0.90	1.0
		Aluminum, Total	17.8	u	UG/L	17.8	1.0
		Barium, Total	21.1		UG/L	0.10	1.0
		Beryllium, Total	0.10	u	UG/L	0.10	1.0
		Calcium, Total	35500		UG/L	6.8	1.0
		Cadmium, Total	0.40	u	UG/L	0.40	1.0
		Cobalt, Total	0.60	u	UG/L	0.60	1.0
		Chromium, Total	3.0		UG/L	0.60	1.0
		Copper, Total	2.7		UG/L	0.90	1.0
		Iron, Total	17.9	u	UG/L	17.9	1.0
		Potassium, Total	1830		UG/L	11.8	1.0
		Magnesium, Total	5690		UG/L	6.2	1.0
		Manganese, Total	0.57		UG/L	0.20	1.0
		Sodium, Total	2980		UG/L	3.3	1.0
		Nickel, Total	1.5		UG/L	1.1	1.0
		Antimony, Total	2.3	u	UG/L	2.3	1.0
		Strontium, Total	137		UG/L	0.10	1.0
		Vanadium, Total	3.6		UG/L	0.60	1.0
		Zinc, Total	5.4		UG/L	0.80	1.0

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INORGANICS METHOD BLANK DATA SUMMARY PAGE 04/05/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L527

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

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK1	99L0194-MB1	Silver, Total	0.90 u	UG/L	0.90	1.0
		Aluminum, Total	21.1	UG/L	17.8	1.0
		Barium, Total	1.2	UG/L	0.10	1.0
		Beryllium, Total	0.10 u	UG/L	0.10	1.0
		Calcium, Total	27.0	UG/L	6.8	1.0
		Cadmium, Total	0.40 u	UG/L	0.40	1.0
		Cobalt, Total	0.60 u	UG/L	0.60	1.0
		Chromium, Total	0.63	UG/L	0.60	1.0
		Copper, Total	3.8	UG/L	0.90	1.0
		Iron, Total	17.9 u	UG/L	17.9	1.0
		Potassium, Total	128	UG/L	11.8	1.0
		Magnesium, Total	8.9	UG/L	6.2	1.0
		Manganese, Total	0.30	UG/L	0.20	1.0
		Sodium, Total	88.7	UG/L	3.3	1.0
		Nickel, Total	1.1 u	UG/L	1.1	1.0
		Antimony, Total	3.2	UG/L	2.3	1.0
		Strontium, Total	0.10 u	UG/L	0.10	1.0
		Vanadium, Total	0.60 u	UG/L	0.60	1.0
		Zinc, Total	10.9	UG/L	0.80	1.0

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INORGANICS ACCURACY REPORT 04/05/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L527

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

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR(SPK)
-001	B0TW89	Silver, Total	50.7	0.90u	50.0	101.4	1.0
		Silver, Total MSD	51.4	0.90u	50.0	102.8	1.0
		Aluminum, Total	2070	17.8 u	2000	103.4	1.0
		Aluminum, Total MSD	2070	17.8 u	2000	103.5	1.0
		Barium, Total	2040	31.8	2000	100.2	1.0
		Barium, Total MSD	2020	31.8	2000	99.3	1.0
		Beryllium, Total	50.8	0.10u	50.0	101.6	1.0
		Beryllium, Total MSD	50.6	0.10u	50.0	101.2	1.0
		Calcium, Total	68200	44600	25000	94.1	1.0
		Calcium, Total MSD	68200	44600	25000	94.2	1.0
		Cadmium, Total	51.4	0.40u	50.0	102.8	1.0
		Cadmium, Total MSD	50.7	0.40u	50.0	101.4	1.0
		Cobalt, Total	507	0.60u	500	101.4	1.0
		Cobalt, Total MSD	504	0.60u	500	100.8	1.0
		Chromium, Total	208	3.6	200	102.2	1.0
		Chromium, Total MSD	206	3.6	200	101.2	1.0
		Copper, Total	256	3.8	250	101.0	1.0
		Copper, Total MSD	253	3.8	250	99.5	1.0
		Iron, Total	1050	17.9 u	1000	104.9	1.0
		Iron, Total MSD	1040	17.9 u	1000	103.5	1.0
		Potassium, Total	28500	2500	25000	103.9	1.0
		Potassium, Total MSD	28100	2500	25000	102.3	1.0
		Magnesium, Total	33200	7910	25000	101.3	1.0
		Magnesium, Total MSD	33100	7910	25000	100.7	1.0
		Manganese, Total	518	0.20u	500	103.7	1.0
		Manganese, Total MSD	514	0.20u	500	102.8	1.0
		Sodium, Total	28200	3680	25000	98.0	1.0
		Sodium, Total MSD	28000	3680	25000	97.1	1.0
		Nickel, Total	504	1.1 u	500	100.7	1.0
		Nickel, Total MSD	502	1.1 u	500	100.3	1.0
		Antimony, Total	516	2.3 u	500	103.3	1.0
		Antimony, Total MSD	512	2.3 u	500	102.5	1.0
		Strontium, Total	1200	223	1000	98.0	1.0
		Strontium, Total MSD	1200	223	1000	97.7	1.0
		Vanadium, Total	522	4.8	500	103.5	1.0
		Vanadium, Total MSD	519	4.8	500	102.8	1.0
		Zinc, Total	504	6.4	500	99.6	1.0
		Zinc, Total MSD	500	6.4	500	98.7	1.0

Recra LabNet - Lionville

INORGANICS DUPLICATE SPIKE REPORT 04/05/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L527

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

SAMPLE	SITE ID	ANALYTE	SPIKE#1 %RECOV	SPIKE#2 %RECOV	%DIFF
-001	B0TW89	Silver, Total	101.4	102.8	1.4
		Aluminum, Total	103.4	103.5	0.14
		Barium, Total	100.2	99.3	0.93
		Beryllium, Total	101.6	101.2	0.39
		Calcium, Total	94.1	94.2	0.036
		Cadmium, Total	102.8	101.4	1.4
		Cobalt, Total	101.4	100.8	0.61
		Chromium, Total	102.2	101.2	0.88
		Copper, Total	101.0	99.5	1.4
		Iron, Total	104.9	103.5	1.3
		Potassium, Total	103.9	102.3	1.6
		Magnesium, Total	101.3	100.7	0.59
		Manganese, Total	103.7	102.8	0.87
		Sodium, Total	98.0	97.1	0.84
		Nickel, Total	100.7	100.3	0.40
		Antimony, Total	103.3	102.5	0.76
		Strontium, Total	98.0	97.7	0.38
		Vanadium, Total	103.5	102.8	0.70
		Zinc, Total	99.6	98.7	0.89

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INORGANICS PRECISION REPORT 04/05/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L527

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

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR(REP)
-001REP	B0TW89	Silver, Total	0.90u	0.90u	NC	1.0
		Aluminum, Total	17.8 u	17.8 u	NC	1.0
		Barium, Total	31.8	31.7	0.31	1.0
		Beryllium, Total	0.10u	0.10u	NC	1.0
		Calcium, Total	44600	43900	1.5	1.0
		Cadmium, Total	0.40u	0.40u	NC	1.0
		Cobalt, Total	0.60u	0.60u	NC	1.0
		Chromium, Total	3.6	3.1	14.9	1.0
		Copper, Total	3.8	3.0	23.5	1.0
		Iron, Total	17.9 u	18.1	~~NC~~ 200	1.0
		Potassium, Total	2500	2430	2.8	1.0
		Magnesium, Total	7910	7700	2.7	1.0
		Manganese, Total	0.20u	0.21	~~NC~~ 200	1.0
		Sodium, Total	3680	3630	1.3	1.0
		Nickel, Total	1.1 u	1.1 u	NC	1.0
		Antimony, Total	2.3 u	2.3 u	NC	1.0
		Strontium, Total	223	218	2.5	1.0
		Vanadium, Total	4.8	4.4	8.7	1.0
		Zinc, Total	6.4	5.4	16.9	1.0

