H1116

0054562



DEC 2000
RECEIVED

## 1.0 GENERAL

Bechtel Hanford Inc. (BHI) Sample Delivery Group H1116 was composed of two water samples designated under SAF No. C01-007 with a Project Designation of: 100 KR4 IAM (1 & 2).

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

## 2.0 ANALYSIS NOTES

### 2.1 Gross Alpha and Gross Beta Analyses

No problems were encountered during the course of the analyses.

### 2.2 Tritium Analyses

No problems were encountered during the course of the analyses.

### 2.3 Strontium-90 Analyses (By Yttrium Analysis)

No problems were encountered during the course of the analyses.

### 2.4 Gamma Spectroscopy Analyses

No problems were encountered during the course of the analyses.

**Case Narrative Certification Statement**

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

Melissa Mannion
**Melissa C. Mannion**
**Program Manager**

12/18/00
**Date**

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MAR 28 2001
EDMC

# TMA/RICHMOND

SAMPLE DELIVERY GROUP H1116

## SAMPLE SUMMARY

SDG 7545
Contact Melissa C. Mannion

Client Hanford
Contract TRC-SBB-207925
Case no SDG H1116

| CLIENT SAMPLE ID | LOCATION | MATRIX | LEVEL | LAB SAMPLE ID | SAF NO | CHAIN OF CUSTODY | COLLECTED |
|---|---|---|---|---|---|---|---|
| B10J11 | Hanford Site | WATER | | R011026-01 | C01-007 | C01-007-3 | 10/31/00 11:46 |
| B10J13 | Hanford Site | WATER | | R011026-02 | C01-007 | C01-007-4 | 10/31/00 10:20 |
| Method Blank | | WATER | | R011026-04 | C01-007 | | |
| Lab Control Sample | | WATER | | R011026-03 | C01-007 | | |
| Duplicate (R011026-01) | Hanford Site | WATER | | R011026-05 | C01-007 | | 10/31/00 11:46 |
| Spike (R011026-01) | Hanford Site | WATER | | R011026-06 | C01-007 | | 10/31/00 11:46 |



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

# TMA/RICHMOND

SAMPLE DELIVERY GROUP H1116

## QC SUMMARY

SDG 7545
Contact Melissa C. Mannion

Client Hanford
Contract TRC-SBB-207925
Case no SDG H1116

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 7545 | C01-007-3 | B10J11 | WATER | | | | 11/01/00 | 1 | R011026-01 | 7545-001 |
| | C01-007-4 | B10J13 | WATER | | | | 11/01/00 | 1 | R011026-02 | 7545-002 |
| | | Method Blank | WATER | | | | | | R011026-04 | 7545-004 |
| | | Lab Control Sample | WATER | | | | | | R011026-03 | 7545-003 |
| | | Duplicate (R011026-01) | WATER | | | | 11/01/00 | 1 | R011026-05 | 7545-005 |
| | | Spike (R011026-01) | WATER | | | | 11/01/00 | 1 | R011026-06 | 7545-006 |



Lab id TMANC
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# TMA/RICHMOND

SAMPLE DELIVERY GROUP H1116

SDG 7545
Contact Melissa C. Mannion

## PREP BATCH SUMMARY

Client Hanford
Contract TRC-SBB-207925
Case no SDG H1116

| 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 | 6962-046 | 10.0 | 2 | | | 1 | 1 | 1/1 | | |
| **Gas Proportional Counting** | | | | | | | | | | | | |
| 82B | WATER | Gross Beta in Water | 6962-046 | 15.0 | 2 | | | 1 | 1 | 1/1 | | |
| 88A | WATER | Gross Alpha in Water | 6962-046 | 20.0 | 2 | | | 1 | 1 | 1/1 | | |
| **Gamma Scan** | | | | | | | | | | | | |
| GAM | WATER | Gamma Emitters | 6962-046 | 15.0 | 2 | | | 1 | 1 | 1/1 | | |
| **Liquid Scintillation Counting** | | | | | | | | | | | | |
| H | WATER | Tritium in Water | 6962-046 | 10.0 | 2 | | | 1 | 1 | 1/1 | 1/1 | |

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



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

# TMA/RICHMOND

SAMPLE DELIVERY GROUP H1116

## WORK SUMMARY

SDG 7545
Contact Melissa C. Mannion

Client Hanford
Contract TRC-SBB-207925
Case no SDG H1116

| CLIENT SAMPLE ID / LOCATION / CUSTODY | SAF No | MATRIX | LAB SAMPLE ID / COLLECTED / RECEIVED | PLANCHET | TEST | SUF-FIX | ANALYZED | REVIEWED | BY | METHOD |
|---|---|---|---|---|---|---|---|---|---|---|
| B10J11 | | | R011026-01 | 7545-001 | 82B/82 | | 11/20/00 | 12/18/00 | MCM | Gross Beta in Water |
| Hanford Site | | WATER | 10/31/00 | 7545-001 | 88A/88 | | 11/18/00 | 12/18/00 | MCM | Gross Alpha in Water |
| C01-007-3 | C01-007 | | 11/01/00 | 7545-001 | GAM | | 11/17/00 | 12/18/00 | MCM | Gamma Emitters |
| | | | | 7545-001 | H | | 12/03/00 | 12/18/00 | MCM | Tritium in Water |
| | | | | 7545-001 | Y | | 11/16/00 | 12/18/00 | MCM | Strontium 90 in Water |
| B10J13 | | | R011026-02 | 7545-002 | 82B/82 | | 11/20/00 | 12/18/00 | MCM | Gross Beta in Water |
| Hanford Site | | WATER | 10/31/00 | 7545-002 | 88A/88 | | 11/18/00 | 12/18/00 | MCM | Gross Alpha in Water |
| C01-007-4 | C01-007 | | 11/01/00 | 7545-002 | GAM | | 11/17/00 | 12/18/00 | MCM | Gamma Emitters |
| | | | | 7545-002 | H | | 12/03/00 | 12/18/00 | MCM | Tritium in Water |
| | | | | 7545-002 | Y | | 11/16/00 | 12/18/00 | MCM | Strontium 90 in Water |
| Method Blank | | | R011026-04 | 7545-004 | 82B/82 | | 11/20/00 | 12/18/00 | MCM | Gross Beta in Water |
| | | WATER | | 7545-004 | 88A/88 | | 11/18/00 | 12/18/00 | MCM | Gross Alpha in Water |
| | C01-007 | | | 7545-004 | GAM | | 11/17/00 | 12/18/00 | MCM | Gamma Emitters |
| | | | | 7545-004 | H | | 12/03/00 | 12/18/00 | MCM | Tritium in Water |
| | | | | 7545-004 | Y | | 11/16/00 | 12/18/00 | MCM | Strontium 90 in Water |
| Lab Control Sample | | | R011026-03 | 7545-003 | 82B/82 | | 11/20/00 | 12/18/00 | MCM | Gross Beta in Water |
| | | WATER | | 7545-003 | 88A/88 | | 11/18/00 | 12/18/00 | MCM | Gross Alpha in Water |
| | C01-007 | | | 7545-003 | GAM | | 11/17/00 | 12/18/00 | MCM | Gamma Emitters |
| | | | | 7545-003 | H | | 12/03/00 | 12/18/00 | MCM | Tritium in Water |
| | | | | 7545-003 | Y | | 11/16/00 | 12/18/00 | MCM | Strontium 90 in Water |
| Duplicate (R011026-01) | | | R011026-05 | 7545-005 | 82B/82 | | 11/20/00 | 12/18/00 | MCM | Gross Beta in Water |
| Hanford Site | | WATER | 10/31/00 | 7545-005 | 88A/88 | | 11/18/00 | 12/18/00 | MCM | Gross Alpha in Water |
| | C01-007 | | 11/01/00 | 7545-005 | GAM | | 11/17/00 | 12/18/00 | MCM | Gamma Emitters |
| | | | | 7545-005 | H | | 12/03/00 | 12/18/00 | MCM | Tritium in Water |
| | | | | 7545-005 | Y | | 11/16/00 | 12/18/00 | MCM | Strontium 90 in Water |
| Spike (R011026-01) | | | R011026-06 | 7545-006 | H | | 12/04/00 | 12/18/00 | MCM | Tritium in Water |
| Hanford Site | | WATER | 10/31/00 | | | | | | | |
| | C01-007 | | 11/01/00 | | | | | | | |

