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JAN 27 2000

Thermo Nutech  
W.O. No. N9-09-202-7221

Bechtel Hanford Inc.  
SDG H0548

**EDMC**

**Case Narrative**

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**1.0 GENERAL**

Bechtel Hanford Inc. Sample Delivery Group H0548 is composed of one liquid (water) sample designated under SAF No. B99-082 with a Project Designation of: 105-DR FSB-QC Sample Analysis.

The sample was received as stated on the Chain-of-Custody document. Any discrepancies are noted on the TNU Sample Receipt Checklist. The results were transmitted to BHI via facsimile on October 20, 1999 (Technetium-99, Isotopic Plutonium, Isotopic Uranium and Nickel 63) and October 26, 1999 (Carbon-14, Tritium, Gamma Scan, Americium-241 and Total Strontium).

**2.0 ANALYSIS NOTES**

**2.1 Total Strontium Analyses**

No problems were encountered during the course of the analyses.

**2.2 Isotopic Uranium Analyses**

No problems were encountered during the course of the analyses.

**2.3 Gamma Spec Analyses**

No problems were encountered during the course of the analyses.

**2.4 Isotopic Plutonium Analyses**

No problems were encountered during the course of the analyses.

**2.5 Americium-241 Analyses**

The results of the duplicate and original analyses were not a good match the RDP was 182% with a protocol limit of 123%. The duplicate analysis result is a detection limit while the original sample contained activity at twice the MDA of the sample.

**2.6 Tritium Analyses**

No problems were encountered during the course of the analyses.

**2.7 Nickel-63 Analyses**

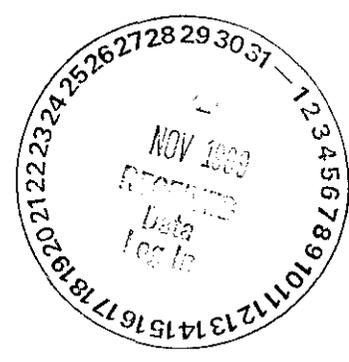
No problems were encountered during the course of the analyses.

**2.8 Technetium-99 Analyses**

No problems were encountered during the course of the analyses.

**2.9 Carbon-14 Analyses**

No problems were encountered during the course of the analyses.



TMA/RICHMOND

SAMPLE DELIVERY GROUP H0548

SAMPLE SUMMARY

SDG 7221  
Contact Kevin C. Johnson

Client Hanford  
Contract TRB-SBB-207925  
Case no SDG H0548

CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	LAB SAMPLE ID	SAF NO	CHAIN OF CUSTODY	COLLECTED
B0WCK9	105 DR	WATER		N909202-01	B99-082	B99-082-4	09/27/99 11:07
Method Blank		WATER		N909202-03	B99-082		
Lab Control Sample		WATER		N909202-02	B99-082		
Duplicate (N909202-01)	105 DR	WATER		N909202-04	B99-082		09/27/99 11:07

SAMPLE SUMMARY

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Lab id TMANC  
Protocol Hanford  
Version Ver 1.0  
Form DVD-CS  
Version 3.06  
Report date 10/26/99

TMA/RICHMOND  
 SAMPLE DELIVERY GROUP H0548

SDG 7221  
 Contact Kevin C. Johnson

QC SUMMARY

Client Hanford  
 Contract TRB-SBB-207925  
 Case no SDG H0548

QC BATCH	CHAIN OF CUSTODY	CLIENT SAMPLE ID	MATRIX	SOLIDS	SAMPLE AMOUNT	BASIS AMOUNT	DAYS SINCE RECEIVED	LAB COLL	LAB SAMPLE ID	DEPARTMENT SAMPLE ID
7221	B99-082-4	B0WCK9	WATER				09/29/99 2	N909202-01		7221-001
		Method Blank	WATER					N909202-03		7221-003
		Lab Control Sample	WATER					N909202-02		7221-002
		Duplicate (N909202-01)	WATER				09/29/99 2	N909202-04		7221-004

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SAMPLE DELIVERY GROUP H0548

SDG 7221  
 Contact Kevin C. Johnson

PREP BATCH SUMMARY

Client Hanford  
 Contract TRB-SBB-207925  
 Case no SDG H0548

TEST	MATRIX	METHOD	PREPARATION ERROR			PLANCHETS ANALYZED			QUALI- FIERS
			BATCH	2σ %	CLIENT MORE	RE	BLANK	LCS	
Alpha Spectroscopy									
AM	WATER	Americium 241 in Water	6904-042	5.0	1		1	1	1/1
PU	WATER	Plutonium, Isotopic in Water	6904-042	5.0	1		1	1	1/1
U	WATER	Uranium, Isotopic in Water	6904-042	5.0	1		1	1	1/1
Beta Counting									
SR	WATER	Total Strontium in Water	6904-042	10.0	1		1	1	1/1
TC	WATER	Technetium 99 in Water	6904-042	10.0	1		1	1	1/1
Gamma Scan									
GAM	WATER	Gamma Emitters	6904-042	15.0	1		1	1	1/1 X
Liquid Scintillation Counting									
C	WATER	Carbon 14 in Water	6904-042	10.0	1		1	1	1/1
H	WATER	Tritium in Water	6904-042	10.0	1		1	1	1/1
NI_L	WATER	Nickel-63 in Liquid	6904-042	10.0	1		1	1	1/1

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

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TMA/RICHMOND

SAMPLE DELIVERY GROUP H0548

SDG 7221  
 Contact Kevin C. Johnson

Client Hanford  
 Contract TRB-SBB-207925  
 Case no SDG H0548

WORK SUMMARY

CLIENT SAMPLE ID	MATRIX	LAB SAMPLE ID	COLLECTED	PLANCHET	TEST	SUF-	ANALYZED	REVIEWED	BY	METHOD
LOCATION			RECEIVED			FIX				
CUSTODY	SAF No									
B0WCK9		N909202-01	7221-001		AM		10/16/99	10/26/99	NJV	Americium 241 in Water
105 DR		WATER	09/27/99	7221-001	C		10/19/99	10/26/99	NJV	Carbon 14 in Water
B99-082-4	B99-082		09/29/99	7221-001	GAM		10/18/99	10/26/99	NJV	Gamma Emitters
				7221-001	H		10/12/99	10/20/99	NJV	Tritium in Water
				7221-001	NI_L		10/15/99	10/20/99	NJV	Nickel-63 in Liquid
				7221-001	PU		10/19/99	10/20/99	NJV	Plutonium, Isotopic in Water
				7221-001	SR		10/15/99	10/20/99	NJV	Total Strontium in Water
				7221-001	TC		10/19/99	10/20/99	NJV	Technetium 99 in Water
				7221-001	U		10/14/99	10/20/99	NJV	Uranium, Isotopic in Water
Method Blank		N909202-03	7221-003		AM		10/16/99	10/26/99	NJV	Americium 241 in Water
		WATER		7221-003	C		10/19/99	10/26/99	NJV	Carbon 14 in Water
	B99-082			7221-003	GAM		10/16/99	10/26/99	NJV	Gamma Emitters
				7221-003	H		10/12/99	10/26/99	NJV	Tritium in Water
				7221-003	NI_L		10/15/99	10/20/99	NJV	Nickel-63 in Liquid
				7221-003	PU		10/19/99	10/20/99	NJV	Plutonium, Isotopic in Water
				7221-003	SR		10/15/99	10/20/99	NJV	Total Strontium in Water
				7221-003	TC		10/19/99	10/20/99	NJV	Technetium 99 in Water
				7221-003	U		10/14/99	10/20/99	NJV	Uranium, Isotopic in Water
Lab Control Sample		N909202-02	7221-002		AM		10/16/99	10/26/99	NJV	Americium 241 in Water
		WATER		7221-002	C		10/19/99	10/26/99	NJV	Carbon 14 in Water
	B99-082			7221-002	GAM		10/22/99	10/26/99	NJV	Gamma Emitters
				7221-002	H		10/12/99	10/20/99	NJV	Tritium in Water
				7221-002	NI_L		10/15/99	10/20/99	NJV	Nickel-63 in Liquid
				7221-002	PU		10/19/99	10/20/99	NJV	Plutonium, Isotopic in Water
				7221-002	SR		10/15/99	10/20/99	NJV	Total Strontium in Water
				7221-002	TC		10/18/99	10/20/99	NJV	Technetium 99 in Water
				7221-002	U		10/14/99	10/20/99	NJV	Uranium, Isotopic in Water
Duplicate (N909202-01)		N909202-04	7221-004		AM		10/17/99	10/26/99	NJV	Americium 241 in Water
105 DR		WATER	09/27/99	7221-004	C		10/20/99	10/26/99	NJV	Carbon 14 in Water
	B99-082		09/29/99	7221-004	GAM		10/22/99	10/26/99	NJV	Gamma Emitters
				7221-004	H		10/13/99	10/20/99	NJV	Tritium in Water
				7221-004	NI_L		10/15/99	10/20/99	NJV	Nickel-63 in Liquid
				7221-004	PU		10/19/99	10/20/99	NJV	Plutonium, Isotopic in Water
				7221-004	SR		10/15/99	10/20/99	NJV	Total Strontium in Water
				7221-004	TC		10/20/99	10/20/99	NJV	Technetium 99 in Water
				7221-004	U		10/14/99	10/20/99	NJV	Uranium, Isotopic in Water

WORK SUMMARY

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 Form DVD-CWS  
 Version 3.06  
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TMA/RICHMOND

SAMPLE DELIVERY GROUP H0548

WORK SUMMARY, cont.