Corrections MD 4/5/99

Recra LabNet - Lionville

INORGANICS LABORATORY CONTROL STANDARDS REPORT 04/05/99

CLIENT: TNU-HANFORD C99-023 RECRA LOT #: 9903L527

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

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	SPIKED AMOUNT	UNITS	%RECOV
LCS1	99L0194-LC1	Silver, LCS	517	500	UG/L	103.4
		Aluminum, LCS	5340	5000	UG/L	106.9
		Barium, LCS	5180	5000	UG/L	103.6
		Beryllium, LCS	255	250	UG/L	101.9
		Calcium, LCS	25800	25000	UG/L	103.2
		Cadmium, LCS	253	250	UG/L	101.2
		Cobalt, LCS	2550	2500	UG/L	102.1
		Chromium, LCS	516	500	UG/L	103.3
		Copper, LCS	1310	1250	UG/L	104.9
		Iron, LCS	5150	5000	UG/L	102.9
		Potassium, LCS	27100	25000	UG/L	108.3
		Magnesium, LCS	25800	25000	UG/L	103.4
		Manganese, LCS	785	750	UG/L	104.7
		Sodium, LCS	25900	25000	UG/L	103.8
		Nickel, LCS	2020	2000	UG/L	101.2
		Antimony, LCS	3070	3000	UG/L	102.2
		Strontium, LCS	5100	5000	UG/L	102.0
		Vanadium, LCS	2640	2500	UG/L	105.6
		Zinc, LCS	1010	1000	UG/L	101.1

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNU-HANFORD C99-023

DATE RECEIVED: 03/24/99 RFW LOT # :9903L527

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
B0TW89						
SILVER, TOTAL	001	W	99L0194	03/22/99	03/30/99	03/31/99
SILVER, TOTAL	001 REP	W	99L0194	03/22/99	03/30/99	03/31/99
SILVER, TOTAL	001 MS	W	99L0194	03/22/99	03/30/99	03/31/99
SILVER, TOTAL	001 MSD	W	99L0194	03/22/99	03/30/99	03/31/99
ALUMINUM, TOTAL	001	W	99L0194	03/22/99	03/30/99	03/31/99
ALUMINUM, TOTAL	001 REP	W	99L0194	03/22/99	03/30/99	03/31/99
ALUMINUM, TOTAL	001 MS	W	99L0194	03/22/99	03/30/99	03/31/99
ALUMINUM, TOTAL	001 MSD	W	99L0194	03/22/99	03/30/99	03/31/99
BARIUM, TOTAL	001	W	99L0194	03/22/99	03/30/99	03/31/99
BARIUM, TOTAL	001 REP	W	99L0194	03/22/99	03/30/99	03/31/99
BARIUM, TOTAL	001 MS	W	99L0194	03/22/99	03/30/99	03/31/99
BARIUM, TOTAL	001 MSD	W	99L0194	03/22/99	03/30/99	03/31/99
BERYLLIUM, TOTAL	001	W	99L0194	03/22/99	03/30/99	03/31/99
BERYLLIUM, TOTAL	001 REP	W	99L0194	03/22/99	03/30/99	03/31/99
BERYLLIUM, TOTAL	001 MS	W	99L0194	03/22/99	03/30/99	03/31/99
BERYLLIUM, TOTAL	001 MSD	W	99L0194	03/22/99	03/30/99	03/31/99
CALCIUM, TOTAL	001	W	99L0194	03/22/99	03/30/99	03/31/99
CALCIUM, TOTAL	001 REP	W	99L0194	03/22/99	03/30/99	03/31/99
CALCIUM, TOTAL	001 MS	W	99L0194	03/22/99	03/30/99	03/31/99
CALCIUM, TOTAL	001 MSD	W	99L0194	03/22/99	03/30/99	03/31/99
CADMIUM, TOTAL	001	W	99L0194	03/22/99	03/30/99	03/31/99
CADMIUM, TOTAL	001 REP	W	99L0194	03/22/99	03/30/99	03/31/99
CADMIUM, TOTAL	001 MS	W	99L0194	03/22/99	03/30/99	03/31/99
CADMIUM, TOTAL	001 MSD	W	99L0194	03/22/99	03/30/99	03/31/99
COBALT, TOTAL	001	W	99L0194	03/22/99	03/30/99	03/31/99
COBALT, TOTAL	001 REP	W	99L0194	03/22/99	03/30/99	03/31/99
COBALT, TOTAL	001 MS	W	99L0194	03/22/99	03/30/99	03/31/99
COBALT, TOTAL	001 MSD	W	99L0194	03/22/99	03/30/99	03/31/99
CHROMIUM, TOTAL	001	W	99L0194	03/22/99	03/30/99	03/31/99
CHROMIUM, TOTAL	001 REP	W	99L0194	03/22/99	03/30/99	03/31/99
CHROMIUM, TOTAL	001 MS	W	99L0194	03/22/99	03/30/99	03/31/99
CHROMIUM, TOTAL	001 MSD	W	99L0194	03/22/99	03/30/99	03/31/99
COPPER, TOTAL	001	W	99L0194	03/22/99	03/30/99	03/31/99
COPPER, TOTAL	001 REP	W	99L0194	03/22/99	03/30/99	03/31/99
COPPER, TOTAL	001 MS	W	99L0194	03/22/99	03/30/99	03/31/99