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

# TMA/RICHMOND

SAMPLE DELIVERY GROUP H1116

SDG 7545
Contact Melissa C. Mannion

## WORK SUMMARY, cont.

Client Hanford
Contract TRC-SBB-207925
Case no SDG H1116

### COUNTS OF TESTS BY SAMPLE TYPE

| TEST | SAF No | METHOD | REFERENCE | CLIENT | MORE | RE | BLANK | LCS | DUP | SPIKE | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 82B/82 | C01-007 | Gross Beta in Water | 900.0_ALPHABETA_GPC | 2 | | | 1 | 1 | 1 | | 5 |
| 88A/88 | C01-007 | Gross Alpha in Water | 900.0_ALPHABETA_GPC | 2 | | | 1 | 1 | 1 | | 5 |
| GAM | C01-007 | Gamma Emitters | GAMMA_GS | 2 | | | 1 | 1 | 1 | | 5 |
| H | C01-007 | Tritium in Water | 906.0_H3_LSC | 2 | | | 1 | 1 | 1 | 1 | 6 |
| Y | C01-007 | Strontium 90 in Water | SRISO_SEP_PRECIP_GPC | 2 | | | 1 | 1 | 1 | | 5 |
| TOTALS | | | | 10 | | | 5 | 5 | 5 | 1 | 26 |



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

# TMA / RICHMOND
## SAMPLE DELIVERY GROUP H1116

R011026-04 Method Blank

## METHOD BLANK

| | | | | | |
|---|---|---|---|---|---|
| SDG | 7545 | Client/Case no | Hanford | SDG H1116 | |
| Contact | Melissa C. Mannion | Contract | TRC-SBB-207925 | | |
| Lab sample id | R011026-04 | Client sample id | Method Blank | | |
| Dept sample id | 7545-004 | Material/Matrix | | WATER | |
| | | SAF No | C01-007 | | |

| ANALYTE | CAS NO | RESULT pCi/L | 2σ ERR (COUNT) | MDA pCi/L | RDL pCi/L | QUALI-FIERS | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | 12587-46-1 | -0.225 | 0.93 | 2.0 | 3.0 | U | 88A |
| Gross Beta | 12587-47-2 | -1.22 | 1.5 | 2.8 | 4.0 | U | 82B |
| Tritium | 10028-17-8 | -55.0 | 640 | 1100 | 400 | U | H |
| Strontium 90 | 10098-97-2 | 0.092 | 0.39 | 1.2 | 2.0 | U | Y |
| Potassium 40 | 13966-00-2 | U | | 230 | | U | GAM |
| Cobalt 60 | 10198-40-0 | U | | 8.9 | 25 | U | GAM |
| Cesium 137 | 10045-97-3 | U | | 8.7 | 15 | U | GAM |
| Radium 226 | 13982-63-3 | U | | 17 | | U | GAM |
| Radium 228 | 15262-20-1 | U | | 36 | | U | GAM |
| Europium 152 | 14683-23-9 | U | | 21 | 50 | U | GAM |
| Europium 154 | 15585-10-1 | U | | 25 | 50 | U | GAM |
| Europium 155 | 14391-16-3 | U | | 25 | 50 | U | GAM |
| Thorium 228 | 14274-82-9 | U | | 12 | | U | GAM |
| Thorium 232 | TH-232 | U | | 36 | | U | GAM |
| Uranium 235 | 15117-96-1 | U | | 34 | | U | GAM |
| Uranium 238 | U-238 | U | | 980 | | U | GAM |
| Americium 241 | 14596-10-2 | U | | 64 | | U | GAM |

100 KR4 IAM (1 & 2)

QC-BLANK 36574



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

# TMA/RICHMOND

SAMPLE DELIVERY GROUP H1116

R011026-03

Lab Control Sample

## LAB CONTROL SAMPLE

SDG 7545
Contact Melissa C. Mannion

Client/Case no Hanford SDG H1116
Case no TRC-SBB-207925

Lab sample id R011026-03
Dept sample id 7545-003

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

| ANALYTE | RESULT pCi/L | 2σ ERR (COUNT) | MDA pCi/L | RDL pCi/L | QUALI-FIERS | TEST | ADDED pCi/L | 2σ ERR pCi/L | REC % | 3σ LMTS (TOTAL) | PROTOCOL LIMITS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Gross Alpha | 117 | 7.8 | 2.1 | 3.0 | | 88A | 100 | 4.0 | 117 | 63-137 | 70-130 |
| Gross Beta | 97.8 | 5.0 | 3.2 | 4.0 | | 82B | 110 | 4.4 | 89 | 78-122 | 70-130 |
| Tritium | 42300 | 1400 | 1100 | 400 | | H | 46700 | 1900 | 91 | 84-116 | 80-120 |
| Strontium 90 | 50.5 | 1.8 | 1.2 | 2.0 | | Y | 44.2 | 1.8 | 114 | 81-119 | 80-120 |
| Cobalt 60 | 459 | 17 | 8.3 | 25 | | GAM | 454 | 18 | 101 | 76-124 | 80-120 |
| Cesium 137 | 529 | 15 | 9.3 | 15 | | GAM | 504 | 20 | 105 | 75-125 | 80-120 |

100 KR4 IAM (1 & 2)

QC-LCS 36573

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

# TMA/RICHMOND

SAMPLE DELIVERY GROUP H1116

R011026-05 B10J11

## DUPLICATE

| | | | | | |
|---|---|---|---|---|---|
| SDG | 7545 | | | Client/Case no | Hanford SDG H1116 |
| Contact | Melissa C. Mannion | | | Case no | TRC-SBB-207925 |
| | DUPLICATE | | ORIGINAL | | |
| Lab sample id | R011026-05 | Lab sample id | R011026-01 | Client sample id | B10J11 |
| Dept sample id | 7545-005 | Dept sample id | 7545-001 | Location/Matrix | Hanford Site WATER |
| | | Received | 11/01/00 | Collected | 10/31/00 11:46 |
| | | | | Custody/SAF No | C01-007-3 C01-007 |

| ANALYTE | DUPLICATE pCi/L | 2σ ERR (COUNT) | MDA pCi/L | RDL pCi/L | QUALI-FIERS | TEST | ORIGINAL pCi/L | 2σ ERR (COUNT) | MDA pCi/L | QUALI-FIERS | RPD % | 3σ TOT | PROT LIMIT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gross Alpha | 13.4 | 3.4 | 2.4 | 3.0 | | 88A | 12.9 | 3.5 | 2.9 | | 4 | 70 | |
| Gross Beta | 9050 | 46 | 3.7 | 4.0 | | 82B | 8670 | 45 | 3.0 | | 4 | 32 | |
| Tritium | 127000 | 1600 | 540 | 400 | | H | 126000 | 1600 | 550 | | 1 | 21 | |
| Strontium 90 | 4730 | 190 | 1.2 | 2.0 | | Y | 4750 | 70 | 1.2 | | 0 | 22 | |
| Potassium 40 | U | | 190 | | U | GAM | U | | 270 | U | - | | |
| Cobalt 60 | U | | 11 | 25 | U | GAM | U | | 15 | U | - | | |
| Cesium 137 | U | | 11 | 15 | U | GAM | U | | 13 | U | - | | |
| Radium 226 | U | | 21 | | U | GAM | U | | 31 | U | - | | |
| Radium 228 | U | | 48 | | U | GAM | U | | 56 | U | - | | |
| Europium 152 | U | | 29 | 50 | U | GAM | U | | 29 | U | - | | |
| Europium 154 | U | | 30 | 50 | U | GAM | U | | 37 | U | - | | |
| Europium 155 | U | | 29 | 50 | U | GAM | U | | 40 | U | - | | |
| Thorium 228 | U | | 15 | | U | GAM | U | | 19 | U | - | | |
| Thorium 232 | U | | 48 | | U | GAM | U | | 56 | U | - | | |
| Uranium 235 | U | | 44 | | U | GAM | U | | 52 | U | - | | |
| Uranium 238 | U | | 1400 | | U | GAM | U | | 1400 | U | - | | |
| Americium 241 | U | | 41 | | U | GAM | U | | 94 | U | - | | |