SDG 7221  
 Contact Kevin C. Johnson

Client Hanford  
 Contract TRB-SBB-207925  
 Case no SDG H0548

COUNTS OF TESTS BY SAMPLE TYPE

TEST	SAF No	METHOD	REFERENCE	CLIENT	MORE	RE	BLANK	LCS	DUP	SPIKE	TOTAL
AM	B99-082	Americium 241 in Water	AM/CMPLATE	1			1	1	1		4
C	B99-082	Carbon 14 in Water	C14CHEMLSC	1			1	1	1		4
GAM	B99-082	Gamma Emitters	GAMMAHI	1			1	1	1		4
H	B99-082	Tritium in Water	EPA906.0	1			1	1	1		4
NI_L	B99-082	Nickel-63 in Liquid	NI63LSC	1			1	1	1		4
PU	B99-082	Plutonium, Isotopic in Water	PUPLATE	1			1	1	1		4
SR	B99-082	Total Strontium in Water	SRTOTAL	1			1	1	1		4
TC	B99-082	Technetium 99 in Water	TC99TRLSC	1			1	1	1		4
U	B99-082	Uranium, Isotopic in Water	UPLATE	1			1	1	1		4
TOTALS				9			9	9	9		36

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**TMA / RICHMOND**  
**SAMPLE DELIVERY GROUP H0548**

N909202-03

Method Blank

**METHOD BLANK**

SDG <u>7221</u>	Client/Case no <u>Hanford</u>	SDG <u>H0548</u>
Contact <u>Kevin C. Johnson</u>	Contract <u>TRB-SBB-207925</u>	
Lab sample id <u>N909202-03</u>	Client sample id <u>Method Blank</u>	
Dept sample id <u>7221-003</u>	Material/Matrix <u>WATER</u>	
	SAF No <u>B99-082</u>	

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Tritium	10028-17-8	17.0	110	190	400	U	H
Carbon 14	14762-75-5	-2.76	10	17		U	C
Technetium 99	14133-76-7	<u>33.3</u>	5.2	11	15		TC
Uranium 233/234	U-233/234	0	0.032	0.12	1.0	U	U
Uranium 235	15117-96-1	0.019	0.039	0.15	1.0	U	U
Uranium 238	U-238	0.016	0.032	0.12	1.0	U	U
Plutonium 238	13981-16-3	-0.004	0.009	0.034	1.0	U	PU
Plutonium 239/240	PU-239/240	-0.004	0.018	0.042	1.0	U	PU
Nickel 63	13981-37-8	-1.23	2.1	3.7		U	NI_L
Americium 241	14596-10-2	0.043	0.047	0.066		U	AM
Total Strontium	SR-RAD	-0.147	0.30	0.43	2.0	U	SR
Potassium 40	13966-00-2	U		460		U	GAM
Barium 133	13981-41-4	U		8.2		UX	GAM
Cobalt 60	10198-40-0	U		18	25	U	GAM
Cesium 137	10045-97-3	U		15	15	U	GAM
Europium 152	14683-23-9	U		41	50	U	GAM
Europium 154	15585-10-1	U		<u>58</u>	50	U	GAM
Europium 155	14391-16-3	U		<u>56</u>	50	U	GAM
Radium 226	13982-63-3	U		32		U	GAM
Radium 228	15262-20-1	U		70		U	GAM
Thorium 228	14274-82-9	U		26		U	GAM
Thorium 232	TH-232	U		70		U	GAM
Americium 241	14596-10-2	U		140		U	GAM
Uranium 238	U-238	U		2200		U	GAM
Uranium 235	15117-96-1	U		71		U	GAM

105-DR FSB-QC Sample Analysis

QC-BLANK 32000

**METHOD BLANKS**  
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Lab id TMANC  
Protocol Hanford  
Version Ver 1.0  
Form DVD-DS  
Version 3.06  
Report date 10/26/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0548

N909202-02

Lab Control Sample

LAB CONTROL SAMPLE

SDG <u>7221</u>	Client/Case no <u>Hanford</u>	SDG <u>H0548</u>
Contact <u>Kevin C. Johnson</u>	Case no <u>TRB-SBB-207925</u>	
Lab sample id <u>N909202-02</u>	Client sample id <u>Lab Control Sample</u>	
Dept sample id <u>7221-002</u>	Material/Matrix <u>WATER</u>	
	SAF No <u>B99-082</u>	

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
Tritium	8870	310	190	400		H	8450	340	105	82-118	80-120
Carbon 14	5000	52	23			C	5120	200	98	84-116	
Technetium 99	1160	37	11	15	B	TC	1130	45	103	83-117	80-120
Uranium 233/234	10.9	0.57	0.25	1.0		U	11.1	0.44	98	88-112	80-120
Uranium 235	9.12	0.51	0.031	1.0		U	9.06	0.36	101	87-113	80-120
Uranium 238	11.7	0.60	0.24	1.0		U	12.1	0.48	97	88-112	80-120
Plutonium 238	11.6	0.89	0.050	1.0		PU	12.5	0.50	93	86-114	80-120
Plutonium 239/240	12.0	0.92	0.050	1.0		PU	13.2	0.53	91	86-114	80-120
Nickel 63	157	4.7	2.8			NI_L	161	6.4	98	84-116	
Americium 241	8.89	0.65	0.055			AM	9.58	0.38	93	86-114	
Total Strontium	30.8	1.2	0.47	2.0		SR	27.2	1.1	113	81-119	
Cobalt 60	543	48	24	25		GAM	520	21	104	72-128	80-120
Cesium 137	484	40	<u>34</u>	15		GAM	464	19	104	73-127	80-120

105-DR FSB-QC Sample Analysis

QC-LCS 31999

Lab id <u>TMANC</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-LCS</u>
Version <u>3.06</u>
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TMA/RICHMOND

SAMPLE DELIVERY GROUP H0548

N909202-04

BOWCK9

DUPLICATE

SDG <u>7221</u>	Client/Case no <u>Hanford</u>	<u>SDG H0548</u>
Contact <u>Kevin C. Johnson</u>	Case no <u>TRB-SBB-207925</u>	
DUPLICATE	ORIGINAL	
Lab sample id <u>N909202-04</u>	Lab sample id <u>N909202-01</u>	Client sample id <u>BOWCK9</u>
Dept sample id <u>7221-004</u>	Dept sample id <u>7221-001</u>	Location/Matrix <u>105_DR</u> <u>WATER</u>
	Received <u>09/29/99</u>	Collected <u>09/27/99 11:07</u>
		Custody/SAF No <u>B99-082-4</u> <u>B99-082</u>

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
Tritium	60.2	120	200	400	U	H	116	110	190	U	-		
Carbon 14	5.77	10	17		U	C	-0.422	10	17	U	-		
Technetium 99	55.4	8.1	13	15	B	TC	73.1	12	12	B	28	40	
Uranium 233/234	-0.015	0.030	0.11	1.0	U	U	0	0.033	0.13	U	-		
Uranium 235	0	0.036	0.14	1.0	U	U	0	0.040	0.15	U	-		
Uranium 238	0	0.030	0.11	1.0	U	U	-0.017	0.033	0.13	U	-		
Plutonium 238	0.009	0.018	0.043	1.0	U	PU	0	0.017	0.047	U	-		
Plutonium 239/240	0.004	0.018	0.043	1.0	U	PU	0.021	0.026	0.032	U	-		
Nickel 63	-1.52	2.1	3.7		U	NI_L	-1.99	1.5	2.6	U	-		
Americium 241	0.006	0.018	0.028		U	AM	0.129	0.052	0.053		182	123	
Total Strontium	-0.027	0.32	0.44	2.0	U	SR	-0.043	0.30	0.42	U	-		
Potassium 40	U		100		U	GAM	U		140	U	-		
Barium 133	U		7.6		UX	GAM	U		8.3	UX	-		
Cobalt 60	U		9.3	25	U	GAM	U		7.8	U	-		
Cesium 137	U		6.9	15	U	GAM	U		7.7	U	-		
Europium 152	U		21	50	U	GAM	U		20	U	-		
Europium 154	U		24	50	U	GAM	U		24	U	-		
Europium 155	U		16	50	U	GAM	U		26	U	-		
Radium 226	U		16		U	GAM	U		14	U	-		
Radium 228	U		32		U	GAM	U		34	U	-		
Thorium 228	U		13		U	GAM	U		12	U	-		
Thorium 232	U		32		U	GAM	U		34	U	-		
Americium 241	U		18		U	GAM	U		64	U	-		
Uranium 238	U		1000		U	GAM	U		910	U	-		
Uranium 235	U		29		U	GAM	U		33	U	-		

105-DR FSB-QC Sample Analysis

DUPLICATES

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Version <u>3.06</u>
Report date <u>10/26/99</u>

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0548

N909202-04

B0WCK9

DUPLICATE, cont.