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNU-HANFORD C99-023

DATE RECEIVED: 03/24/99 RFW LOT # :9903L527

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
COPPER, TOTAL	001 MSD	W	99L0194	03/22/99	03/30/99	03/31/99
IRON, TOTAL	001	W	99L0194	03/22/99	03/30/99	03/31/99
IRON, TOTAL	001 REP	W	99L0194	03/22/99	03/30/99	03/31/99
IRON, TOTAL	001 MS	W	99L0194	03/22/99	03/30/99	03/31/99
IRON, TOTAL	001 MSD	W	99L0194	03/22/99	03/30/99	03/31/99
POTASSIUM, TOTAL	001	W	99L0194	03/22/99	03/30/99	03/31/99
POTASSIUM, TOTAL	001 REP	W	99L0194	03/22/99	03/30/99	03/31/99
POTASSIUM, TOTAL	001 MS	W	99L0194	03/22/99	03/30/99	03/31/99
POTASSIUM, TOTAL	001 MSD	W	99L0194	03/22/99	03/30/99	03/31/99
MAGNESIUM, TOTAL	001	W	99L0194	03/22/99	03/30/99	03/31/99
MAGNESIUM, TOTAL	001 REP	W	99L0194	03/22/99	03/30/99	03/31/99
MAGNESIUM, TOTAL	001 MS	W	99L0194	03/22/99	03/30/99	03/31/99
MAGNESIUM, TOTAL	001 MSD	W	99L0194	03/22/99	03/30/99	03/31/99
MANGANESE, TOTAL	001	W	99L0194	03/22/99	03/30/99	03/31/99
MANGANESE, TOTAL	001 REP	W	99L0194	03/22/99	03/30/99	03/31/99
MANGANESE, TOTAL	001 MS	W	99L0194	03/22/99	03/30/99	03/31/99
MANGANESE, TOTAL	001 MSD	W	99L0194	03/22/99	03/30/99	03/31/99
SODIUM, TOTAL	001	W	99L0194	03/22/99	03/30/99	03/31/99
SODIUM, TOTAL	001 REP	W	99L0194	03/22/99	03/30/99	03/31/99
SODIUM, TOTAL	001 MS	W	99L0194	03/22/99	03/30/99	03/31/99
SODIUM, TOTAL	001 MSD	W	99L0194	03/22/99	03/30/99	03/31/99
NICKEL, TOTAL	001	W	99L0194	03/22/99	03/30/99	03/31/99
NICKEL, TOTAL	001 REP	W	99L0194	03/22/99	03/30/99	03/31/99
NICKEL, TOTAL	001 MS	W	99L0194	03/22/99	03/30/99	03/31/99
NICKEL, TOTAL	001 MSD	W	99L0194	03/22/99	03/30/99	03/31/99
ANTIMONY, TOTAL	001	W	99L0194	03/22/99	03/30/99	03/31/99
ANTIMONY, TOTAL	001 REP	W	99L0194	03/22/99	03/30/99	03/31/99
ANTIMONY, TOTAL	001 MS	W	99L0194	03/22/99	03/30/99	03/31/99
ANTIMONY, TOTAL	001 MSD	W	99L0194	03/22/99	03/30/99	03/31/99
STRONTIUM, TOTAL	001	W	99L0194	03/22/99	03/30/99	03/31/99
STRONTIUM, TOTAL	001 REP	W	99L0194	03/22/99	03/30/99	03/31/99
STRONTIUM, TOTAL	001 MS	W	99L0194	03/22/99	03/30/99	03/31/99
STRONTIUM, TOTAL	001 MSD	W	99L0194	03/22/99	03/30/99	03/31/99
VANADIUM, TOTAL	001	W	99L0194	03/22/99	03/30/99	03/31/99
VANADIUM, TOTAL	001 REP	W	99L0194	03/22/99	03/30/99	03/31/99
VANADIUM, TOTAL	001 MS	W	99L0194	03/22/99	03/30/99	03/31/99
VANADIUM, TOTAL	001 MSD	W	99L0194	03/22/99	03/30/99	03/31/99
ZINC, TOTAL	001	W	99L0194	03/22/99	03/30/99	03/31/99

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNU-HANFORD C99-023

DATE RECEIVED: 03/24/99 RFW LOT # :9903L527

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
ZINC, TOTAL	001 REP	W	99L0194	03/22/99	03/30/99	03/31/99
ZINC, TOTAL	001 MS	W	99L0194	03/22/99	03/30/99	03/31/99
ZINC, TOTAL	001 MSD	W	99L0194	03/22/99	03/30/99	03/31/99
B0TW91						
SILVER, TOTAL	003	W	99L0194	03/22/99	03/30/99	03/31/99
ALUMINUM, TOTAL	003	W	99L0194	03/22/99	03/30/99	03/31/99
BARIUM, TOTAL	003	W	99L0194	03/22/99	03/30/99	03/31/99
BERYLLIUM, TOTAL	003	W	99L0194	03/22/99	03/30/99	03/31/99
CALCIUM, TOTAL	003	W	99L0194	03/22/99	03/30/99	03/31/99
CADMIUM, TOTAL	003	W	99L0194	03/22/99	03/30/99	03/31/99
COBALT, TOTAL	003	W	99L0194	03/22/99	03/30/99	03/31/99
CHROMIUM, TOTAL	003	W	99L0194	03/22/99	03/30/99	03/31/99
COPPER, TOTAL	003	W	99L0194	03/22/99	03/30/99	03/31/99
IRON, TOTAL	003	W	99L0194	03/22/99	03/30/99	03/31/99
POTASSIUM, TOTAL	003	W	99L0194	03/22/99	03/30/99	03/31/99
MAGNESIUM, TOTAL	003	W	99L0194	03/22/99	03/30/99	03/31/99
MANGANESE, TOTAL	003	W	99L0194	03/22/99	03/30/99	03/31/99
SODIUM, TOTAL	003	W	99L0194	03/22/99	03/30/99	03/31/99
NICKEL, TOTAL	003	W	99L0194	03/22/99	03/30/99	03/31/99
ANTIMONY, TOTAL	003	W	99L0194	03/22/99	03/30/99	03/31/99
STRONTIUM, TOTAL	003	W	99L0194	03/22/99	03/30/99	03/31/99
VANADIUM, TOTAL	003	W	99L0194	03/22/99	03/30/99	03/31/99
ZINC, TOTAL	003	W	99L0194	03/22/99	03/30/99	03/31/99
LAB QC:						
SILVER LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
SILVER, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
ALUMINUM LABORTORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
ALUMINUM, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
BARIUM LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
BARIUM, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
BERYLLIUM LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
BERYLLIUM, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
CALCIUM LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
CALCIUM, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNU-HANFORD C99-023

DATE RECEIVED: 03/24/99 RFW LOT # :9903L527

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
CADMIUM LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
CADMIUM, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
COBALT LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
COBALT, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
CHROMIUM LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
CHROMIUM, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
COPPER LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
COPPER, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
IRON LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
IRON, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
POTASSIUM LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
POTASSIUM, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
MAGNESIUM LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
MAGNESIUM, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
MANGANESE LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
MANGANESE, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
SODIUM LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
SODIUM, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
NICKEL LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
NICKEL, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
ANTIMONY LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
ANTIMONY, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
STRONTIUM LCS STANDA	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
STRONTIUM, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
VANADIUM LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
VANADIUM, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99
ZINC LABORATORY	LC1 BS	W	99L0194	N/A	03/30/99	03/31/99
ZINC, TOTAL	MB1	W	99L0194	N/A	03/30/99	03/31/99

RECRA LabNet Use Only
9903L527

Custody Transfer Record/Lab Work Request

Page 1 of 1

RECRA LabNet

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS

Client TNU Hanford C99-023

Est. Final Proj. Sampling Date

Project # 10955-001-001-0001-00

Project Contact/Phone #

RECRA Project Manager OJ

QC Spec Del std TAT 30 day

Date Rec'd 3-24-99 Date Due 4/23/99

Account #

Refrigerator #									3		3					
#/Type Container	Liquid								1P1		1P1					
	Solid															
Volume	Liquid								500		500					
	Solid															
Preservatives									HNO3		—					
ANALYSES REQUESTED		ORGANIC: VOA	BNA	Pest/PCB	Herb				INORG: ICP Metal	CN	Anions IC					

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								MICROATC		INGO					
001	B0TW89	✓	✓	W	3-22-99	1211								✓							
2	90															✓					
3	91					1015								✓							
4	92															✓					

Special Instructions: SAF#C99-023
SDG#H0366

DATE/REVISIONS:
1. INGO = ICCL, ICFL, ICNO2, ICNO3, ICSO4
2. Met1 = Al, Sb, Ba, Be, Cd, Ca, Cr, Cu, Co,
3. Fe, Mg, Mn, Ni, K, Ag, Na, Sr, V, Zn
4.
5.
6.

RECRA LabNet Use Only

Samples were:
1) Shipped ✓ or Hand Delivered
Airbill # 806247160119
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
Fed Ex	[signature]	3-24-99	0930

Relinquished by	Received by	Date	Time

ORIGINAL REWRITTEN

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

PNNL

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

11636

C.O.C. # C99-023-11

Page 1 of 1

Collector AG RIZZO	Contact/Requester JH KESSNER	Telephone No. (509) 375-4688 MSIN FAX
SAF No. C99-023	Sampling Origin HANFORD SITE	Purchase Order/Charge Code
Project Title 100NR2IAM(1) GW MONITORING MARCH 1999	Logbook No. WM-SML H21, PAGE 93	Ice Chest No. SML 593 Temp. Cool 4°C
Shipped To (Lab) TMA/RECRA	Method of Shipment GOVT. VEHICLE	Bill of Lading/Air Bill No. 4235795236ZZ 2.9
Protocol CERCLA	Data Turnaround 45 Days	Offsite Property No.