100 KR4 IAM (1 & 2)

QC-DUP#1 36575



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

# TMA/RICHMOND

SAMPLE DELIVERY GROUP H1116

R011026-06 B10J11

## MATRIX SPIKE

| | | | |
|---|---|---|---|
| SDG | 7545 | Client/Case no | Hanford SDG H1116 |
| Contact | Melissa C. Mannion | Case no | TRC-SBB-207925 |
| MATRIX SPIKE | | ORIGINAL | |
| Lab sample id | R011026-06 | Lab sample id | R011026-01 |
| Dept sample id | 7545-006 | Dept sample id | 7545-001 |
| | | Received | 11/01/00 |
| Client sample id | B10J11 | | |
| Location/Matrix | Hanford Site WATER | | |
| Collected | 10/31/00 11:46 | | |
| Custody/SAF No | C01-007-3 C01-007 | | |

| ANALYTE | SPIKE pCi/L | 2σ ERR (COUNT) | MDA pCi/L | RDL pCi/L | QUALI-FIERS | TEST | ADDED pCi/L | 2σ ERR pCi/L | ORIGINAL pCi/L | 2σ ERR (COUNT) | REC % | 3σ LMTS (TOTAL) | PROTOCOL LIMITS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tritium | 212000 | 2100 | 600 | 400 | | H | 89900 | 3600 | 126000 | 1600 | 96 | 58-142 | 60-140 |

100 KR4 IAM (1 & 2)

QC-MS#1 36576

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

# TMA / RICHMOND

**SAMPLE DELIVERY GROUP H1116**

R011026-01 B10J11

## DATA SHEET

| | | | |
|---|---|---|---|
| SDG | 7545 | Client/Case no | Hanford SDG H1116 |
| Contact | Melissa C. Mannion | Contract | TRC-SBB-207925 |
| Lab sample id | R011026-01 | Client sample id | B10J11 |
| Dept sample id | 7545-001 | Location/Matrix | Hanford Site WATER |
| Received | 11/01/00 | Collected | 10/31/00 11:46 |
| | | Custody/SAF No | C01-007-3 C01-007 |

| ANALYTE | CAS NO | RESULT pCi/L | 2σ ERR (COUNT) | MDA pCi/L | RDL pCi/L | QUALI-FIERS | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | 12587-46-1 | 12.9 | 3.5 | 2.9 | 3.0 | | 88A |
| Gross Beta | 12587-47-2 | 8670 | 45 | 3.0 | 4.0 | | 82B |
| Tritium | 10028-17-8 | 126000 | 1600 | 550 | 400 | | H |
| Strontium 90 | 10098-97-2 | 4750 | 70 | 1.2 | 2.0 | | Y |
| Potassium 40 | 13966-00-2 | U | | 270 | | U | GAM |
| Cobalt 60 | 10198-40-0 | U | | 15 | 25 | U | GAM |
| Cesium 137 | 10045-97-3 | U | | 13 | 15 | U | GAM |
| Radium 226 | 13982-63-3 | U | | 31 | | U | GAM |
| Radium 228 | 15262-20-1 | U | | 56 | | U | GAM |
| Europium 152 | 14683-23-9 | U | | 29 | 50 | U | GAM |
| Europium 154 | 15585-10-1 | U | | 37 | 50 | U | GAM |
| Europium 155 | 14391-16-3 | U | | 40 | 50 | U | GAM |
| Thorium 228 | 14274-82-9 | U | | 19 | | U | GAM |
| Thorium 232 | TH-232 | U | | 56 | | U | GAM |
| Uranium 235 | 15117-96-1 | U | | 52 | | U | GAM |
| Uranium 238 | U-238 | U | | 1400 | | U | GAM |
| Americium 241 | 14596-10-2 | U | | 94 | | U | GAM |

100 KR4 IAM (1 & 2)



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

# TMA / RICHMOND

**SAMPLE DELIVERY GROUP H1116**

R011026-02 B10J13

## DATA SHEET

| | | | | | |
|---|---|---|---|---|---|
| SDG | 7545 | Client/Case no | Hanford | SDG H1116 | |
| Contact | Melissa C. Mannion | Contract | TRC-SBB-207925 | | |
| Lab sample id | R011026-02 | Client sample id | B10J13 | | |
| Dept sample id | 7545-002 | Location/Matrix | Hanford Site | WATER | |
| Received | 11/01/00 | Collected | 10/31/00 10:20 | | |
| | | Custody/SAF No | C01-007-4 | C01-007 | |

| ANALYTE | CAS NO | RESULT pCi/L | 2σ ERR (COUNT) | MDA pCi/L | RDL pCi/L | QUALI-FIERS | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | 12587-46-1 | -1.01 | 0.76 | 1.9 | 3.0 | U | 88A |
| Gross Beta | 12587-47-2 | 1.97 | 1.8 | 2.8 | 4.0 | U | 82B |
| Tritium | 10028-17-8 | 1060 | 350 | 540 | 400 | | H |
| Strontium 90 | 10098-97-2 | 2.57 | 1.2 | 3.5 | 2.0 | U | Y |
| Potassium 40 | 13966-00-2 | U | | 370 | | U | GAM |
| Cobalt 60 | 10198-40-0 | U | | 15 | 25 | U | GAM |
| Cesium 137 | 10045-97-3 | U | | 14 | 15 | U | GAM |
| Radium 226 | 13982-63-3 | U | | 27 | | U | GAM |
| Radium 228 | 15262-20-1 | U | | 59 | | U | GAM |
| Europium 152 | 14683-23-9 | U | | 33 | 50 | U | GAM |
| Europium 154 | 15585-10-1 | U | | 40 | 50 | U | GAM |
| Europium 155 | 14391-16-3 | U | | 25 | 50 | U | GAM |
| Thorium 228 | 14274-82-9 | U | | 17 | | U | GAM |
| Thorium 232 | TH-232 | U | | 59 | | U | GAM |
| Uranium 235 | 15117-96-1 | U | | 43 | | U | GAM |
| Uranium 238 | U-238 | U | | 1600 | | U | GAM |
| Americium 241 | 14596-10-2 | U | | 14 | | U | GAM |

100 KR4 IAM (1 & 2)



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

# TMA/RICHMOND

SAMPLE DELIVERY GROUP H1116

| | |
|---|---|
| Test | Y |
| Matrix | WATER |
| SDG | 7545 |
| Contact | Melissa C. Mannion |

## METHOD SUMMARY

STRONTIUM 90 IN WATER

BETA COUNTING

| | |
|---|---|
| Client | Hanford |
| Contract | TRC-SBB-207925 |
| Contract | SDG H1116 |

## RESULTS

| CLIENT SAMPLE ID | LAB SAMPLE ID | RAW TEST | SUF-FIX | PLANCHET | Strontium 90 |
|---|---|---|---|---|---|
| Preparation batch 6962-046 | | | | | |
| B10J11 | R011026-01 | | | 7545-001 | 4750 |
| B10J13 | R011026-02 | | | 7545-002 | 2.57 U |
| BLK (QC ID=36574) | R011026-04 | | | 7545-004 | U |
| LCS (QC ID=36573) | R011026-03 | | | 7545-003 | ok |
| Duplicate (R011026-01) | R011026-05 | | | 7545-005 | ok |
| Nominal values and limits from method 100 KR4 IAM (1 & 2) | | | | RDLs (pCi/L) | 2.0 |