SDG <u>7221</u>		Client/Case no <u>Hanford</u>	<u>SDG H0548</u>
Contact <u>Kevin C. Johnson</u>		Case no <u>TRB-SBB-207925</u>	
<b>DUPLICATE</b>	<b>ORIGINAL</b>		
Lab sample id <u>N909202-04</u>	Lab sample id <u>N909202-01</u>	Client sample id <u>B0WCK9</u>	
Dept sample id <u>7221-004</u>	Dept sample id <u>7221-001</u>	Location/Matrix <u>105 DR</u>	<u>WATER</u>
	Received <u>09/29/99</u>	Collected <u>09/27/99 11:07</u>	
		Custody/SAF No <u>B99-082-4</u>	<u>B99-082</u>

QC-DUP#1 32001

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Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DUP</u>
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Report date <u>10/26/99</u>

**TMA / RICHMOND**  
**SAMPLE DELIVERY GROUP H0548**

N909202-01

BOWCK9

**DATA SHEET**

SDG <u>7221</u>	Client/Case no <u>Hanford</u>	SDG <u>H0548</u>
Contact <u>Kevin C. Johnson</u>	Contract <u>TRB-SBB-207925</u>	
Lab sample id <u>N909202-01</u>	Client sample id <u>BOWCK9</u>	
Dept sample id <u>7221-001</u>	Location/Matrix <u>105 DR</u>	<u>WATER</u>
Received <u>09/29/99</u>	Collected <u>09/27/99 11:07</u>	
	Custody/SAF No <u>B99-082-4</u>	<u>B99-082</u>

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Tritium	10028-17-8	116	110	190	400	U	H
Carbon 14	14762-75-5	-0.422	10	17		U	C
Technetium 99	14133-76-7	73.1	12	12	15	B	TC
Uranium 233/234	U-233/234	0	0.033	0.13	1.0	U	U
Uranium 235	15117-96-1	0	0.040	0.15	1.0	U	U
Uranium 238	U-238	-0.017	0.033	0.13	1.0	U	U
Plutonium 238	13981-16-3	0	0.017	0.047	1.0	U	PU
Plutonium 239/240	PU-239/240	0.021	0.026	0.032	1.0	U	PU
Nickel 63	13981-37-8	-1.99	1.5	2.6		U	NI_L
Americium 241	14596-10-2	0.129	0.052	0.053			AM
Total Strontium	SR-RAD	-0.043	0.30	0.42	2.0	U	SR
Potassium 40	13966-00-2	U		140		U	GAM
Barium 133	13981-41-4	U		8.3		UX	GAM
Cobalt 60	10198-40-0	U		7.8	25	U	GAM
Cesium 137	10045-97-3	U		7.7	15	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		26	50	U	GAM
Radium 226	13982-63-3	U		14		U	GAM
Radium 228	15262-20-1	U		34		U	GAM
Thorium 228	14274-82-9	U		12		U	GAM
Thorium 232	TH-232	U		34		U	GAM
Americium 241	14596-10-2	U		64		U	GAM
Uranium 238	U-238	U		910		U	GAM
Uranium 235	15117-96-1	U		33		U	GAM

105-DR FSB-QC Sample Analysis

**DATA SHEETS**

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**SUMMARY DATA SECTION**

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Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
Report date <u>10/26/99</u>

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0548

METHOD SUMMARY

AMERICIUM 241 IN WATER  
ALPHA SPECTROSCOPY

Test AM Matrix WATER  
SDG 7221  
Contact Kevin C. Johnson

Client Hanford  
Contract TRB-SBB-207925  
Case no SDG H0548

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	PLANCHET	Americium
------------------	---------------	----------	----------	----------	-----------

Preparation batch 6904-042

BOWCK9	N909202-01	7221-001			0.129
BLK (QC ID=32000)	N909202-03	7221-003			U
LCS (QC ID=31999)	N909202-02	7221-002			ok
Duplicate (N909202-01)	N909202-04	7221-004			<u>OUT</u> U

Nominal values and limits from method RDLs (pCi/L)  
105-DR FSB-QC Sample Analysis

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 6904-042 2σ prep error 5.0 % Reference Lab Notebook 6904 pg. 042

BOWCK9	N909202-01			0.053	0.500			73	736				19	10/15/99	10/16	SS-027
BLK (QC ID=32000)	N909202-03			0.066	0.500			79	736					10/15/99	10/16	SS-029
LCS (QC ID=31999)	N909202-02			0.055	0.500			84	721					10/15/99	10/16	SS-050
Duplicate (N909202-01)	N909202-04			0.028	0.500			75	1004				20	10/15/99	10/17	SS-006
	(QC ID=32001)															

Nominal values and limits from method 0.500 20-105 700 100 180

PROCEDURES	REFERENCE	AM/CMPLATE
EP-040	Environmental Water Dissolution, rev 1	
EP-940	Plutonium Purification, rev 0	
EP-960	Americium-Curium Purification, rev 0	
EP-008	Heavy Elements Electroplating, rev 0	

AVERAGES ± 2 SD	MDA	0.050 ± 0.032
FOR 4 SAMPLES	YIELD	78 ± 10

METHOD SUMMARIES

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Lab id TMANC  
Protocol Hanford  
Version Ver 1.0  
Form DVD-CMS  
Version 3.06  
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TMA/RICHMOND

SAMPLE DELIVERY GROUP H0548

METHOD SUMMARY

PLUTONIUM, ISOTOPIC IN WATER

ALPHA SPECTROSCOPY

Test PU Matrix WATER  
 SDG 7221  
 Contact Kevin C. Johnson

Client Hanford  
 Contract TRB-SBB-207925  
 Case no SDG H0548

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	Plutonium 238	Plutonium 239/240
------------------	---------------	----------	----------	---------------	-------------------

Preparation batch 6904-042

BOWCK9	N909202-01	7221-001		U	U
BLK (QC ID=32000)	N909202-03	7221-003		U	U
LCS (QC ID=31999)	N909202-02	7221-002		ok	ok
Duplicate (N909202-01)	N909202-04	7221-004		- U	- U

Nominal values and limits from method RDLs (pCi/L) 1.0 1.0  
 105-DR FSB-QC Sample Analysis

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	ANAL- PREPARED	YZED	DETECTOR
------------------	---------------	----------	----------	---------------	--------	----------	------------	---------	-------	-----------	----------	-----------	-----------	----------------	------	----------

Preparation batch 6904-042 2σ prep error 5.0 % Reference Lab Notebook 6904 pg. 042

BOWCK9	N909202-01			0.047	0.500			77	740				22	10/18/99	10/19	SS-013
BLK (QC ID=32000)	N909202-03			0.042	0.500			76	740					10/18/99	10/19	SS-015
LCS (QC ID=31999)	N909202-02			0.050	0.500			78	740					10/18/99	10/19	SS-014
Duplicate (N909202-01) (QC ID=32001)	N909202-04			0.043	0.500			73	740				22	10/18/99	10/19	SS-016

Nominal values and limits from method 1.0 0.500 20-105 700 100 180

PROCEDURES	REFERENCE	PUPLATE
EP-040	Environmental Water Dissolution, rev 1	
EP-940	Plutonium Purification, rev 0	
EP-008	Heavy Elements Electroplating, rev 0	

AVERAGES ± 2 SD	MDA <u>0.046</u> ± <u>0.007</u>
FOR 4 SAMPLES	YIELD <u>76</u> ± <u>4</u>