POSSIBLE SAMPLE HAZARDS/REMARKS
** **

SPECIAL INSTRUCTIONS Hold Time Total Activity Exemption: Yes ☒ No ☐
FAX copies of QES & TMA log-in to DL Stewart (372-1704) & JH Kessner (372-9487)

Sample No.	Lab ID	*	Date	Time	No/Type Container	Sample Analysis	Preservative
B0TW89 (F)		W	3-22-99	1211	1x500-mL G/P	ICP Metals - 6010A RCRA GW	HNO3 to pH <2
B0TW90		W			1x500-mL P	IC Anions - 300.0 (Chloride, Fluoride, Nitrate, Nitrite, Sulfate)	Cool 4C
B0TW90		W			1x20-mL P	Activity Scan	None
B0TW90		W			1x1000-mL G/P	Gross Beta	HNO3 to pH <2
B0TW90		W			2x1000-mL G/P	Strontium-89,90 -- Sr-90	HNO3 to pH <2
B0TW90		W			1x250-mL P	Tritium - H3	None

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
AG RIZZO [signature]	1220 MAR 22 1999	K. Young [signature]	1220 MAR 22 1999
K. Young	1421 MAR 22 1999	Fed Ex	3-22-99
Fed Ex	3-23-99 11:00	Alonso JR Close	3-23-99 11:00
	[illegible]	[signature]	3/24/99 0930

Matrix *
S = Soil
SE = Sediment
SO = Solid
SL = Sludge
W = Water
O = Oil
A = Air
DS = Drum Solid
DL = Drum Liquid
T = Tissue
WI = Wipe
L = Liquid
V = Vegetation
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 He3ll	C.O.C. # C99-023-13 Page 1 of 1

018

Collector AG RIZZO	Contact/Requester JH KESSNER	Telephone No. (509) 375-4688 MSIN FAX
SAF No. C99-023	Sampling Origin HANFORD SITE	Purchase Order/Charge Code
Project Title 100NR2IAM(1) GW MONITORING, MARCH 1999	Logbook No. WM-SML # 21, PAGE 93	Ice Chest No. SML 593 Temp. Cool/4°C
Shipped To (Lab) TMA/RECRA	Method of Shipment GOVT. VEHICLE	Bill of Lading/Air Bill No. 4235795Z 3622
Protocol CERCLA	Data Turnaround 45 Days	Offsite Property No.

POSSIBLE SAMPLE HAZARDS/REMARKS
** ** .

SPECIAL INSTRUCTIONS Hold Time Total Activity Exemption: Yes ☒ No ☐
FAX copies of QES & TMA log-in to DL Stewart (372-1704) & JH Kessner (372-9487)

Sample No.	Lab ID	*	Date	Time	No/Type Container	Sample Analysis	Preservative
B0TW91 (F)		W	3-22-99	1016	1x500-mL G/P	ICP Metals - 6010A RCRA GW	HNO3 to pH <2
B0TW92		W	↓	↓	1x500-mL P	IC Anions - 300.0 (Chloride, Fluoride, Nitrate, Nitrite, Sulfate)	Cool 4C
B0TW92		W			1x20-mL P	Activity Scan	None
B0TW92		W			1x1000-mL G/P	Gross Beta	HNO3 to pH <2
B0TW92		W			1x1000-mL G/P	Gamma Spectroscopy(Water)	HNO3 to pH <2
B0TW92		W			2x1000-mL G/P	Strontium-89,90 -- Sr-90	HNO3 to pH <2
B0TW92		W			1x250-mL P	Tritium - H3	None

Relinquished By	Date/Time	Received By	Date/Time
Print AG RIZZO Sign [signature]	1220 MAR 22 1999	Print KJ Young Sign [signature]	1220 3-22-99
[signature]	3-22-99 1421	Fed Ex	3-22-99
Fed Ex	3-23-99 1100	DC Corse JR [signature]	3-23-99 11:20
[signature]		[signature]	3/24/99 0930

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

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

Case Narrative

1.0 GENERAL

Bechtel Hanford Inc. Sample Delivery Group H0366 is comprised of two water samples designated under SAF No. C99-023 with a Project Designation of: 100NR2IAM(1)GW MONITORING MARCH 1999.

The samples were received as stated on the Chain-of-Custody documents. Any discrepancies are noted on the TNU Sample Receipt Checklist. A complete data package was sent to Bechtel Hanford on May 12, 1999 vix fax.

2.0 ANALYSIS NOTES

2.1 Tritium Analyses

No problems were encountered during the processing of the samples.

2.2 Strontium-90 Analyses

The aliquot for the analysis was reduced due to the sample matrix. The resultant increased MDA's reflect the decreased aliquot. No problems were encountered during the processing of the samples.

2.3 Gross Beta Analyses

The aliquot for the analysis was reduced due to the sample matrix. The resultant increased MDA's reflect the decreased aliquot. No problems were encountered during the processing of the samples.

2.4 Gamma Scan Analyses

No problems were encountered during the processing of the samples.

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0366

SAMPLE SUMMARY

SDG 7104
Contact L.A. Johnson

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0366

CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	LAB SAMPLE ID	SAF NO	CHAIN OF CUSTODY	COLLECTED
B0TW90		WATER		N903116-01	C99-023	C99-023-11	03/22/99 12:11
B0TW92		WATER		N903116-02	C99-023	C99-023-11	03/22/99 10:16
Method Blank		WATER		N903092-06	C99-023		
Lab Control Sample		WATER		N903092-05	C99-023		

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CS
Version 3.06
Report date 05/12/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0366

QC SUMMARY

SDG 7104
Contact L.A. Johnson

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0366

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
7098		Method Blank	WATER						N903092-06	7098-006
		Lab Control Sample	WATER						N903092-05	7098-005
7104	C99-023-11	B0TW90	WATER				03/23/99	1	N903116-01	7104-001
		B0TW92	WATER				03/23/99	1	N903116-02	7104-002

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-QS
Version 3.06
Report date 05/12/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0366

PREP BATCH SUMMARY

SDG 7104
Contact L.A. Johnson

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0366

TEST	MATRIX	METHOD	PREPARATION BATCH	ERROR 2σ %	PLANCHETS ANALYZED CLIENT	MORE	RE	BLANK	LCS	DUP/ORIG	MS/ORIG	QUALIFIERS
Beta Counting												
Y	WATER	Strontium 90 in Water	2857-189	10.0	2			1	1			
Gas Proportional Counting												
82B	WATER	Gross Beta in Water	2857-189	15.0	2			1	1			
Gamma Scan												
GAM	WATER	Gamma Emitters	2857-189	15.0	1			1	1			
Liquid Scintillation Counting												
H	WATER	Tritium in Water	2857-189	10.0	2			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 05/12/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0366