## METHOD PERFORMANCE

| CLIENT SAMPLE ID | LAB SAMPLE ID | RAW TEST | SUF-FIX | MDA pCi/L | ALIQ L | PREP FAC | DILU-TION | YIELD % | EFF % | COUNT min | FWHM keV | DRIFT KeV | DAYS HELD | PREPARED | ANAL-YZED | DETECTOR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Preparation batch 6962-046 2σ prep error 10.0 % Reference Lab Notebook 6962 pg. 046 | | | | | | | | | | | | | | | | |
| B10J11 | R011026-01 | | | 1.2 | 0.500 | | | 62 | | 100 | | | 16 | 11/16/00 | 11/16 | GRB-223 |
| B10J13 | R011026-02 | | | 3.5 | 0.500 | | | 21 | | 100 | | | 16 | 11/16/00 | 11/16 | GRB-224 |
| BLK (QC ID=36574) | R011026-04 | | | 1.2 | 0.500 | | | 65 | | 100 | | | | 11/16/00 | 11/16 | GRB-203 |
| LCS (QC ID=36573) | R011026-03 | | | 1.2 | 0.500 | | | 65 | | 100 | | | | 11/16/00 | 11/16 | GRB-202 |
| Duplicate (R011026-01) (QC ID=36575) | R011026-05 | | | 1.2 | 0.500 | | | 67 | | 100 | | | 16 | 11/16/00 | 11/16 | GRB-204 |
| Nominal values and limits from method | | | | 2.0 | 0.500 | | | 20-105 | | 100 | | | 180 | | | |

| PROCEDURES | REFERENCE | SRISO_SEP_PRECIP_GPC |
|---|---|---|
| | CP-040 | Environmental Water Dissolution, rev 3 |
| | CP-520 | Yttrium Purification, rev 2 |

| AVERAGES ± 2 SD FOR 5 SAMPLES | | | | |
|---|---|---|---|---|
| MDA | 1.7 | ± | 2.1 |
| YIELD | 56 | ± | 39 |

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

Test 82B Matrix WATER
SDG 7545
Contact Melissa C. Mannion

# TMA/RICHMOND

SAMPLE DELIVERY GROUP H1116

## METHOD SUMMARY

GROSS BETA IN WATER
GAS PROPORTIONAL COUNTING

Client Hanford
Contract TRC-SBB-207925
Contract SDG H1116

## RESULTS

| CLIENT SAMPLE ID | LAB SAMPLE ID | RAW TEST | SUF-FIX | PLANCHET | 1: Gross Beta | 2: Sum, Beta Emitters | RESULT RATIO (%) 2÷1 | 2σ |
|---|---|---|---|---|---|---|---|---|
| Preparation batch 6962-046 | | | | | | | | |
| B10J11 | R011026-01 | 82 | | 7545-001 | 8670 | | | |
| B10J13 | R011026-02 | 82 | | 7545-002 | U | | | |
| BLK (QC ID=36574) | R011026-04 | 82 | | 7545-004 | U | | | |
| LCS (QC ID=36573) | R011026-03 | 82 | | 7545-003 | ok | | | |
| Duplicate (R011026-01) | R011026-05 | 82 | | 7545-005 | ok | | | |
| Nominal values and limits from method | | | RDLs (pCi/L) | | 4.0 | | | |
| 100 KR4 IAM (1 & 2) | | | | | | Average | | |

## METHOD PERFORMANCE

| CLIENT SAMPLE ID | LAB SAMPLE ID | RAW TEST | SUF-FIX | MDA pCi/L | ALIQ L | PREP FAC | DILU-TION | RESID mg | EFF % | COUNT min | FWHM keV | DRIFT KeV | DAYS HELD | PREPARED | ANAL-YZED | DETECTOR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Preparation batch 6962-046 | 2σ prep error 15.0 % Reference Lab Notebook 6962 pg. 046 | | | | | | | | | | | | | | | |
| B10J11 | R011026-01 | 82 | | 3.0 | 0.200 | | | 123 | | 100 | | | 20 | 11/18/00 | 11/20 | GRB-115 |
| B10J13 | R011026-02 | 82 | | 2.8 | 0.200 | | | 0 | | 100 | | | 20 | 11/18/00 | 11/20 | GRB-113 |
| BLK (QC ID=36574) | R011026-04 | 82 | | 2.8 | 0.200 | | | 24 | | 100 | | | | 11/18/00 | 11/20 | GRB-115 |
| LCS (QC ID=36573) | R011026-03 | 82 | | 3.2 | 0.200 | | | 21 | | 100 | | | | 11/18/00 | 11/20 | GRB-114 |
| Duplicate (R011026-01) (QC ID=36575) | R011026-05 | 82 | | 3.7 | 0.200 | | | 83 | | 100 | | | 20 | 11/18/00 | 11/20 | GRB-116 |
| Nominal values and limits from method | | | | 4.0 | 0.200 | | | 5-250 | | 100 | | | 180 | | | |

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

AVERAGES ± 2 SD FOR 5 SAMPLES
MDA 3.1 ± 0.75
RESIDUE 50 ± 102

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

Test 88A Matrix WATER
SDG 7545
Contact Melissa C. Mannion

# TMA/RICHMOND

SAMPLE DELIVERY GROUP H1116

## METHOD SUMMARY

GROSS ALPHA IN WATER
GAS PROPORTIONAL COUNTING

Client Hanford
Contract TRC-SBB-207925
Contract SDG H1116

## RESULTS

| CLIENT SAMPLE ID | LAB SAMPLE ID | RAW TEST | SUF-FIX | PLANCHET | Gross Alpha |
|---|---|---|---|---|---|
| Preparation batch 6962-046 | | | | | |
| B10J11 | R011026-01 | 88 | | 7545-001 | 12.9 |
| B10J13 | R011026-02 | 88 | | 7545-002 | U |
| BLK (QC ID=36574) | R011026-04 | 88 | | 7545-004 | U |
| LCS (QC ID=36573) | R011026-03 | 88 | | 7545-003 | ok |
| Duplicate (R011026-01) | R011026-05 | 88 | | 7545-005 | ok |
| Nominal values and limits from method 100 KR4 IAM (1 & 2) | | | | RDLs (pCi/L) | 3.0 |

## METHOD PERFORMANCE

| CLIENT SAMPLE ID | LAB SAMPLE ID | RAW TEST | SUF-FIX | MDA pCi/L | ALIQ L | PREP FAC | DILU-TION | RESID mg | EFF % | COUNT min | FWHM keV | DRIFT KeV | DAYS HELD | PREPARED | ANAL-YZED | DETECTOR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Preparation batch 6962-046 2σ prep error 20.0 % Reference Lab Notebook 6962 pg. 046 | | | | | | | | | | | | | | | | |
| B10J11 | R011026-01 | 88 | | 2.9 | 0.200 | | | 82 | | 100 | | | 18 | 11/18/00 | 11/18 | GRB-111 |
| B10J13 | R011026-02 | 88 | | 1.9 | 0.200 | | | 0 | | 100 | | | 18 | 11/18/00 | 11/18 | GRB-113 |
| BLK (QC ID=36574) | R011026-04 | 88 | | 2.0 | 0.200 | | | 23 | | 100 | | | | 11/18/00 | 11/18 | GRB-115 |
| LCS (QC ID=36573) | R011026-03 | 88 | | 2.1 | 0.200 | | | 25 | | 100 | | | | 11/18/00 | 11/18 | GRB-114 |
| Duplicate (R011026-01) (QC ID=36575) | R011026-05 | 88 | | 2.4 | 0.200 | | | 82 | | 100 | | | 18 | 11/18/00 | 11/18 | GRB-116 |
| Nominal values and limits from method | | | | 3.0 | 0.200 | | | 5-250 | | 100 | | | 180 | | | |