METHOD SUMMARIES

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TMA/RICHMOND

SAMPLE DELIVERY GROUP H0548

METHOD SUMMARY

URANIUM, ISOTOPIC IN WATER

ALPHA SPECTROSCOPY

Test U Matrix WATER  
SDG 7221  
Contact Kevin C. Johnson

Client Hanford  
Contract TRB-SBB-207925  
Case no SDG H0548

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	PLANCHET	1: Uranium		2: Uranium		3: Uranium		RESULT RATIOS (%)				
					233/234		235		238		1+3	2σ	2+3	2σ	
Preparation batch 6904-042															
BOWCK9	N909202-01			7221-001	U		U		U						
BLK (QC ID=32000)	N909202-03			7221-003	U		U		U						
LCS (QC ID=31999)	N909202-02			7221-002	ok		ok		ok						
Duplicate (N909202-01)	N909202-04			7221-004	-	U	-	U	-	U					
Nominal values and limits from method				RDLs (pCi/L)	1.0		1.0		1.0		100		4		
105-DR FSB-QC Sample Analysis											Averages				

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	ANAL- YZED	DETECTOR	
																2σ prep error 5.0 %
Preparation batch 6904-042																
BOWCK9	N909202-01			0.15	0.500			86		160			17	10/13/99	10/14 SS-032	
BLK (QC ID=32000)	N909202-03			0.15	0.500			92		160				10/13/99	10/14 SS-033	
LCS (QC ID=31999)	N909202-02			0.25	0.500			102		705				10/13/99	10/14 SS-035	
Duplicate (N909202-01)	N909202-04			0.14	0.500			99		160				17	10/13/99 10/14 SS-034	
(QC ID=32001)																
Nominal values and limits from method				1.0	0.500			30-105		150	100		180			

PROCEDURES	REFERENCE	UPLATE
EP-040		Environmental Water Dissolution, rev 1
EP-910		Uranium Purification, rev 0
EP-008		Heavy Elements Electroplating, rev 0

AVERAGES ± 2 SD MDA 0.17 ± 0.10  
FOR 4 SAMPLES YIELD 95 ± 14

METHOD SUMMARIES

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TMA/RICHMOND

SAMPLE DELIVERY GROUP H0548

METHOD SUMMARY

TOTAL STRONTIUM IN WATER

BETA COUNTING

Test SR Matrix WATER

SDG 7221

Contact Kevin C. Johnson

Client Hanford

Contract TRB-SBB-207925

Case no SDG H0548

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	PLANCHET	Total Strontium
Preparation batch 6904-042					
B0WCK9	N909202-01	7221-001			U
BLK (QC ID=32000)	N909202-03	7221-003			U
LCS (QC ID=31999)	N909202-02	7221-002			ok
Duplicate (N909202-01)	N909202-04	7221-004			- U

Nominal values and limits from method RDLs (pCi/L) 2.0

105-DR FSB-QC Sample Analysis

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 6904-042 2σ prep error 10.0 % Reference Lab Notebook 6904 pg. 042																
B0WCK9	N909202-01			0.42	0.500			75		400			18	10/15/99	10/15	GRB-217
BLK (QC ID=32000)	N909202-03			0.43	0.500			73		400				10/15/99	10/15	GRB-219
LCS (QC ID=31999)	N909202-02			0.47	0.500			76		400				10/15/99	10/15	GRB-218
Duplicate (N909202-01)	N909202-04			0.44	0.500			71		400			18	10/15/99	10/15	GRB-220
	(QC ID=32001)															

Nominal values and limits from method

2.0 0.500

100

180

PROCEDURES	REFERENCE	SRTOTAL
EP-040	Environmental Water Dissolution, rev 1	
EP-500	Strontium-89,90 - Purification, rev 0	
EP-519	Strontium-89,90 Planchet Demounting and Yttrium Purification, rev 0	

AVERAGES ± 2 SD MDA 0.44 ± 0.043  
FOR 4 SAMPLES YIELD 74 ± 4

METHOD SUMMARIES

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Protocol Hanford

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TMA/RICHMOND  
 SAMPLE DELIVERY GROUP H0548

METHOD SUMMARY  
 TECHNETIUM 99 IN WATER  
 BETA COUNTING

Test TC Matrix WATER  
 SDG 7221  
 Contact Kevin C. Johnson

Client Hanford  
 Contract TRB-SBB-207925  
 Case no SDG H0548

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	Technetium PLANCHET	99
Preparation batch 6904-042					
BOWCK9	N909202-01			7221-001	73.1
BLK (QC ID=32000)	N909202-03			7221-003	<u>33.3</u>
LCS (QC ID=31999)	N909202-02			7221-002	ok
Duplicate (N909202-01)	N909202-04			7221-004	ok
Nominal values and limits from method					
105-DR FSB-QC Sample Analysis				RDLs (pCi/L)	15

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	ANAL- PREPARED	YZED	DETECTOR
Preparation batch 6904-042 2σ prep error 10.0 % Reference Lab Notebook 6904 pg. 042																
BOWCK9	N909202-01			12	0.0500			60	101				22	10/13/99	10/19	GRB-202
BLK (QC ID=32000)	N909202-03			11	0.0500			60	101					10/13/99	10/19	GRB-203
LCS (QC ID=31999)	N909202-02			11	0.0500			64	101					10/13/99	10/18	GRB-202
Duplicate (N909202-01)	N909202-04			13	0.0500			54	101				23	10/13/99	10/20	GRB-228
(QC ID=32001)																
Nominal values and limits from method				15	0.0500			20-105	50		180					

PROCEDURES REFERENCE TC99TRLSC  
 EP-020 Sample Leach For Technetium-99, rev 0  
 EP-540 Technetium-99 Purification, rev 0

AVERAGES ± 2 SD MDA 12 ± 1.9  
 FOR 4 SAMPLES YIELD 60 ± 8

Lab id TMANC  
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TMA/RICHMOND

SAMPLE DELIVERY GROUP H0548

METHOD SUMMARY

GAMMA EMITTERS  
GAMMA SCAN

Test GAM Matrix WATER  
SDG 7221  
Contact Kevin C. Johnson

Client Hanford  
Contract TRB-SBB-207925  
Case no SDG H0548

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	PLANCHET	Cobalt 60	Cesium 137
Preparation batch 6904-042						
BOWCK9	N909202-01			7221-001	U	U
BLK (QC ID=32000)	N909202-03			7221-003	U	U
LCS (QC ID=31999)	N909202-02			7221-002	ok	ok
Duplicate (N909202-01)	N909202-04			7221-004	- U	- U

Nominal values and limits from method RDLs (pCi/L) 25 15  
105-DR FSB-QC Sample Analysis

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	ANAL- PREPARED	YZED	DETECTOR
Preparation batch 6904-042 2σ prep error 15.0 % Reference Lab Notebook 6904 pg. 042																
BOWCK9	N909202-01			7.7	0.500					919			21	10/01/99	10/18	MB,05,00
BLK (QC ID=32000)	N909202-03			15	0.500					<u>201</u>				10/01/99	10/16	MB,05,00
LCS (QC ID=31999)	N909202-02			<u>34</u>	0.500					<u>291</u>				10/01/99	10/22	01,03,00
Duplicate (N909202-01) (QC ID=32001)	N909202-04			6.9	0.500					<u>291</u>			25	10/01/99	10/22	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 MDA 16 ± 25  
FOR 4 SAMPLES YIELD \_\_\_\_\_ ± \_\_\_\_\_

METHOD SUMMARIES

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SUMMARY DATA SECTION

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TMA/RICHMOND

SAMPLE DELIVERY GROUP H0548

METHOD SUMMARY

CARBON 14 IN WATER

LIQUID SCINTILLATION COUNTING

Test C Matrix WATER  
SDG 7221  
Contact Kevin C. Johnson

Client Hanford  
Contract TRB-SBB-207925  
Case no SDG H0548

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Carbon 14
------------------	---------------	--------------	---------------	-----------

Preparation batch 6904-042

BOWCK9	N909202-01	7221-001		U
BLK (QC ID=32009)	N909202-03	7221-003		U
LCS (QC ID=31999)	N909202-02	7221-002		ok
Duplicate (N909202-01)	N909202-04	7221-004		- U

Nominal values and limits from method RDLs (pCi/L)

105-DR FSB-QC Sample Analysis

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- TEST FIX	MDA pCi/L	ALIQ L	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
------------------	---------------	--------------	---------------	-----------	--------	----------	------------	---------	-------	-----------	----------	-----------	-----------	----------------	------	----------

Preparation batch 6904-042 2σ prep error 10.0 % Reference Lab Notebook 6904 pg. 042

BOWCK9	N909202-01			17	0.0500			100	200				22	10/19/99	10/19	LSC-004
BLK (QC ID=32009)	N909202-03			17	0.0500			100	200					10/19/99	10/19	LSC-004
LCS (QC ID=31999)	N909202-02			23	0.0500			100	105					10/19/99	10/19	LSC-004
Duplicate (N909202-01) (QC ID=32001)	N909202-04			17	0.0500			100	200				23	10/19/99	10/20	LSC-004