WORK SUMMARY

SDG 7104
Contact L.A. Johnson

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0366

CLIENT SAMPLE ID / LOCATION / CUSTODY	SAF No	MATRIX	LAB SAMPLE ID / COLLECTED / RECEIVED	PLANCHET	TEST	SUF-FIX	ANALYZED	REVIEWED	BY	METHOD
B0TW90			N903116-01	7104-001	82B/82		04/01/99	05/12/99	TAH	Gross Beta in Water
		WATER	03/22/99	7104-001	H		04/09/99	05/12/99	TAH	Tritium in Water
C99-023-11	C99-023		03/23/99	7104-001	Y		04/10/99	05/12/99	TAH	Strontium 90 in Water
B0TW92			N903116-02	7104-002	82B/82		04/02/99	05/12/99	TAH	Gross Beta in Water
		WATER	03/22/99	7104-002	GAM		04/23/99	05/12/99	TAH	Gamma Emitters
C99-023-11	C99-023		03/23/99	7104-002	H		04/09/99	05/12/99	TAH	Tritium in Water
				7104-002	Y		04/10/99	05/12/99	TAH	Strontium 90 in Water
Method Blank			N903092-06	7098-006	82B/82		04/01/99	05/07/99	TAH	Gross Beta in Water
		WATER		7098-006	GAM		05/04/99	05/07/99	TAH	Gamma Emitters
	C99-023			7098-006	H		04/09/99	05/07/99	TAH	Tritium in Water
				7098-006	Y		04/16/99	05/07/99	TAH	Strontium 90 in Water
Lab Control Sample			N903092-05	7098-005	82B/82		04/02/99	05/07/99	TAH	Gross Beta in Water
		WATER		7098-005	GAM		05/04/99	05/07/99	TAH	Gamma Emitters
	C99-023			7098-005	H		04/09/99	05/07/99	TAH	Tritium in Water
				7098-005	Y		04/16/99	05/07/99	TAH	Strontium 90 in Water

COUNTS OF TESTS BY SAMPLE TYPE

TEST	SAF No	METHOD	REFERENCE	CLIENT	MORE	RE	BLANK	LCS	DUP SPIKE	TOTAL
82B/82	C99-023	Gross Beta in Water	EPA900.0	2			1	1		4
GAM	C99-023	Gamma Emitters	GAMMAHI	1			1	1		3
H	C99-023	Tritium in Water	EPA906.0	2			1	1		4
Y	C99-023	Strontium 90 in Water	SR90Y90	2			1	1		4
TOTALS				7			4	4		15

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CWS
Version 3.06
Report date 05/12/99

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0366

N903092-06

Method Blank

METHOD BLANK

SDG 7104	Client/Case no Hanford	SDG-H0366	
Contact L.A. Johnson	Case no TRB-SBB-207925		
Lab sample id N903092-06	Client sample id Method Blank		
Dept sample id 7098-006	Material/Matrix	WATER	
	SAF No C99-023		

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Gross Beta	12587-47-2	-0.639	1.5	2.6	4.0	U	82B
Tritium	10028-17-8	-20.2	100	180	400	U	H
Strontium 90	10098-97-2	-0.097	0.15	0.33	2.0	U	Y
Potassium 40	13966-00-2	U		140		U	GAM
Cobalt 60	10198-40-0	U		7.1	25	U	GAM
Cesium 137	10045-97-3	U		6.6	15	U	GAM
Europium 152	14683-23-9	U		19	50	U	GAM
Europium 154	15585-10-1	U		21	50	U	GAM
Europium 155	14391-16-3	U		18	50	U	GAM
Americium 241	14596-10-2	U		16		U	GAM
Uranium 238	U-238	U		950		U	GAM
Uranium 235	15117-96-1	U		27		U	GAM

100NR21AM(1)GW MONITORING,MARCH 1999

QC-BLANK 30394

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 05/12/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0366

N903092-05

Lab Control Sample

LAB CONTROL SAMPLE

SDG 7104
Contact L.A. Johnson

Client/Case no Hanford SDG-H0366
Case no TRB-SBB-207925

Lab sample id N903092-05
Dept sample id 7098-005

Client sample id Lab Control Sample
Material/Matrix WATER
SAF No C99-023

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 Beta	83.7	3.7	2.1	4.0		82B	84.0	3.4	100	76-124	
Tritium	7150	260	180	400		H	7260	290	98	83-117	80-120
Strontium 90	12.4	0.80	0.33	2.0		Y	11.5	0.46	108	80-120	80-120
Cobalt 60	532	24	11	25		GAM	530	21	100	76-124	80-120
Cesium 137	552	21	13	15		GAM	572	23	96	77-123	80-120

100NR21AM(1)GW MONITORING,MARCH 1999

QC-LCS 30393

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-LCS
Version 3.06
Report date 05/12/99

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0366

N903116-01 B0TW90

DATA SHEET

SDG	7104	Client/Case no	Hanford SDG-H0366
Contact	L.A. Johnson	Case no	TRB-SBB-207925
Lab sample id	N903116-01	Client sample id	B0TW90
Dept sample id	7104-001	Location/Matrix	WATER
Received	03/23/99	Collected	03/22/99 12:11
		Custody/SAF No	C99-023-11 C99-023

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Gross Beta	12587-47-2	845	14	3.7	4.0		82B
Tritium	10028-17-8	28900	500	180	400		H
Strontium 90	10098-97-2	442	9.0	4.1	2.0		Y

100NR21AM(1)GW MONITORING,MARCH 1999

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	05/12/99

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0366

N903116-02 B0TW92

DATA SHEET

SDG	7104	Client/Case no	Hanford SDG-H0366
Contact	L.A. Johnson	Case no	TRB-SBB-207925
Lab sample id	N903116-02	Client sample id	B0TW92
Dept sample id	7104-002	Location/Matrix	WATER
Received	03/23/99	Collected	03/22/99 10:16
		Custody/SAF No	C99-023-11 C99-023

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Gross Beta	12587-47-2	1150	16	3.7	4.0		82B
Tritium	10028-17-8	51600	660	180	400		H
Strontium 90	10098-97-2	558	8.3	4.1	2.0		Y
Potassium 40	13966-00-2	U		100		U	GAM
Cobalt 60	10198-40-0	U		7.8	25	U	GAM
Cesium 137	10045-97-3	U		6.1	15	U	GAM
Europium 152	14683-23-9	U		17	50	U	GAM
Europium 154	15585-10-1	U		21	50	U	GAM
Europium 155	14391-16-3	U		17	50	U	GAM
Americium 241	14596-10-2	U		16		U	GAM
Uranium 238	U-238	U		870		U	GAM
Uranium 235	15117-96-1	U		25		U	GAM

100NR21AM(1)GW MONITORING,MARCH 1999

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	05/12/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0366

METHOD SUMMARY

STRONTIUM 90 IN WATER

BETA COUNTING

Test Y Matrix WATER
SDG 7104
Contact L.A. Johnson

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0366

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	PLANCHET	Strontium 90
Preparation batch 2857-189					
B0TW90	N903116-01			7104-001	442
B0TW92	N903116-02			7104-002	558
BLK (QC ID=30394)	N903092-06			7098-006	U
LCS (QC ID=30393)	N903092-05			7098-005	ok
Nominal values and limits from method				RDLs (pCi/L)	2.0
100NR21AM(1)GW MONITORING,MARCH 1999					

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 2857-189	2σ prep error 10.0 %			Reference Lab	Notebook #2857 pg. 189											
B0TW90	N903116-01			4.1	0.100			75	200				19	04/09/99	04/10	GRB-205
B0TW92	N903116-02			4.1	0.100			82	200				19	04/09/99	04/10	GRB-206
BLK (QC ID=30394)	N903092-06			0.33	1.00			79	200					04/09/99	04/16	GRB-208
LCS (QC ID=30393)	N903092-05			0.33	1.00			76	200					04/09/99	04/16	GRB-201
Nominal values and limits from method				2.0	1.00			20-105	25				180			