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

AVERAGES ± 2 SD FOR 5 SAMPLES
MDA 2.3 ± 0.81
RESIDUE 42 ± 75

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

Test GAM Matrix WATER
SDG 7545
Contact Melissa C. Mannion

# TMA/RICHMOND

SAMPLE DELIVERY GROUP H1116

## METHOD SUMMARY

GAMMA EMITTERS

GAMMA SCAN

Client Hanford
Contract TRC-SBB-207925
Contract SDG H1116

## RESULTS

| CLIENT SAMPLE ID | LAB SAMPLE ID | RAW TEST | SUF-FIX | PLANCHET | Cobalt 60 | | Cesium 137 | |
|---|---|---|---|---|---|---|---|---|
| Preparation batch 6962-046 | | | | | | | | |
| B10J11 | R011026-01 | | | 7545-001 | U | | U | |
| B10J13 | R011026-02 | | | 7545-002 | U | | U | |
| BLK (QC ID=36574) | R011026-04 | | | 7545-004 | U | | U | |
| LCS (QC ID=36573) | R011026-03 | | | 7545-003 | ok | | ok | |
| Duplicate (R011026-01) | R011026-05 | | | 7545-005 | - | U | - | U |
| Nominal values and limits from method 100 KR4 IAM (1 & 2) | | | | RDLs (pCi/L) | 25 | | 15 | |

## METHOD PERFORMANCE

| CLIENT SAMPLE ID | LAB SAMPLE ID | RAW TEST | SUF-FIX | MAX MDA pCi/L | ALIQ L | PREP FAC | DILU-TION | YIELD % | EFF % | COUNT min | FWHM keV | DRIFT KeV | DAYS HELD | PREPARED | ANAL-YZED | DETECTOR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Preparation batch 6962-046 2σ prep error 15.0 % Reference Lab Notebook 6962 pg. 046 | | | | | | | | | | | | | | | | |
| B10J11 | R011026-01 | | | 13 | 0.500 | | | | | 394 | | | 17 | 11/16/00 | 11/17 | MB,05,00 |
| B10J13 | R011026-02 | | | 14 | 0.500 | | | | | 394 | | | 17 | 11/16/00 | 11/17 | MB,07,00 |
| BLK (QC ID=36574) | R011026-04 | | | 8.7 | 0.500 | | | | | 785 | | | | 11/16/00 | 11/17 | MB,05,00 |
| LCS (QC ID=36573) | R011026-03 | | | 9.3 | 0.500 | | | | | 785 | | | | 11/16/00 | 11/17 | 01,04,00 |
| Duplicate (R011026-01) (QC ID=36575) | R011026-05 | | | 11 | 0.500 | | | | | 785 | | | 17 | 11/16/00 | 11/17 | 01,03,00 |
| Nominal values and limits from method | | | | 15 | 0.500 | | | | | 100 | | | 180 | | | |

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

AVERAGES ± 2 SD FOR 5 SAMPLES
MDA 11 ± 4.6
YIELD ____ ± ____

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

Test H Matrix WATER
SDG 7545
Contact Melissa C. Mannion

# TMA/RICHMOND

SAMPLE DELIVERY GROUP H1116

## METHOD SUMMARY

TRITIUM IN WATER

LIQUID SCINTILLATION COUNTING

Client Hanford
Contract TRC-SBB-207925
Contract SDG H1116

## RESULTS

| CLIENT SAMPLE ID | LAB SAMPLE ID | RAW TEST | SUF-FIX | PLANCHET | Tritium |
|---|---|---|---|---|---|
| Preparation batch 6962-046 | | | | | |
| B10J11 | R011026-01 | | | 7545-001 | 126000 |
| B10J13 | R011026-02 | | | 7545-002 | 1060 |
| BLK (QC ID=36754) | R011026-04 | | | 7545-004 | U |
| LCS (QC ID=36753) | R011026-03 | | | 7545-003 | ok |
| Duplicate (R011026-01) | R011026-05 | | | 7545-005 | ok |
| Spike (R011026-01) | R011026-06 | | | 7545-006 | ok |
| Nominal values and limits from method | | | | RDLs (pCi/L) | 400 |
| 100 KR4 IAM (1 & 2) | | | | | |

## METHOD PERFORMANCE

| CLIENT SAMPLE ID | LAB SAMPLE ID | RAW TEST | SUF-FIX | MDA pCi/L | ALIQ L | PREP FAC | DILU-TION | YIELD % | EFF % | COUNT min | FWHM keV | DRIFT KeV | DAYS HELD | PREPARED | ANAL-YZED | DETECTOR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Preparation batch 6962-046 | 2σ prep error 10.0 % Reference Lab Notebook 6962 pg. 046 | | | | | | | | | | | | | | | |
| B10J11 | R011026-01 | | | 550 | 0.0100 | | | 20 | | 200 | | | 33 | 11/30/00 | 12/03 | LSC-007 |
| B10J13 | R011026-02 | | | 540 | 0.0100 | | | 20 | | 200 | | | 33 | 11/30/00 | 12/03 | LSC-007 |
| BLK (QC ID=36754) | R011026-04 | | | 1100 | 0.0100 | | | 10 | | 200 | | | | 11/30/00 | 12/03 | LSC-007 |
| LCS (QC ID=36753) | R011026-03 | | | 1100 | 0.0100 | | | 10 | | 200 | | | | 11/30/00 | 12/03 | LSC-007 |
| Duplicate (R011026-01) (QC ID=36755) | R011026-05 | | | 540 | 0.0100 | | | 20 | | 200 | | | 33 | 11/30/00 | 12/03 | LSC-007 |
| Spike (R011026-01) (QC ID=36756) | R011026-06 | | | 600 | 0.0100 | | | 18 | | 200 | | | 34 | 11/30/00 | 12/04 | LSC-007 |
| Nominal values and limits from method | | | | 400 | 0.0100 | | | | | 25 | | | 180 | | | |

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

AVERAGES ± 2 SD FOR 6 SAMPLES
MDA 740 ± 560
YIELD 16 ± 10

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

PNNL

# CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. # C01-007-3

Page 1 of 1

| | | |
|---|---|---|
| Collector: D. R. BREWINGTON | Contact/Requester: JH KESSNER | Telephone No.: (509) 375-4688 MSIN FAX |
| SAF No.: C01-007 | Sampling Origin: HANFORD SITE H1116 (7545) | Purchase Order/Charge Code |
| Project Title: 100 KR4 IAM (1 & 2) | Logbook No.: WM-SAWS-H37 | Ice Chest No.: SML226 Temp. |
| Shipped To (Lab): TMA/RECRA | Method of Shipment: GOVT. VEHICLE | Bill of Lading/Air Bill No.: 4235 7954 0154 |
| Protocol: CERCLA | Data Turnaround: 45 Days | Offsite Property No.: W010 0018 |

POSSIBLE SAMPLE HAZARDS/REMARKS
** **

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

| Sample No. | Lab ID | * | Date | Time | No/Type Container | Sample Analysis | Preservative |
|---|---|---|---|---|---|---|---|
| B10J10 (F) | | W | 10-31-00 | 1146 | 1x500-mL G/P | ICP Metals - 6010A RCRA GW | HNO3 to pH <2 |
| B10J11 | | W | | | 1x500-mL G/P | ICP Metals - 6010A RCRA GW FOR RECRA | HNO3 to pH <2 |
| B10J11 | | W | | | 1x500-mL P | IC Anions - 300.0 | Cool 4C |
| B10J11 | | W | | | 1x20-mL P | Activity Scan | None |
| B10J11 | | W | | | 2x1000-mL G/P | Gross Alpha | HNO3 to pH <2 |
| B10J11 | | W | | | 2x1000-mL G/P | Gross Beta | HNO3 to pH <2 |
| B10J11 | | W | | | 1x1000-mL G/P | Gamma Spectroscopy(Water) | HNO3 to pH <2 |
| B10J11 | | W | | | 2x1000-mL G/P | Strontium-89,90 -- Sr-90 | HNO3 to pH <2 |
| B10J11 | | W | | | 1x250-mL P | Tritium - H3 | None |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
|---|---|---|---|---|---|---|---|
| D. R. BREWINGTON | D.R. Brewington | | OCT 31 2000 1442 | FED EX | | | 10/31/00 |
| FED. EXPRESS | | | 11/01/00 10:AM | E. Segura | | | 11/01/00 10:AM |
| | | | | | | | |
| | | | | | | | |