Nominal values and limits from method

0.0500

150

180

PROCEDURES REFERENCE C14CHEMLSC  
EP-240 Carbon-14 in Aqueous Solutions, rev 0

AVERAGES ± 2 SD MDA 18 ± 6.0  
FOR 4 SAMPLES YIELD 100 ± 0

METHOD SUMMARIES

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TMA/RICHMOND

SAMPLE DELIVERY GROUP H0548

METHOD SUMMARY

TRITIUM IN WATER

LIQUID SCINTILLATION COUNTING

Test H Matrix WATER  
 SDG 7221  
 Contact Kevin C. Johnson

Client Hanford  
 Contract TRB-SBB-207925  
 Case no SDG H0548

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Tritium
Preparation batch 6904-042				
BOWCK9	N909202-01		7221-001	U
BLK (QC ID=32000)	N909202-03		7221-003	U
LCS (QC ID=31999)	N909202-02		7221-002	ok
Duplicate (N909202-01)	N909202-04		7221-004	- U

Nominal values and limits from method RDLs (pCi/L) 400  
 105-DR FSB-QC Sample Analysis

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/L	MDA	ALIQ L	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
Preparation batch 6904-042 2σ prep error 10.0 % Reference Lab Notebook 6904 pg. 042																
BOWCK9	N909202-01		190	0.0100				100	100			15	10/12/99	10/12		LSC-005
BLK (QC ID=32000)	N909202-03		190	0.0100				100	100				10/12/99	10/12		LSC-005
LCS (QC ID=31999)	N909202-02		190	0.0100				100	100				10/12/99	10/12		LSC-005
Duplicate (N909202-01)	N909202-04		200	0.0100				100	100			16	10/12/99	10/13		LSC-005
	(QC ID=32001)															
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 MDA 190 ± 10  
 FOR 4 SAMPLES YIELD 100 ± 0

METHOD SUMMARIES

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TMA/RICHMOND

SAMPLE DELIVERY GROUP H0548

METHOD SUMMARY

NICKEL-63 IN LIQUID  
LIQUID SCINTILLATION COUNTING

Test NI L Matrix WATER

SDG 7221

Contact Kevin C. Johnson

Client Hanford

Contract TRB-SBB-207925

Case no SDG H0548

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	PLANCHET	Nickel 63
------------------	---------------	----------	----------	----------	-----------

Preparation batch 6904-042

BOWCK9	N909202-01	7221-001			U
BLK (QC ID=32000)	N909202-03	7221-003			U
LCS (QC ID=31999)	N909202-02	7221-002			ok
Duplicate (N909202-01)	N909202-04	7221-004			- U

Nominal values and limits from method RDLs (pCi/L)

105-DR FSB-QC Sample Analysis

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	ANAL- PREPARED	YZED	DETECTOR
------------------	---------------	----------	----------	-----------	--------	----------	------------	---------	-------	-----------	----------	-----------	-----------	----------------	------	----------

Preparation batch 6904-042 2σ prep error 10.0 % Reference Lab Notebook 6904 pg. 042

BOWCK9	N909202-01			2.6	0.500			70	100				18	10/15/99	10/15	LSC-005
BLK (QC ID=32000)	N909202-03			3.7	0.500			51	100					10/15/99	10/15	LSC-005
LCS (QC ID=31999)	N909202-02			2.8	0.500			64	100					10/15/99	10/15	LSC-005
Duplicate (N909202-01)	N909202-04			3.7	0.500			52	100				18	10/15/99	10/15	LSC-005

(QC ID=32001)

Nominal values and limits from method 0.500 25 180

PROCEDURES	REFERENCE	NI63LSC
RP-070		Sample Dissolution - HF Method, rev 0
RP-431		Nickel-63 Purification, rev 0

AVERAGES ± 2 SD	MDA	3.2	±	1.2
FOR 4 SAMPLES	YIELD	59	±	19

METHOD SUMMARIES

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SDG 7221  
Contact Kevin C. Johnson

REPORT GUIDE

Client Hanford  
Contract TRB-SBB-207925  
Case no SDG H0548

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.

TMA / RICHMOND  
SAMPLE DELIVERY GROUP H0548

SDG 7221  
Contact Kevin C. Johnson

REPORT GUIDE

Client Hanford  
Contract TRB-SBB-207925  
Case no SDG H0548

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.

REPORT GUIDES

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SUMMARY DATA SECTION

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Lab id TMANC  
Protocol Hanford  
Version Ver 1.0  
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Version 3.06  
Report date 10/26/99

TMA / RICHMOND  
SAMPLE DELIVERY GROUP H0548

SDG 7221  
Contact Kevin C. Johnson

REPORT GUIDE

Client Hanford  
Contract TRB-SBB-207925  
Case no SDG H0548

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.

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REPORT GUIDE

Client Hanford  
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Case no SDG\_H0548

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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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.

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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.

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LAB CONTROL SAMPLE

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.

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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.

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DUPLICATE

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.

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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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MATRIX SPIKE

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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METHOD SUMMARY

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.
- \* Preparation 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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METHOD SUMMARY

- \* 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

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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.

## CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

B99-082-4

Page 1 of 1

Collector Bob Fahlberg	Company Contact Jason Adler	Telephone No. 373-4316	Project Coordinator TRENT, SJ	Price Code <b>7L</b>	Data Turnaround <b>21 Days</b>
Project Designation 105-DR FSB - QC Sample Analysis		Sampling Location 105 DR	SAF No. B99-082		
Ice Chest No. <b>SML 457</b>	Field Logbook No. EL-1281		Method of Shipment <b>Fed Ex</b>		
Shipped To TMA/RECRA <b>RF 9-27-99</b>		Offsite Property No. <b>A99 0280</b>		Bill of Lading/Air Bill No. <b>4235 7952-9918</b>	

COA **R105D42800**

POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	None	None	HNO3 to pH <2	HCl to pH <2	HNO3 to pH <2	Cool 4C	HNO3 to pH <2			
		Type of Container	P	P	aG	P	P	aG	P		
Special Handling and/or Storage	No. of Container(s)	1	1	1	1	1	3	5			
	Volume	120mL	120mL	500mL	500mL	500mL	1000mL	1L			

SAMPLE ANALYSIS				Carbon-14	Tritium -113	Mercury - 2470 - (CV)	Technetium-99	ICP Metals - 6010A (Add-on) (Lead)	PCBs - 8080	See item (1) in Special Instructions			
Sample No.	Matrix *	Sample Date	Sample Time										

B0WCK9	Water	9-27-99	1107	X	X	X	X	X	X	X	X	X	X

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS	Matrix *
Relinquished By <i>RF Fahlberg</i>	Date/Time 9-27-99 1150	Received By <i>R. Nielson</i>	Soil Water Vapor Other Solid Other Liquid
Relinquished By <i>R. Nielson</i>	Date/Time 9/27/99 1357	Received By <i>REC #1A</i>	
Relinquished By <i>REC #1A</i>	Date/Time 9/28/99 0950	Received By <i>R. Nielson</i>	
Relinquished By <i>R. Nielson</i>	Date/Time 9/28/99 1330	Received By <i>FEL Ex</i>	

(1) Gamma Spectroscopy (Water) {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Gamma Spec - Add-on {Barium-133} Isotopic Plutonium, Isotopic Uranium, Americium-241, Strontium-89,90 -- Total Sr, Nickel-63

COLLECTOR UNAVAILABLE TO SIGN COA

LABORATORY SECTION	Received By <i>TNU M. Coldebberg</i>	Title <i>9-29-99</i>	Date/Time <i>10:00</i>	Disposal Method	Disposed By	Date/Time
FINAL SAMPLE DISPOSITION						

Thermo NUtech - Richmond

SAMPLE RECEIPT CHECKLIST

SAMPLE RECEIPT

Client: Beehnel Hayford Inc Date/Time received 9-29-99 10:00  
CoC No. B99-082-4  
Container I.D. No. SML-457 Requested TAT (Days) 21 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: 1
- 7. Number of containers per sample: \_\_\_\_\_ (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 M. Goldenberg Date: 9-29-99 Time: 10:00

LOGIN

TNU W.O. No. \_\_\_\_\_ Group No. \_\_\_\_\_ Client W.O. No. \_\_\_\_\_

PROGRAM MANAGER

Sample holding times exceeded? Yes [ ] No [ ]  
Client Notified: Name \_\_\_\_\_ Date/time \_\_\_\_\_

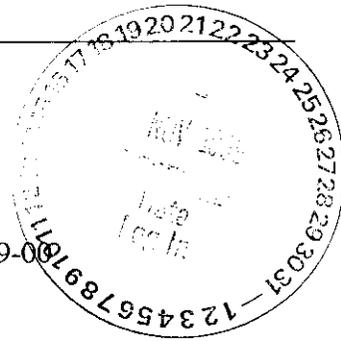


a division of Recra Environmental, Inc.  
Virtual Laboratories Everywhere

**Recra LabNet Philadelphia  
Analytical Report**

**Client :** TNU-HANFORD B99-082  
**RFW# :** 9909L230  
**SDG/SAF# :** H0548/B99-082

**W.O.# :** 10985-001-001-9999-00  
**Date Received:** 09-29-99



**METALS CASE NARRATIVE**

1. This narrative covers the analyses of 1 water sample.
2. The sample was 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).
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) 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 laboratory control limits. Refer to the Inorganics Laboratory Control Standards Report.
10. All matrix spike recoveries were within the 75-125% control limits. Refer to the Inorganics Accuracy Report.
11. The duplicate analysis for 1 analyte was 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 **13** 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.