PROCEDURES

REFERENCE	SR90Y90	
EP-040	Environmental Water Dissolution, rev 1	
EP-520	Yttrium Purification for Strontium-90 Analysis, rev 0	

AVERAGES ± 2 SD FOR 4 SAMPLES

MDA 2.2 ± 4.4
YIELD 78 ± 6

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 05/12/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0366

Test 82B Matrix WATER
SDG 7104
Contact L.A. Johnson

METHOD SUMMARY

GROSS BETA IN WATER
GAS PROPORTIONAL COUNTING

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0366

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 2857-189								
B0TW90	N903116-01	82		7104-001	845	442	52	10
B0TW92	N903116-02	82		7104-002	1150	558	49	9
BLK (QC ID=30394)	N903092-06	82		7098-006	U			
LCS (QC ID=30393)	N903092-05	82		7098-005	ok			
Nominal values and limits from method					RDLs (pCi/L)	4.0		
100NR21AM(1)GW MONITORING,MARCH 1999						Average	50	

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 2857-189	2σ prep error 15.0 %			Reference Lab		Notebook #2857 pg. 189										
B0TW90	N903116-01	82		3.7	0.200			32	100				10	04/01/99	04/01	GRB-112
B0TW92	N903116-02	82		3.7	0.200			23	100				11	04/01/99	04/02	GRB-112
BLK (QC ID=30394)	N903092-06	82		2.6	0.300			35	100					04/01/99	04/01	GRB-110
LCS (QC ID=30393)	N903092-05	82		2.1	0.300			35	100					04/01/99	04/02	GRB-111
Nominal values and limits from method				4.0	0.300			5-150	100				180			

PROCEDURES REFERENCE EPA900.0
EP-120 Gross Alpha and Gross Beta in Environmental Water, rev 2

AVERAGES ± 2 SD FOR 4 SAMPLES
MDA 3.0 ± 1.6
RESIDUE 31 ± 11

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 05/12/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0366

METHOD SUMMARY

GAMMA EMITTERS

GAMMA SCAN

Test GAM Matrix WATER
SDG 7104
Contact L.A. Johnson

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0366

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	PLANCHET	Cobalt 60	Cesium 137
Preparation batch 2857-189						
B0TW92	N903116-02			7104-002	U	U
BLK (QC ID=30394)	N903092-06			7098-006	U	U
LCS (QC ID=30393)	N903092-05			7098-005	ok	ok
Nominal values and limits from method 100NR21AM(1)GW MONITORING,MARCH 1999				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 2857-189 2σ prep error 15.0 % Reference Lab Notebook #2857 pg. 189																
B0TW92	N903116-02			6.1	0.500					411			32	04/23/99		01,04,00
BLK (QC ID=30394)	N903092-06			6.6	0.500					401				03/26/99	05/04	01,04,00
LCS (QC ID=30393)	N903092-05			13	0.500					452				03/26/99	05/04	01,04,00
Nominal values and limits from method				15	0.500					400			180			

PROCEDURES REFERENCE GAMMAHI
EP-100 Ge(Li) Preparation for Environmental Samples, rev 0

AVERAGES ± 2 SD FOR 3 SAMPLES
MDA 8.6 ± 7.7
YIELD ____ ± ____

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 05/12/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0366

METHOD SUMMARY

TRITIUM IN WATER

LIQUID SCINTILLATION COUNTING

Test H Matrix WATER
SDG 7104
Contact L.A. Johnson

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0366

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	PLANCHET	Tritium
Preparation batch 2857-189					
B0TW90	N903116-01			7104-001	28900
B0TW92	N903116-02			7104-002	51600
BLK (QC ID=30394)	N903092-06			7098-006	U
LCS (QC ID=30393)	N903092-05			7098-005	ok
Nominal values and limits from method				RDLs (pCi/L)	400
100NR21AM(1)GW MONITORING,MARCH 1999					

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 2857-189	2σ prep error 10.0 %			Reference Lab		Notebook #2857 pg. 189										
B0TW90	N903116-01			180	0.0100			100		120			18	04/07/99	04/09	LSC-005
B0TW92	N903116-02			180	0.0100			100		120			18	04/07/99	04/09	LSC-005
BLK (QC ID=30394)	N903092-06			180	0.0100					120				04/07/99	04/09	LSC-005
LCS (QC ID=30393)	N903092-05			180	0.0100					120				04/07/99	04/09	LSC-005
Nominal values and limits from method				400	0.0100					25			180			

PROCEDURES REFERENCE EPA906.0
EP-210 Tritium in Water by Distillation, rev 0

AVERAGES ± 2 SD FOR 4 SAMPLES
MDA 180 ± 0
YIELD 100 ± 0

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 05/12/99

SDG 7104
Contact L.A. Johnson

REPORT GUIDE

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0366

SAMPLE SUMMARY

The Sample and QC Summary Reports show all samples, including QC samples, reported in one Sample Delivery Group (SDG).

The Sample Summary Report fully identifies client samples and gives the corresponding lab sample identification. The QC Summary Report shows at the sample level how the lab organized the samples into batches and generated QC samples. The Preparation Batch and Method Summary Reports show this at the analysis level.

The following notes apply to these reports:

* LAB SAMPLE ID is the lab's primary identification for a sample.

* DEPARTMENT SAMPLE ID is an alternate lab id, for example one assigned by a radiochemistry department in a lab.

* CLIENT SAMPLE ID is the client's primary identification for a sample. It includes any sample preparation done by the client that is necessary to identify the sample.

* QC BATCH is a lab assigned code that groups samples to be processed and QCed together. These samples should have similar matrices.

  QC BATCH is not necessarily the same as SDG, which reflects samples received and reported together.

* All Lab Control Samples, Method Blanks, Duplicates and Matrix Spikes are shown that QC any of the samples. Due to possible reanalyses, not all results for all these QC samples may be relevant to the SDG. The Lab Control Sample, Method Blank, Duplicate, Matrix Spike and Method Summary Reports detail these relationships.

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-RG
Version 3.06
Report date 05/12/99

SDG 7104
Contact L.A. Johnson

REPORT GUIDE

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0366

PREPARATION BATCH SUMMARY

The Preparation Batch Summary Report shows all preparation batches in one Sample Delivery Group (SDG) with information necessary to check the completeness and consistency of the SDG.

The following notes apply to this report:

* The preparation batches are shown in the same order as the Method Summary Reports are printed.

* Only analyses of planchets relevant to the SDG are included.

* Each preparation batch should have at least one Method Blank and LCS in it to validate client sample results.

* The QUALIFIERS shown are all qualifiers other than U, J, B, L and H that occur on any analysis in the preparation batch. The Method Summary Report has these qualifiers on a per sample basis.

  These qualifiers should be reviewed as follows:

  X Some data has been manually entered or modified. Transcription errors are possible.

  P One or more results are 'preliminary'. The data is not ready for final reporting.

  2 There were two or more results for one analyte on one planchet imported at one time. The results in DVD may not be the same as on the raw data sheets.

  Other lab defined qualifiers may occur. In general, these should be addressed in the SDG narrative.

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-RG
Version 3.06
Report date 05/12/99

SDG 7104
Contact L.A. Johnson

REPORT GUIDE

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0366

WORK SUMMARY

The Work Summary Report shows all samples, including QC samples, and all relevant analyses in one Sample Delivery Group (SDG). This report is often useful as supporting documentation for an invoice.

The following notes apply to this report:

* TEST is a code for the method used to measure associated analytes. Results and related information for each analyte are on the Data Sheet Report. In special cases, a test code used in the summary data section is not the same as in associated raw data. In this case, both codes are shown on the Work Summary.