Matrix *

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

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

# CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. # C01-007-4

Page 1 of 1

| | | |
|---|---|---|
| D. R. BREWINGTON | Contact/Requester: JH KESSNER | Telephone No.: (509) 375-4688 MSIN FAX |
| SAF No.: C01-007 | Sampling Origin: HANFORD SITE H1116 (7545) | Purchase Order/Charge Code |
| Project Title: 100 KR4 IAM (1 & 2) | Logbook No.: WM-SANS-H37 | Ice Chest No.: SML226 Temp. |
| Shipped To (Lab): TMA/RECRA | Method of Shipment: GOVT. VEHICLE | Bill of Lading/Air Bill No.: 4235 7554 0154 |
| Protocol: CERCLA | Data Turnaround: 45 Days | Offsite Property No.: W010 0018 |

POSSIBLE SAMPLE HAZARDS/REMARKS
** **

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

| Sample No. | Lab ID | * | Date | Time | No/Type Container | Sample Analysis | Preservative |
|---|---|---|---|---|---|---|---|
| B10J12 (F) ✓ | | W | 10-31-00 | 1020 ✓ | 1x500-mL G/P ✓ | ICP Metals - 6010A RCRA GW ✓ | HNO3 to pH <2 |
| B10J13 ✓ | | W | | | 1x500-mL G/P ✓ | ICP Metals - 6010A RCRA GW FOR RECRA | HNO3 to pH <2 |
| B10J13 ✓ | | W | | | 1x500-mL P ✓ | IC Anions - 300.0 | Cool 4C |
| B10J13 | | W | | | 1x20-mL P | Activity Scan ✓ | None |
| B10J13 | | W | | | 2x1000-mL G/P | Gross Alpha ✓ | HNO3 to pH <2 |
| B10J13 | | W | | | 2x1000-mL G/P | Gross Beta ✓ | HNO3 to pH <2 |
| B10J13 | | W | | | 1x1000-mL G/P | Gamma Spectroscopy(Water) ✓ | HNO3 to pH <2 |
| B10J13 | | W | | | 2x1000-mL G/P | Strontium-89,90 -- Sr-90 ✓ | HNO3 to pH <2 |
| B10J13 | | W | ✓ | ✓ | 1x250-mL P | Tritium - H3 ✓ | None |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

| Relinquished By (Print / Sign) | Date/Time | Received By (Print / Sign) | Date/Time |
|---|---|---|---|
| D. R. BREWINGTON D.R. Brewington | 1442 OCT 31 2000 | FEDEX | 10/31/00 |
| FED. EXPRESS | 11/01/00 10AM | E. Segura | 11/01/00 10AM |
| | | | |
| | | | |

Matrix *

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

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

ThermoRetec
Richmond Laboratory

Analytical Services

## ICE CHEST RECEIPT LOG

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

Customer: (WMTS) BECHTEL HANFORD (PNNL) Date: 11/01/00

| | | | | | | |
|---|---|---|---|---|---|---|
| Ice chest # or description | SML-226 | | | | | |
| Thermometer: time in | 2:00 PM | | | | | |
| Thermometer: time out | 2:40 PM | | | | | |
| Thermometer reading | 4°C | | | | | |
| Thermometer number | 2132 | | | | | |
| Correction factor | NONE | | | | | |
| Actual temperature* | — | | | | | |
| Custody seals on ice chest intact? | NO | | | | | |
| Custody seals dated ? | — | | | | | |
| Custody seals signed? | — | | | | | |
| Custody seals on samples? | Yes | | | | | |
| Ice chest scanned for activity? | Yes | | | | | |

* Temperature is in degrees centigrade.

Technician: _____

Comments: _____

ThermoRetec
Richmond Laboratory

Analytical Services

## SAMPLE RECEIPT CHECKLIST

### SAMPLE RECEIPT

Client: (WMTS) BECHTEL HANFORD (PNNL) Date/Time received 11/01/00 10:AM

CoC No. C01-007-3 AND C01-007-4

Container I.D. No. SML-226 Requested TAT (Days) 45 P.O. Received Yes [ ] No [✓]

### INSPECTION

1. Custody seals on shipping container intact? Yes [✓] No [ ] N/A [ ]
2. Custody seals on shipping container dated & signed? Yes [✓] No [ ] N/A [ ]
3. Custody seals on sample containers intact? Yes [✓] No [ ] N/A [ ]
4. Custody seals on sample containers dated & signed? Yes [✓] No [ ] N/A [ ]
5. Cooler Temperature: _____ Packing material is: Wet [✓] Dry [✓]
6. Number of samples in shipping container: 3
7. Number of containers per sample: PLEASE REPER (Or see CoC _____)
8. Paperwork agrees with samples? Yes [✓] No [ ]
9. Samples have: Tape [ ] Hazard labels [ ] Rad labels [ ] Appropriate sample labels [✓]
10. Samples are: In good condition [✓] Leaking [ ] Broken Container [ ] Missing [ ]
11. Describe any anomalies: _____
13. Was P.M. notified of any anomalies? Yes [ ] No [ ] Date _____
14. Received by E. Deguro Date: 11/01/00 Time: 10:AM

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

Ion Chamber Ser. No. _____ Calibration date _____

Survey Meter Ser No. _____ Calibration date _____

JAN 2001
RECEIVED

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNUHANFORD C01-007 H1116

DATE RECEIVED: 11/07/00 RFW LOT # :0011L167

| CLIENT ID /ANALYSIS | RFW # | MTX | PREP # | COLLECTION | EXTR/PREP | ANALYSIS |
|---|---|---|---|---|---|---|
| B10J11 | | | | | | |
| BROMIDE BY IC | 002 | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| BROMIDE BY IC | 002 REP | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| BROMIDE BY IC | 002 MS | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| CHLORIDE BY IC | 002 | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| CHLORIDE BY IC | 002 REP | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| CHLORIDE BY IC | 002 MS | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| FLUORIDE BY IC | 002 | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| FLUORIDE BY IC | 002 REP | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| FLUORIDE BY IC | 002 MS | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| NITRITE BY IC | 002 | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| NITRITE BY IC | 002 REP | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| NITRITE BY IC | 002 MS | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| NITRATE BY IC | 002 | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| NITRATE BY IC | 002 REP | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| NITRATE BY IC | 002 MS | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| PHOSPHATE BY IC | 002 | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| PHOSPHATE BY IC | 002 REP | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| PHOSPHATE BY IC | 002 MS | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| SULFATE BY IC | 002 | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| SULFATE BY IC | 002 REP | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| SULFATE BY IC | 002 MS | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| B10J13 | | | | | | |
| BROMIDE BY IC | 004 | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| CHLORIDE BY IC | 004 | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| FLUORIDE BY IC | 004 | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| NITRITE BY IC | 004 | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| NITRATE BY IC | 004 | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| PHOSPHATE BY IC | 004 | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |
| SULFATE BY IC | 004 | W | 00LIC072 | 10/31/00 | 11/16/00 | 11/16/00 |

LAB QC:

| | | | | | | |
|---|---|---|---|---|---|---|
| BROMIDE BY IC | MB1 | W | 00LIC072 | N/A | 11/16/00 | 11/16/00 |

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNUHANFORD C01-007 H1116

DATE RECEIVED: 11/07/00 RFW LOT # :0011L167

| CLIENT ID /ANALYSIS | RFW # | MTX | PREP # | COLLECTION | EXTR/PREP | ANALYSIS |
|---|---|---|---|---|---|---|
| BROMIDE BY IC | MB1 BS | W | 00LIC072 | N/A | 11/16/00 | 11/16/00 |
| CHLORIDE BY IC | MB1 | W | 00LIC072 | N/A | 11/16/00 | 11/16/00 |
| CHLORIDE BY IC | MB1 BS | W | 00LIC072 | N/A | 11/16/00 | 11/16/00 |
| FLUORIDE BY IC | MB1 | W | 00LIC072 | N/A | 11/16/00 | 11/16/00 |
| FLUORIDE BY IC | MB1 BS | W | 00LIC072 | N/A | 11/16/00 | 11/16/00 |
| NITRITE BY IC | MB1 | W | 00LIC072 | N/A | 11/16/00 | 11/16/00 |
| NITRITE BY IC | MB1 BS | W | 00LIC072 | N/A | 11/16/00 | 11/16/00 |
| NITRATE BY IC | MB1 | W | 00LIC072 | N/A | 11/16/00 | 11/16/00 |
| NITRATE BY IC | MB1 BS | W | 00LIC072 | N/A | 11/16/00 | 11/16/00 |
| PHOSPHATE BY IC | MB1 | W | 00LIC072 | N/A | 11/16/00 | 11/16/00 |
| PHOSPHATE BY IC | MB1 BS | W | 00LIC072 | N/A | 11/16/00 | 11/16/00 |
| SULFATE BY IC | MB1 | W | 00LIC072 | N/A | 11/16/00 | 11/16/00 |
| SULFATE BY IC | MB1 BS | W | 00LIC072 | N/A | 11/16/00 | 11/16/00 |

RECRA
ENVIRONMENTAL
INC.