J. Michael Taylor  
Vice President  
Philadelphia Analytical Laboratory

mld/m09-230

10-20-99

Date



# METALS METHOD GLOSSARY

The following methods are used as reference for the digestion and analysis of samples contained within this

Recra Lot#: 9909L230

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	<u>  </u> 6010B	<u>  </u> 200.7			<u>  </u> 99
Antimony	<u>  </u> 6010B <u>  </u> 7041 <sup>5</sup>	<u>  </u> 200.7 <u>  </u> 204.2			<u>  </u> 99
Arsenic	<u>  </u> 6010B <u>  </u> 7060A <sup>5</sup>	<u>  </u> 200.7 <u>  </u> 206.2	<u>  </u> 3113B		<u>  </u> 99
Barium	<u>  </u> 6010B	<u>  </u> 200.7			<u>  </u> 99
Beryllium	<u>  </u> 6010B	<u>  </u> 200.7			<u>  </u> 99
Bismuth	<u>  </u> 6010B <sup>1</sup>	<u>  </u> 200.7 <sup>1</sup>		<u>  </u> 1620	<u>  </u> 99
Boron	<u>  </u> 6010B	<u>  </u> 200.7			<u>  </u> 99
Cadmium	<u>  </u> 6010B <u>  </u> 7131A <sup>5</sup>	<u>  </u> 200.7 <u>  </u> 213.2			<u>  </u> 99
Calcium	<u>  </u> 6010B	<u>  </u> 200.7			<u>  </u> 99
Chromium	<u>  </u> 6010B <u>  </u> 7191 <sup>5</sup>	<u>  </u> 200.7 <u>  </u> 218.2			<u>  </u> SS17
Cobalt	<u>  </u> 6010B	<u>  </u> 200.7			<u>  </u> 99
Copper	<u>  </u> 6010B <u>  </u> 7211 <sup>5</sup>	<u>  </u> 200.7 <u>  </u> 220.2			<u>  </u> 99
Iron	<u>  </u> 6010B	<u>  </u> 200.7			<u>  </u> 99
Lead	<input checked="" type="checkbox"/> 6010B <u>  </u> 7421 <sup>5</sup>	<u>  </u> 200.7 <u>  </u> 239.2	<u>  </u> 3113B		<u>  </u> 99
Lithium	<u>  </u> 6010B <u>  </u> 7430 <sup>4</sup>	<u>  </u> 200.7		<u>  </u> 1620	<u>  </u> 99
Magnesium	<u>  </u> 6010B	<u>  </u> 200.7			<u>  </u> 99
Manganese	<u>  </u> 6010B	<u>  </u> 200.7			<u>  </u> 99
Mercury	<input checked="" type="checkbox"/> 7470A <sup>3</sup> <u>  </u> 7471A <sup>3</sup>	<u>  </u> 245.1 <sup>2</sup> <u>  </u> 245.5 <sup>2</sup>			<u>  </u> 99
Molybdenum	<u>  </u> 6010B	<u>  </u> 200.7			<u>  </u> 99
Nickel	<u>  </u> 6010B	<u>  </u> 200.7			<u>  </u> 99
Potassium	<u>  </u> 6010B <u>  </u> 7610 <sup>4</sup>	<u>  </u> 200.7 <u>  </u> 258.1 <sup>4</sup>			<u>  </u> 99
Rare Earths	<u>  </u> 6010B <sup>1</sup>	<u>  </u> 200.7 <sup>1</sup>		<u>  </u> 1620	<u>  </u> 99
Selenium	<u>  </u> 6010B <u>  </u> 7740 <sup>5</sup>	<u>  </u> 200.7 <u>  </u> 270.2	<u>  </u> 3113B		<u>  </u> 99
Silicon	<u>  </u> 6010B <sup>1</sup>	<u>  </u> 200.7		<u>  </u> 1620	<u>  </u> 99
Silica	<u>  </u> 6010B	<u>  </u> 200.7		<u>  </u> 1620	<u>  </u> 99
Silver	<u>  </u> 6010B <u>  </u> 7761 <sup>5</sup>	<u>  </u> 200.7 <u>  </u> 272.2			<u>  </u> 99
Sodium	<u>  </u> 6010B <u>  </u> 7770 <sup>4</sup>	<u>  </u> 200.7 <u>  </u> 273.1 <sup>4</sup>			<u>  </u> 99
Strontium	<u>  </u> 6010B	<u>  </u> 200.7			<u>  </u> 99
Thallium	<u>  </u> 6010B <u>  </u> 7841 <sup>5</sup>	<u>  </u> 200.7 <u>  </u> 279.2 <u>  </u> 200.9			<u>  </u> 99
Tin	<u>  </u> 6010B	<u>  </u> 200.7			<u>  </u> 99
Titanium	<u>  </u> 6010B	<u>  </u> 200.7			<u>  </u> 99
Uranium	<u>  </u> 6010B <sup>1</sup>	<u>  </u> 200.7 <sup>1</sup>		<u>  </u> 1620	<u>  </u> 99
Vanadium	<u>  </u> 6010B	<u>  </u> 200.7			<u>  </u> 99
Zinc	<u>  </u> 6010B	<u>  </u> 200.7			<u>  </u> 99
Zirconium	<u>  </u> 6010B <sup>1</sup>	<u>  </u> 200.7 <sup>1</sup>		<u>  </u> 1620	<u>  </u> 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.

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

Recre LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 10/20/99

CLIENT: TNU-HANFORD B99-082

RECRA LOT #: 9909L230

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

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
*****	*****	*****	*****	*****	*****	*****
-001	B0WCK9	Mercury, Total	0.10	u UG/L	0.10	1.0
		Lead, Total	2.1	u UG/L	2.1	1.0

Recra LabNet - Lionville

INORGANICS METHOD BLANK DATA SUMMARY PAGE 10/20/99

CLIENT: TNU-HANFORD B99-082

RECRA LOT #: 9909L230

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

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
*****	*****	*****	*****	*****	*****	*****
BLANK1	99C0296-MB1	Mercury, Total	0.10 u	UG/L	0.10	1.0
BLANK1	99L0682-MB1	Lead, Total	2.1 u	UG/L	2.1	1.0

Recra LabNet - Lionville

INORGANICS ACCURACY REPORT 10/20/99

CLIENT: TNU-HANFORD B99-082

RECRA LOT #: 9909L230

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

SAMPLE	SITE ID	ANALYTE	SPIKED	INITIAL	SPIKED	%RECOV	DILUTION
			SAMPLE	RESULT	AMOUNT		FACTOR (SPK)
-001	BOWCK9	Mercury, Total	0.94	0.10u	1.0	93.8	1.0
		Lead, Total	510	2.1 u	500	102.0	1.0

Recra LabNet - Lionville

INORGANICS PRECISION REPORT 10/20/99

CLIENT: TNU-HANFORD B99-082

RECRA LOT #: 9909L230

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

SAMPLE	SITE ID	ANALYTE	INITIAL			DILUTION
			RESULT	REPLICATE	RPD	
*****	*****	*****	*****	*****	*****	*****
-001REP	BOWCK9	Mercury, Total	0.10u	0.10u	NC	1.0
		Lead, Total	2.1 u	2.3	<del>NC</del> 200 19-10/20/99	1.0

Recra LabNet - Lionville

INORGANICS LABORATORY CONTROL STANDARDS REPORT 10/20/99

CLIENT: TNU-HANFORD B99-082

RECRA LOT #: 9909L230

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

SAMPLE	SITE ID	ANALYTE	SPIKED	SPIKED	UNITS	%RECOV
			SAMPLE	AMOUNT		
*****	*****	*****	*****	*****	*****	*****
LCS1	99C0296-LC1	Mercury, LCS	5.2	5.0	UG/L	104.2
LCS1	99L0682-LC1	Lead, LCS	2470	2500	UG/L	98.9