* SUFFIX is the lab's code to distinguish multiple analyses (recounts, reworks, reanalyses) of a fraction of the sample. The suffix indicates which result is being reported. An empty suffix normally identifies the first attempt to analyze the sample.

* The LAB SAMPLE ID, TEST and SUFFIX uniquely identify all supporting data for a result. The Method Summary Report for each TEST has method performance data, such as yield, for each lab sample id and suffix and procedures used in the method.

* PLANCHET is an alternate lab identifier for work done for one test. It, combined with the TEST and SUFFIX, may be the best link to raw data.

* For QC samples, only analyses that directly QC some regular sample are shown. The Lab Control Sample, Method Blank, Duplicate, Matrix Spike and Method Summary Reports detail these relationships.

* The SAS (Special Analytical Services) Number is a client or lab assigned code that reflects special processing for samples, such as rapid turn around. Counts of tests done are lists by SAS number since it is likely to affect prices.

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-RG
Version 3.06
Report date 05/12/99

SDG 7104
Contact L.A. Johnson

REPORT GUIDE

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0366

WORK SUMMARY

The Work Summary Report shows all samples, including QC samples, and all relevant analyses in one Sample Delivery Group (SDG). This report is often useful as supporting documentation for an invoice.

The following notes apply to this report:

* TEST is a code for the method used to measure associated analytes. Results and related information for each analyte are on the Data Sheet Report. In special cases, a test code used in the summary data section is not the same as in associated raw data. In this case, both codes are shown on the Work Summary.

* SUFFIX is the lab's code to distinguish multiple analyses (recounts, reworks, reanalyses) of a fraction of the sample. The suffix indicates which result is being reported. An empty suffix normally identifies the first attempt to analyze the sample.

* The LAB SAMPLE ID, TEST and SUFFIX uniquely identify all supporting data for a result. The Method Summary Report for each TEST has method performance data, such as yield, for each lab sample id and suffix and procedures used in the method.

* PLANCHET is an alternate lab identifier for work done for one test. It, combined with the TEST and SUFFIX, may be the best link to raw data.

* For QC samples, only analyses that directly QC some regular sample are shown. The Lab Control Sample, Method Blank, Duplicate, Matrix Spike and Method Summary Reports detail these relationships.

* The SAS (Special Analytical Services) Number is a client or lab assigned code that reflects special processing for samples, such as rapid turn around. Counts of tests done are lists by SAS number since it is likely to affect prices.

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-RG
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Report date 05/12/99

SDG 7104
Contact L.A. Johnson

REPORT GUIDE

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0366

DATA SHEET

The Data Sheet Report shows all results and primary supporting information for one client sample or Method Blank. This report corresponds to both the CLP Inorganics and Organics Data Sheet.

The following notes apply to this report:

* TEST is a code for the method used to measure an analyte. If the TEST is empty, no data is available; the analyte was not analyzed for.

* The LAB SAMPLE ID and TEST uniquely identify work within the Summary Data Section of a Data Package. The Work Summary and Method Summary Reports further identify raw data that underlies this work.

  The Method Summary Report for each TEST has method performance data, such as yield, for each Lab Sample ID and a list of procedures used in the method.

* ERRORs can be labeled TOTAL or COUNT. TOTAL implies a preparation (non-counting method) error has been added, as square root of sum of squares, to the counting error denoted by COUNT. The preparation errors, which may vary by preparation batch, are shown on the Method Summary Report.

* A RESULT can be 'N.R.' (Not Reported). This means the lab did this work but chooses not to report it now, possibly because it was reported at another time.

* When reporting a Method Blank, a RESULT can be 'N.A.' (Not Applicable). This means there is no reported client sample work in the same preparation batch as the Blank's result. This is likely to occur when the Method Blank is associated with reanalyses of selected work for a few samples in the SDG.

The following qualifiers are defined by the DVD system:

U The RESULT is less than the MDA (Minimum Detectable Activity).

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Protocol Hanford
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Contact L.A. Johnson

Client Hanford
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Case no SDG-H0366

DATA SHEET

If the MDA is blank, the ERROR is used as the limit.

J The RESULT is less than the RDL (Required Detection Limit) and no U qualifier is assigned.

B A Method Blank associated with this sample had a result without a U flag and, after correcting for possibly different aliquots, that result is greater than or equal to the MDA for this sample.

Normally, B is not assigned if U is. When method blank subtraction is shown on this report, B flags are assigned based on the unsubtracted values while U's are assigned based on the subtracted ones. Both flags can be assigned in this case.

For each sample result, all Method Blank results in the same preparation batch are compared. The Method Summary Report documents this and other QC relationships.

L Some Lab Control Sample that QC's this sample had a low recovery. The lab can disable assignment of this qualifier.

H Similar to 'L' except the recovery was high.

P The RESULT is 'preliminary'.

X Some data necessary to compute the RESULT, ERROR or MDA was manually entered or modified.

2 There were two or more results available for this analyte. The reported result may not be the same as in the raw data.

Other qualifiers are lab defined. Definitions should be in the SDG narrative.

The following values are underlined to indicate possible problems:

* An MDA is underlined if it is bigger than its RDL.

Lab id TMANC
Protocol Hanford
Version Ver 1.0
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SDG 7104
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GUIDE, cont.

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0366

DATA SHEET

* An ERROR is underlined if the 1.645 sigma counting error is bigger than both the MDA and the RESULT, implying that the MDA may not be a good estimate of the 'real' minimum detectable activity.

* A negative RESULT is underlined if it is less than the negative of its 2 sigma counting ERROR.

* When reporting a Method Blank, a RESULT is underlined if greater than its MDA. If the MDA is blank, the 2 sigma counting error is used in the comparison.

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-RG
Version 3.06
Report date 05/12/99

SDG 7104
Contact L.A. Johnson

R E P O R T G U I D E

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0366

L A B C O N T R O L S A M P L E

The Lab Control Sample Report shows all results, recoveries and primary supporting information for one Lab Control Sample.

The following notes apply to this report:

* All fields in common with the Data Sheet Report have similar usage. Refer to its Report Guide for details.

* An amount ADDED is the lab's value for the actual amount spiked into this sample with its ERROR an estimate of the error of this amount.

  An amount added is underlined if its ratio to the corresponding RDL is outside protocol specified limits.

* REC (Recovery) is RESULT divided by ADDED expressed as a percent.

* The first, computed limits for the recovery reflect:

  1. The error of RESULT, including that introduced by rounding the result prior to printing.

     If the limits are labeled (TOTAL), they include preparation error in the result. If labeled (COUNT), they do not.

  2. The error of ADDED.

  3. A lab specified, per analyte bias. The bias changes the center of the computed limits.

* The second limits are protocol defined upper and lower QC limits for the recovery.

* The recovery is underlined if it is outside either of these ranges.

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-RG
Version 3.06
Report date 05/12/99

SDG 7104
Contact L.A. Johnson

REPORT GUIDE

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0366

DUPLICATE

The Duplicate Report shows all results, differences and primary supporting information for one Duplicate and associated Original sample.

The following notes apply to this report:

* All fields in common with the Data Sheet Report have similar usage. This applies both to the Duplicate and Original sample data. Refer to the Data Sheet Report Guide for details.

  If the Duplicate has data for a TEST and the lab did not do this test to the Original, the Original's RESULTs are underlined.

* The RPD (Relative Percent Difference) is the absolute value of the difference of the RESULTs divided by their average expressed as a percent.

  If both RESULTs are less than their MDAs, no RPD is computed and a '-' is printed.