*Chemical and Environmental Measurement Information*

**Recra LabNet Philadelphia**
**Analytical Report**

**Client :** TNU-HANFORD C01-007 H1116
**RFW# :** 0011L167

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

## INORGANIC CASE NARRATIVE

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

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

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

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

5. The method blanks were within method criteria.

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

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

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

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

for

J. Michael Taylor
VP, Laboratory General Manager
Lionville Laboratory

12-25-00
Date

njp\i11-167

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.



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

Recra LabNet Philadelphia

## WET CHEMISTRY

## METHODS GLOSSARY FOR WATER SAMPLE ANALYSIS

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

**Other:** **Method:**

## Recra LabNet Philadelphia
# METHOD REFERENCES AND DATA QUALIFIERS

## DATA QUALIFIERS

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

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

## ABBREVIATIONS

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

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

## ANALYTICAL WET CHEMISTRY METHODS

1. ASTM Standard Methods.

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

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

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

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

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

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

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

f. Code of Federal Regulations.

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 12/06/00

CLIENT: TNUHANFORD C01-007 H1116 RECRA LOT #: 0011L167

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

| SAMPLE | SITE ID | ANALYTE | RESULT | UNITS | REPORTING LIMIT | DILUTION FACTOR |
|---|---|---|---|---|---|---|
| -002 | B10J11 | Bromide by IC | 0.25 u | MG/L | 0.25 | 1.0 |
| | | Chloride by IC | 21.7 | MG/L | 1.2 | 5.0 |
| | | 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 | 10 | MG/L | 1.2 | 5.0 |
| | | Phosphate by IC | 0.25 u | MG/L | 0.25 | 1.0 |
| | | Sulfate by IC | 14.4 | MG/L | 1.2 | 5.0 |
| -004 | B10J13 | Bromide by IC | 0.25 u | MG/L | 0.25 | 1.0 |
| | | Chloride by IC | 0.25 u | MG/L | 0.25 | 1.0 |
| | | Fluoride by IC | 0.50 u | MG/L | 0.50 | 1.0 |
| | | Nitrite by IC | 0.25 u | MG/L | 0.25 | 1.0 |
| | | Nitrate by IC | 0.28 | MG/L | 0.25 | 1.0 |
| | | Phosphate by IC | 0.25 u | MG/L | 0.25 | 1.0 |
| | | Sulfate by IC | 0.25 u | MG/L | 0.25 | 1.0 |

Recra LabNet - Lionville

INORGANICS METHOD BLANK DATA SUMMARY PAGE 12/06/00

CLIENT: TNUHANPORD C01-007 H1116

RECRA LOT #: 0011L167

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

| SAMPLE | SITE ID | ANALYTE | RESULT | UNITS | REPORTING LIMIT | DILUTION FACTOR |
|---|---|---|---|---|---|---|
| BLANK10 | 00LIC072-MB1 | Bromide by IC | 0.25 u | MG/L | 0.25 | 1.0 |
| | | Chloride by IC | 0.25 u | MG/L | 0.25 | 1.0 |
| | | Fluoride by IC | 0.50 u | MG/L | 0.50 | 1.0 |
| | | Nitrite by IC | 0.25 u | MG/L | 0.25 | 1.0 |
| | | Nitrate by IC | 0.25 u | MG/L | 0.25 | 1.0 |
| | | Phosphate by IC | 0.25 u | MG/L | 0.25 | 1.0 |
| | | Sulfate by IC | 0.25 u | MG/L | 0.25 | 1.0 |

Recra LabNet - Lionville

INORGANICS ACCURACY REPORT 12/06/00

CLIENT: TNUHANFORD C01-007 H1116

RECRA LOT #: 0011L167

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

| SAMPLE | SITE ID | ANALYTE | SPIKED SAMPLE | INITIAL RESULT | SPIKED AMOUNT | %RECOV | DILUTION FACTOR(SPK) |
|---|---|---|---|---|---|---|---|
| -002 | B10J11 | Bromide by IC | 4.9 | 0.00 | 5.0 | 98.1 | 1.0 |
| | | Chloride by IC | 50.1 | 21.7 | 25.0 | 113.3 | 5.0 |
| | | Fluoride by IC | 11.2 | 0.15 | 10.0 | 110.2 | 1.0 |
| | | Nitrite by IC | 4.9 | 0.25u | 5.0 | 97.6 | 1.0 |
| | | Nitrate by IC | 36 | 10 | 25 | 103.6 | 5.0 |
| | | Phosphate by IC | 4.8 | 0.25u | 5.0 | 96.5 | 1.0 |
| | | Sulfate by IC | 42.2 | 14.4 | 25.0 | 111.4 | 5.0 |
| BLANK10 | 00LIC072-MB1 | Bromide by IC | 4.8 | 0.25u | 5.0 | 96.7 | 1.0 |
| | | Chloride by IC | 4.8 | 0.25u | 5.0 | 95.5 | 1.0 |
| | | Fluoride by IC | 10.6 | 0.50u | 10.0 | 106.1 | 1.0 |
| | | Nitrite by IC | 5.0 | 0.25u | 5.0 | 99.8 | 1.0 |
| | | Nitrate by IC | 4.9 | 0.25u | 5.0 | 97.7 | 1.0 |
| | | Phosphate by IC | 4.9 | 0.25u | 5.0 | 98.7 | 1.0 |
| | | Sulfate by IC | 4.8 | 0.25u | 5.0 | 95.7 | 1.0 |

Recra LabNet - Lionville

INORGANICS PRECISION REPORT 12/06/00

CLIENT: TNUHANFORD C01-007 H1116 RECRA LOT #: 0011L167

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

| SAMPLE | SITE ID | ANALYTE | INITIAL RESULT | REPLICATE | RPD | DILUTION FACTOR(REP) |
|---|---|---|---|---|---|---|
| -002REP | B10J11 | Bromide by IC | 0.25u | 0.25u | NC | 1.0 |
| | | Chloride by IC | 21.7 | 21.5 | 1.2 | 5.0 |
| | | Fluoride by IC | 0.50u | 0.50u | NC | 1.0 |
| | | Nitrite by IC | 0.25u | 0.25u | NC | 1.0 |
| | | Nitrate by IC | 10 | 11 | 1.9 | 5.0 |
| | | Phosphate by IC | 0.25u | 0.25u | NC | 1.0 |
| | | Sulfate by IC | 14.4 | 13.9 | 3.5 | 5.0 |

| RECRA LabNet Use Only |
|---|
| 00116167 |

# Custody Transfer Record/Lab Work Request

Page 1 of 1

**FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS**

RECRA LabNet

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

| | | A | B |
|---|---|---|---|
| Refrigerator # | | S | S |
| #/Type Container | Liquid | 1PL | 1PL |
| | Solid | | |
| Volume | Liquid | 500 | 500 |
| | Solid | | |
| Preservatives | | HNO3 | — |
| ANALYSES REQUESTED | ORGANIC: VOA | | |
| | BNA | | |
| | Pest/PCB | | |
| | Herb | | |
| | INORG: Metal | | |
| | CN | | |
| | | IC NO2 NO3 PO4 | |