Recra LabNet - Lionville Laboratory  
 INORGANIC ANALYTICAL DATA PACKAGE FOR  
 TNU-HANFORD B99-082

DATE RECEIVED: 09/29/99

RFW LOT # :9909L230

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
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BOWCK9

MERCURY, TOTAL	001	W	99C0296	09/27/99	10/14/99	10/15/99
MERCURY, TOTAL	001 REP	W	99C0296	09/27/99	10/14/99	10/15/99
MERCURY, TOTAL	001 MS	W	99C0296	09/27/99	10/14/99	10/15/99
LEAD, TOTAL	001	W	99L0682	09/27/99	10/06/99	10/15/99
LEAD, TOTAL	001 REP	W	99L0682	09/27/99	10/06/99	10/15/99
LEAD, TOTAL	001 MS	W	99L0682	09/27/99	10/06/99	10/15/99

LAB QC:

MERCURY LABORATORY	LC1 BS	W	99C0296	N/A	10/14/99	10/15/99
MERCURY, TOTAL	MB1	W	99C0296	N/A	10/14/99	10/15/99
LEAD LABORATORY	LC1 BS	W	99L0682	N/A	10/06/99	10/08/99
LEAD, TOTAL	MB1	W	99L0682	N/A	10/06/99	10/08/99



# CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

B99-082-4

Page 1 of 1

Collector Bob Fahberg	Company Contact Jason Adler	Telephone No. 373-4316	Project Coordinator TRENT, SJ
Project Designation 105-DR FSB - QC Sample Analysis	Sampling Location 105 DR	SAF No. B99-082	
Ice Chest No. SML-153	Field Logbook No. EL-1281	Method of Shipment Federal Express	
Shipped To TMA/RECRA RF 9.22.99	Offsite Property No. A90278	Bill of Lading/Air Bill No. 42357952 9892	
		COA R105 D42800	

POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	None	None	HNO3 to pH <2	HCl to pH <2	HNO3 to pH <2	Cool 4C	HNO3 to pH <2			
	Type of Container	P	P	aG	P	P	aG	P			
	No. of Container(s)	1	1	1	1	1	3	5			
	Special Handling and/or Storage	Volume	120mL	120mL	500mL	500mL	500mL	1000mL	1L		
SAMPLE ANALYSIS	Carbon-14	Tritium - H3	Mercury - 7470 - (CV)	Technetium-99	ICP Metals - 6010A (Add-on) (Lead)	PCBs - 8080	See item (1) in Special instructions.				
Sample No.	Matrix *	Sample Date	Sample Time								
B0WCK9	Water	9.27.99	1107		X		X	X			

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS	Matrix *
Relinquished By 9.27.99 - R. Fahberg	Received By R. Nielsen 9/27/99	(1) Gamma Spectroscopy (Water) (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Barium-133); Isotopic Plutonium; Isotopic Uranium; Americium-241; Strontium-89,90 - Total Sr; Nickel-63 COLLECTOR UNAVAILABLE TO SIGN COC RETURNED SAMPLES: RUN 9/28/99 COLLECTOR UNAVAILABLE TO SIGN COC	Soil Water Vapor Other Solid Other Liquid
Relinquished By R. Nielsen 9/27/99	Received By REF# 1A 9/27/99		
Relinquished By REF# 1A 9/28/99	Received By R. Nielsen 9/28/99		
Relinquished By R. Nielsen 9/28/99	Received By Fed Ex 9/28/99		
LABORATORY SECTION	Received By Fed Ex 9.29.99 0940 - TMurray 9.29.99 0940	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

012

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

B99-082-4

Page 1 of 1

Collector Bob Fahlberg	Company Contact Jason Adler	Telephone No. 373-4316	Project Coordinator TRENT, SJ	Price Code 7L	Data Turnaround 21 Days
Project Designation 105-DR FSB - QC Sample Analysis	Sampling Location 105 DR	Field Logbook No. EL-1281	SAF No. B99-082		
Ice Chest No. SML-457	Offsite Property No. A99 0280	Method of Shipment Fed Ex			
Shipped To TMA/RECR4 RF. 9-27-99	Bill of Lading/Air Bill No. 4235 7952-9918	COA R105D42800			

POSSIBLE SAMPLE HAZARDS/REMARKS

**COPY**

Preservation	None	None	HNO3 to pH <2	HCl to pH <2	HNO3 to pH <2	Cool 4C	HNO3 to pH <2				
Type of Container	P	P	aG	P	P	aG	P				
No. of Container(s)	1	1	1	1	1	3	5				
Special Handling and/or Storage	Volume	120mL	120mL	500mL	500mL	500mL	1000mL	1L			

SAMPLE ANALYSIS

Sample No.	Matrix *	Sample Date	Sample Time	Carbon-14	Tritium - H3	Mercury - 7470 - (CV)	Technetium-99	ICP Metals - 6010A (Add-on) (Lead)	PCBs - 8080	See item (1) in Special Instructions				
B0WCK9	Water	9-27-99	1107	X	X		X			X				

CHAIN OF POSSESSION

Sign/Print Names

Relinquished By RF Fahlberg 9-27-99 1150	Received By R. Nielson 9/27/99 1150
Relinquished By R. Nielson 9/27/99 1357	Received By REC #1A 9/27/99 1337
Relinquished By REC #1A 9/28/99 0950	Received By R. Nielson 9/28/99 0950
Relinquished By R. Nielson 9/28/99 1330	Received By FELLEY 9/28/99 1330

SPECIAL INSTRUCTIONS

(1) Gamma Spectroscopy (Water) (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Barium-133); Isotopic Plutonium; Isotopic Uranium; Americium-241; Strontium-89,90 -- Total Sr; Nickel-63

COLLECTOR UNAVAILABLE TO SIGN COA

Matrix \*

- Soil
- Water
- Vapor
- Other Solid
- Other Liquid

LABORATORY SECTION	Received By Fed Ex 929-990940 - T Murray 929-99-0940	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

**Recra LabNet Philadelphia  
Analytical Report**

**Client:** TNU-HANFORD B99-082  
**RFW#:** 9909L230  
**SDG/SAF#:** H0548/B99-082

**W.O.#:** 10985-001-001-9999-00  
**Date Received:** 09-29-99

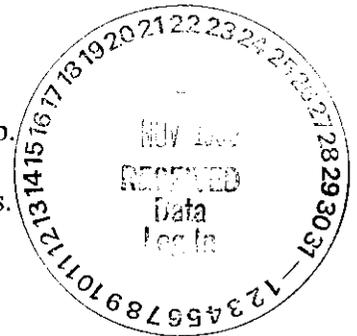
**PCB**

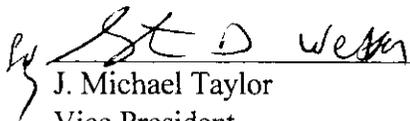
One (1) water sample was collected on 09-27-99.

The sample and its associated QC samples were extracted on 10-04-99 and analyzed according to Recra OPs based on SW846, 3rd Edition procedures on 10-20-99. The extraction procedure was based on method 3520 and the extracts were analyzed based on method 8082 for Aroclors only.

The following is a summary of the QC results accompanying the sample results and a description of any problems encountered during their analyses:

1. The cooler temperature has been recorded on the chain-of-custody.
2. All required holding times for extraction and analysis have been met.
3. The sample and its associated QC samples received a sulfuric acid cleanup.
4. The method blank was below the reporting limits for all target compounds.
5. All surrogate recoveries were within acceptance criteria.
6. The blank spike recovery was within acceptance criteria.
7. All matrix spike recoveries were within acceptance criteria.
8. All initial calibrations associated with this data set were within acceptance criteria.
9. All continuing calibration standards analyzed prior to sample extracts were within acceptance criteria.



  
J. Michael Taylor  
Vice President  
Philadelphia Analytical Laboratory

10-26-99  
Date

pefr:\group\data\pest\09L-230.pcb

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 8 pages.

GLOSSARY OF PESTICIDE/PCB DATA

DATA QUALIFIERS

- U** = Indicates that the compound was analyzed for but not detected. The minimum detection limit for the sample (not the method detection limit) is reported with the U (e.g., 10U).
- J** = Indicates an estimated value. This flag is used in cases where a target analyte is detected at a level less than the lower quantification level. If the limit of quantification is 10 ug/L and a concentration of 3 ug/L is calculated, it is reported as 3J.
- B** = This flag is used when the analyte is found in the associated blank as well as in the sample. It indicates possible/probable blank contamination.
- E** = Indicates that the compound was detected beyond the calibration range and was subsequently analyzed at a dilution.
- I** = Interference.