  For an analyte, if the lab did work for both samples but has data for only one, the MDA from the sample with data is used as the other's result in the RPD.

* The first, computed limit is the sum, as square root of sum of squares, of the errors of the results divided by the average result as a percent, hence the relative error of the difference rather than the error of the relative difference. The errors include those introduced by rounding the RESULTs prior to printing.

  If this limit is labeled TOT, it includes the preparation error in the RESULTs. If labeled CNT, it does not.

  This value reported for this limit is at most 999.

* The second limit for the RPD is the larger of:

  1. A fixed percentage specified in the protocol.

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-RG
Version 3.06
Report date 05/12/99

SDG 7104
Contact L.A. Johnson

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0366

D U P L I C A T E

2. A protocol factor (typically 2) times the average MDA as a percent of the average result. This limit applies when the results are close to the MDAs.

* The RPD is underlined if it is greater than either limit.

* If specified by the lab, the second limit column is replaced by the Difference Error Ratio (DER), which is the absolute value of the difference of the results divided by the quadratic sum of their one sigma errors, the same errors as used in the first limit.

  Except for differences due to rounding, the DER is the same as the RPD divided by the first RPD limit with the limit scaled to 1 sigma.

* The DER is underlined if it is greater than the sigma factor, typically 2 or 3, shown in the header for the first RPD limit.

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-RG
Version 3.06
Report date 05/12/99

SDG 7104
Contact L.A. Johnson

REPORT GUIDE

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0366

MATRIX SPIKE

The Matrix Spike Report shows all results, recoveries and primary supporting information for one Matrix Spike and associated Original sample.

The following notes apply to this report:

* All fields in common with the Data Sheet Report have similar usage. This applies both to the Spiked and Original sample data. Refer to the Data Sheet Report Guide for details.

  If the Spike has data for a TEST and the lab did not do this test to the Original, the Original's RESULTs are underlined.

* An amount ADDED is the lab's value for the actual amount spiked into the Spike sample with its ERROR an estimate of the error of this amount.

  An amount is underlined if its ratio to the corresponding RDL is outside protocol specified limits.

* REC (Recovery) is the Spike RESULT minus the Original RESULT divided by ADDED expressed as a percent.

* The first, computed limits for the recovery reflect:

  1. The errors of the two RESULTs, including those introduced by rounding them prior to printing.

     If the limits are labeled (TOTAL), they include preparation error in the result. If labeled (COUNT), they do not.

  2. The error of ADDED.

  3. A lab specified, per analyte bias. The bias changes the center of the computed limits.

* The second limits are protocol defined upper and lower QC limits

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Version Ver 1.0
Form DVD-RG
Version 3.06
Report date 05/12/99

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Contact L.A. Johnson

Client Hanford
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Case no SDG-H0366

M A T R I X S P I K E

for the recovery.

These limits are left blank if the Original RESULT is more than a protocol defined factor (typically 4) times ADDED. This is a way of accounting for that when the spike is small compared to the amount in the original sample, the recovery is unreliable.

* The recovery is underlined (out of spec) if it is outside either of these ranges.

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METHOD SUMMARY

The Method Summary Report has two tables. One shows up to five results measured using one method. The other has performance data for the method. There is one report for each TEST, as used on the Data Sheet Report.

The following notes apply to this report:

* Each table is subdivided into sections, one for each preparation batch. A preparation batch is a group of aliquots prepared at roughly the same time in one work area of the lab using the same method.

  There should be Lab Control Sample and Method Blank results in each preparation batch since this close correspondence makes the QC meaningful. Depending on lab policy, Duplicates need not occur in each batch since they QC sample dependencies such as matrix effects.

* The RAW TEST column shows the test code used in the raw data to identify a particular analysis if it is different than the test code in the header of the report. This occurs in special cases due to method specific details about how the lab labels work.

  The Lab Sample or Planchet ID combined with the (Raw) Test Code and Suffix uniquely identify the raw data for each analysis.

* If a result is less than both its MDA and RDL, it is replaced by just 'U' on this report. If it is greater than or equal to the RDL but less than the MDA, the result is shown with a 'U' flag.

  The J and X flags are as on the data sheet.

* Non-U results for Method Blanks are underlined to indicate possible contamination of other samples in the preparation batch. The Method Blank Report has supporting data.

* Lab Control Sample and Matrix Spike results are shown as: ok, No data, LOW or HIGH, with the last two underlined. 'No data'

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means no amount ADDED was specified. 'LOW' and 'HIGH' correspond to when the recovery is underlined on the Lab Control Sample or Matrix Spike Report. See these reports for supporting data.

* Duplicate sample results are shown as: ok, No data, or OUT, with the last two underlined. 'No data' means there was no original sample data found for this duplicate. 'OUT' corresponds to when the RPD is underlined on the Duplicate Report. See this report for supporting data.

* If the MDA column is labeled 'MAX MDA', there was more than one result measured by the reported method and the MDA shown is the largest MDA. If not all these results have the same RDL, the MAX MDA reflects only those results with RDL equal to the smallest one.

  MDAs are underlined if greater than the printed RDL.

* Aliquots are underlined if less than the nominal value specified for the method.

* Prepareation factors are underlined if greater than the nominal value specified for the method.

* Dilution factors are underlined if greater than the nominal value specified for the method.

* Residues are underlined if outside the range specified for the method. Residues are not printed if yields are.

* Yields, which may be gravimetric, radiometric or some type of recovery depending on the method, are underlined if outside the range specified for the method.

* Efficiencies are underlined if outside the range specified for the method. Efficiencies are detector and geometry dependent so this test is only approximate.

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* Count times are underlined if less than the nominal value specified for the method.

* Resolutions (as FWHM; Full Width at Half Max) are underlined if greater than the method specified limit.

* Tracer drifts are underlined if their absolute values are greater than the method specified limit. Tracer drifts are not printed if percent moistures are.

* Days Held are underlined if greater than the holding time specified in the protocol.

* Analysis dates are underlined if before their planchet's preparation date or, if a limit is specified, too far after it.

For some methods, ratios as percentages and error estimates for them are computed for pairs of results. A ratio column header like '1÷3' means the ratio of the first result column and the third result column.

Ratios are not computed for Lab Control Sample, Method Blank or Matrix Spike results since their matrices are not necessarily similar to client samples'.

The error estimate for a ratio of results from one planchet reflects only counting errors since other errors should be correlated. For a ratio involving different planchets, if QC limits are computed based on total errors, the error for the ratio allows for the preparation errors for the planchets.

The ratio is underlined (out of spec) if the absolute value of its difference from the nominal value is greater than its error estimate. If no nominal value is specified, this test is not done.

For Gross Alpha or Gross Beta results, there may be a column showing the sum of other Alpha or Beta emitters. This sum includes all relevant

METHOD SUMMARY

results in the DVD database, whether reported or not. Results in the sum are weighted by a particles/decay value specified by the lab for each relevant analyte. Results less than their MDA are not included. No sums are computed for Lab Control, Method Blank or Matrix Spike samples since their various planchets may not be physically related.

If a ratio of total isotopic to Gross Alpha or Beta is shown, the error for the ratio reflects both the error in the Gross result and the sum, as square root of sum of squares, of the errors in the isotopic results.

For total elemental uranium or thorium results, there may be a column showing the total weight computed from associated isotopic results. Ignoring results less than their MDAs, this is a weighted sum of the isotopic results. The weights depend on the molecular weight and half-life of each isotope so as to convert activities (decays) to weight (atoms).

If a ratio of total computed to measured elemental uranium or thorium is shown, the error for the ratio reflects the errors in all the measurements.