ABBREVIATIONS

- BS** = Indicates blank spike in which reagent grade water is spiked with the CLP matrix spiking solutions and carried through all the steps in the method. Spike recoveries are reported.
- BSD** = Indicates blank spike duplicate.
- MS** = Indicates matrix spike.
- MSD** = Indicates matrix spike duplicate.
- DL** = Indicates that recoveries were not obtained because the extract had to be diluted for analysis.
- NA** = Not Applicable.
- DF** = Dilution Factor.
- NR** = Not Required.
- SP** = Indicates Spiked Compound.



GLOSSARY OF PESTICIDE/PCB DATA

- P** = This flag is used for a pesticide/Aroclor target analyte when there is greater than 25% difference for detected concentrations between the two GC columns (see Form X). The lower of the two values is reported on Form I and flagged with a "P".
- D** = This flag identifies all compounds identified in an analysis at a secondary dilution factor.
- C** = This flag applies to a compound that has been confirmed by GC/MS.



Recra LabNet - Lionville Laboratory

PCBs by GC

Report Date: 10/23/99 10:51

RFW Batch Number: 9909L230

Client: TNU-HANFORD B99-082

Work Order: 10985001001 Page: 1

000

	Cust ID:	BOWCK9	BOWCK9	BOWCK9	PBLKVX	PBLKVX BS
Sample Information	RFW#:	001	001 MS	001 MSD	99LE1193-MB1	99LE1193-MB1
	Matrix:	WATER	WATER	WATER	WATER	WATER
	D.F.:	1.00	1.00	1.00	1.00	1.00
	Units:	UG/L	UG/L	UG/L	UG/L	UG/L
Surrogate:	Tetrachloro-m-xylene	110 %	88 %	108 %	75 %	62 %
	Decachlorobiphenyl	93 %	87 %	93 %	101 %	103 %
=====fl=====fl=====fl=====fl=====fl=====fl=====fl=====						
Aroclor-1016		0.95 U	0.95 U	0.95 U	1.0 U	1.0 U
Aroclor-1221		1.9 U	1.9 U	1.9 U	2.0 U	2.0 U
Aroclor-1232		0.95 U	0.95 U	0.95 U	1.0 U	1.0 U
Aroclor-1242		0.95 U	0.95 U	0.95 U	1.0 U	1.0 U
Aroclor-1248		0.95 U	0.95 U	0.95 U	1.0 U	1.0 U
Aroclor-1254		0.95 U	96 %	96 %	1.0 U	91 %
Aroclor-1260		0.95 U	0.95 U	0.95 U	1.0 U	1.0 U

*Handwritten signature*  
10-25-99

U= Analyzed, not detected. J= Present below detection limit. B= Present in blank. NR= Not reported. NS= Not spiked.  
%= Percent recovery. D= Diluted out. I= Interference. NA= Not Applicable. \*= Outside of EPA CLP QC

Recra LabNet - Lionville Laboratory  
PCB ANALYTICAL DATA PACKAGE FOR  
TNU-HANFORD B99-082

DATE RECEIVED: 09/29/99

RFW LOT # :9909L230

CLIENT ID	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
BOWCK9	001	W	99LE1193	09/27/99	10/04/99	10/20/99
BOWCK9	001 MS	W	99LE1193	09/27/99	10/04/99	10/20/99
BOWCK9	001 MSD	W	99LE1193	09/27/99	10/04/99	10/20/99

LAB QC:

PBLKVX	MB1	W	99LE1193	N/A	10/04/99	10/20/99
PBLKVX	MB1 BS	W	99LE1193	N/A	10/04/99	10/20/99

*fw*  
*10-25-99*



# CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

B99-082-4

Page 1 of 1

Collector Bob Fahlberg	Company Contact Jason Adler	Telephone No. 373-4316	Project Coordinator Trent, SJ
Project Designation 105-DR FSB - QC Sample Analysis	Sampling Location 105 DR	SAF No. B99-082	Price Code 7L
Ice Chest No. SML-153	Field Logbook No. EL-1281	Method of Shipment Federal Express	
Shipped To FMA/RECRA RF 9-27-99	Offsite Property No. AM0278	Bill of Lading/Air Bill No. 42357952 9892	
		COA R105D42800	

Data Turnaround  
**21 Days**

POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	None	None	HNO3 to pH <2	HCl to pH <2	HNO3 to pH <2	Cool 4C	HNO3 to pH <2			
	Type of Container	P	P	aG	P	P	aG	P			
	No. of Container(s)	1	1	1	1	1	3	5			
	Volume	120mL	120mL	500mL	500mL	500mL	1000mL	1L			
SPECIAL HANDLING AND/OR STORAGE											
SAMPLE ANALYSIS	Carbon-14	Tritium - H3	Mercury - 7470 - (CV)	Technetium-99	ICP Metals - 6010A (Add-on) (Lead)	PCBs - 8080	See item (1) in Special Instructions				
Sample No.	Matrix *	Sample Date	Sample Time								
BOWCK9	Water	9-27-99	1107		X		X	X			

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS	Matrix *
Relinquished By 9-27-99 R. Fahlberg	Date/Time 1150 Received By R. Nielson 9/27/99	(1) Gamma Spectroscopy(Water) (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Barium-133); Isotopic Plutonium; Isotopic Uranium; Americium-241; Strontium-89,90 -- Total Sr; Nickel-63 COLLECTOR UNAVAILABLE TO SIGN SAMPLES - RUN 9/28/99  COLLECTOR UNAVAILABLE TO SIGN CONC.	Soil Water Vapor Other Solid Other Liquid
Relinquished By R. Nielson 9/27/99	Date/Time 1337 Received By Ref# IA 9/27/99		
Relinquished By Ref# IA 9/28/99	Date/Time 0950 Received By R. Nielson 9/28/99		
Relinquished By R. Nielson 9/28/99	Date/Time 1330 Received By Fed Ex 9/28/99		
LABORATORY SECTION	Received By Fed Ex 9-29-99 0940 - T. Murray	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

# CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

B99-082-4

Page 1 of 1

Collector Bob Fahlberg	Company Contact Jason Adler	Telephone No. 373-4316	Project Coordinator TRENT, SJ	Price Code 7L	Data Turnaround <b>21 Days</b>
Project Designation 105-DR FSB - QC Sample Analysis	Sampling Location 105 DR	SAF No. B99-082			
Ice Chest No. <b>SML-457</b>	Field Logbook No. EL-1281	Method of Shipment <b>Fed Ex</b>			
Shipped To TMA/RECRA <b>RF. 9-27-99</b>	Offsite Property No. <b>A99 0280</b>	Bill of Lading/Air Bill No. <b>4235 7952-9918</b>			
			COA <b>R105D42800</b>		

POSSIBLE SAMPLE HAZARDS/REMARKS <h2 style="text-align: center; margin: 0;">COPY</h2> Special Handling and/or Storage	Preservation	None	None	HNO3 to pH <2	HCl to pH <2	HNO3 to pH <2	Cool 4C	HNO3 to pH <2			
	Type of Container	P	P	aG	P	P	aG	P			
	No. of Container(s)	1	1	1	1	1	3	5			
	Volume	120mL	120mL	500mL	500mL	500mL	1000mL	1L			

Sample No.	Matrix *	Sample Date	Sample Time	Carbon-14	Tritium - H3	Mercury - 7470 - (CV)	Technetium-99	ICP Metals - 6010A (Add-on) (Lead)	PCBs - 8080	See item (1) in Special Instructions
B0WCK9	Water	9-27-99	1107	X	X		X			X

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS	Matrix *
Relinquished By <i>RF Fahlberg</i>	Date/Time 9-27-99 1150	Received By <i>R. Nielson</i>	Date/Time 9/27/99 1150
Relinquished By <i>R. Nielson</i>	Date/Time 9/27/99 1357	Received By <i>REC #1A</i>	Date/Time 9/27/99 1337
Relinquished By <i>REC #1A</i>	Date/Time 9/28/99 0950	Received By <i>R. Nielson</i>	Date/Time 9/28/99 0950
Relinquished By <i>R. Nielson</i>	Date/Time 9/28/99 1330	Received By <i>Felix</i>	Date/Time 9/28/99 1330
LABORATORY SECTION	Received By Ted Ek 9-29-99 0940 - T. Murray 9-29-99 0940	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

(1) Gamma Spectroscopy (Water) [Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155]; Gamma Spec - Add-on [Barium-133]; Isotopic Plutonium; Isotopic Uranium; Americium-241; Strontium-89,90 -- Total Sr; Nickel-63

COLLECTOR UNAVAILABLE TO SIGN COA