RECRA LabNet Use Only

| MATRIX CODES: | Lab ID | Client ID/Description | Matrix QC Chosen (✓) MS | MSD | Matrix | Date Collected | Time Collected | Metal (1) | IC (1) |
|---|---|---|---|---|---|---|---|---|---|
| S - Soil<br>SE - Sediment<br>SO - Solid<br>SL - Sludge<br>W - Water<br>O - Oil<br>A - Air<br>DS - Drum Solids<br>DL - Drum Liquids<br>L - EP/TCLP Leachate<br>WI - Wipe<br>X - Other<br>F - Fish | 001 | B10J10 (F) | | | W | 10/31/00 | 1146 | 1 |
| | 002 | 11 | | | | | ⊥ | 1 |
| | 003 | 12 | | | | | 1020 | 1 |
| | 004 | 13 | | | | | ⊥ | 1 |

Special Instructions: Saf C01-007

Run Matrix QC

DATE/REVISIONS:

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

**RECRA LabNet Use Only**

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

COC Tape was:
1) Present on Outer Package (Y) or N
2) Unbroken on Outer Package (Y) or N
3) Present on Sample (Y) or N
4) Unbroken on Sample (Y) or N
COC Record Present Upon Sample Rec't (Y) or N
Cooler Temp. 4.2 °C

| Relinquished by | Received by | Date | Time |
|---|---|---|---|
| FedEx | K. Hernandez | 11/7/00 | 0930 |
| | | | |

| Relinquished by | Received by | Date | Time |
|---|---|---|---|
| COMPOSITE WASTE | ORIGINAL REWRITTEN | | |

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

PNNL

# CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

CHEM SOG H1116

C.O.C. # C01-007-3

Page 1 of 9

| | | |
|---|---|---|
| Collector: D. R. BREWINGTON | Contact/Requester: JH KESSNER | Telephone No.: (509) 375-4688 MSIN FAX |
| SAF No.: C01-007 | Sampling Origin: HANFORD SITE | Purchase Order/Charge Code |
| Project Title: 100 KR4 IAM (1 & 2) | Logbook No.: WM-SAWS-H37 | Ice Chest No.: SML226 Temp. |
| Shipped To (Lab): TMA/RECRA | Method of Shipment: GOVT. VEHICLE | Bill of Lading/Air Bill No.: 4235 7954 0154 |
| Protocol: CERCLA | Data Turnaround: 45 Days | Offsite Property No.: W010 0018 |

POSSIBLE SAMPLE HAZARDS/REMARKS
** **

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

| Sample No. | Lab ID | * | Date | Time | No/Type Container | Sample Analysis | Preservative |
|---|---|---|---|---|---|---|---|
| B10J10 (F) ✓ | | W | 10-31-00 | 1146 | 1x500-mL G/P | ICP Metals - 6010A RCRA GW | HNO3 to pH <2 |
| B10J11 ✓ | | W | | | 1x500-mL G/P | ICP Metals - 6010A RCRA GW | HNO3 to pH <2 |
| B10J11 ✓ | | W | | | 1x500-mL P | IC Anions - 300.0 | Cool 4C |
| B10J11 ✓ | | W | | | 1x20-mL P | Activity Scan | None |
| B10J11 ✓ | | W | | | 2x1000-mL G/P | Gross Alpha | HNO3 to pH <2 |
| B10J11 ✓ | | W | | | 2x1000-mL G/P | Gross Beta | HNO3 to pH <2 |
| B10J11 ✓ | | W | | | 1x1000-mL G/P | Gamma Spectroscopy(Water) | HNO3 to pH <2 |
| B10J11 ✓ | | W | | | 2x1000-mL G/P | Strontium-89,90 -- Sr-90 | HNO3 to pH <2 |
| B10J11 ✓ | | W | | | 1x250-mL P | Tritium - H3 | None |

FOR RECRA

| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
|---|---|---|---|---|---|---|---|
| D. R. BREWINGTON | D.R. Brewington | OCT 31 2000 | 1442 | FED EX | | | 10/31/00 |
| FED. EXPRESS | | | 11/01/00 10:AM | E. Segura | | | 11/01/00 10:AM |
| JA Corso | JA Corso | | 11-6-00 16:00 | FedEx | | | 11-6-00 |
| | | | | | | | |

Matrix *

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

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

4-2

PNNL

# CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

CHEM SDG H1116

C.O.C. # C01-007-4

Page 1 of 1

| | | |
|---|---|---|
| Collector: D. R. BREWINGTON | Contact/Requester: JH KESSNER | Telephone No.: (509) 375-4688 MSIN FAX |
| SAF No.: C01-007 | Sampling Origin: HANFORD SITE | Purchase Order/Charge Code |
| Project Title: 100 KR4 IAM (1 & 2) | Logbook No.: WM-SANS-437 | Ice Chest No.: SML226 Temp. |
| Shipped To (Lab): TMA/RECRA | Method of Shipment: GOVT. VEHICLE | Bill of Lading/Air Bill No.: 4235 7554 0154 |
| Protocol: CERCLA | Data Turnaround: 45 Days | Offsite Property No.: W010 0018 |

POSSIBLE SAMPLE HAZARDS/REMARKS
** **

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

| Sample No. | Lab ID | * | Date | Time | No/Type Container | Sample Analysis | Preservative |
|---|---|---|---|---|---|---|---|
| B10J12 (F) | | W | 10-31-00 | 1020 | 1x500-mL G/P | ICP Metals - 6010A RCRA GW | HNO3 to pH <2 |
| B10J13 | | W | | | 1x500-mL G/P | ICP Metals - 6010A RCRA GW FOR RECRA | HNO3 to pH <2 |
| B10J13 | | W | | | 1x500-mL P | IC Anions - 300.0 | Cool 4C |
| B10J13 | | W | | | 1x20-mL P | Activity Scan | None |
| B10J13 | | W | | | 2x1000-mL G/P | Gross Alpha | HNO3 to pH <2 |
| B10J13 | | W | | | 2x1000-mL G/P | Gross Beta | HNO3 to pH <2 |
| B10J13 | | W | | | 1x1000-mL G/P | Gamma Spectroscopy(Water) | HNO3 to pH <2 |
| B10J13 | | W | | | 2x1000-mL G/P | Strontium-89,90 -- Sr-90 | HNO3 to pH <2 |
| B10J13 | | W | | | 1x250-mL P | Tritium - H3 | None |

| Relinquished By (Print / Sign) | Date/Time | Received By (Print / Sign) | Date/Time |
|---|---|---|---|
| D. R. BREWINGTON | OCT 31 2000 1442 | FED EX | 10/31/00 |
| FED. EXPRESS | 11/01/00 10AM | E. Segura | 11/01/00 10AM |
| JR Corso | 11-6-00 16:00 | Fed Ex | 11-6-00 |
| Fed Ex | 11/7/00 0930 | | 11/7/00 0930 |

Matrix *

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

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

4-3

PAGE 1 Thermo NUtech CHAIN OF CUSTODY ORD # R0-11-034

11/02/00 14:33:44 WORK ID: SAF C01-007 SDG H1116

RCVD: 11/01/00 DUE: 12/16/00 KEEP: 12/16/01 DISP: S

| DASH | SAMPLE IDENTIFICATION | STORED | TESTS | | |
|---|---|---|---|---|---|
| 01A | B10J10(F) | RECRA | DISPOS | E011 | |
| 02A | B10J11 | RECRA | DISPOS | E011 | E260 |
| 02B | B10J11 MS | RECRA | E011 | E260 | |
| 02C | B10J11 DUP | RECRA | E011 | E260 | |
| 03A | B10J12(F) | RECRA | DISPOS | E011 | |
| 04A | B10J13 | RECRA | DISPOS | E011 | E260 |
| 04B | B10J13 DUP | RECRA | E011 | E260 | |
| 04C | B10J13 MS | RECRA | E011 | E260 | |

| RELEASED BY | DATE | TRANSFERRED TO | DATE | RECEIVED BY | DATE |
|---|---|---|---|---|---|
| JRCorey | 11-6-00 | Fed Ex | 11-6-00 | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

JAN 2001
RECEIVED

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNUHANFORD C01-007 H1116

DATE RECEIVED: 11/07/00 RFW LOT # :0011L167

| CLIENT ID /ANALYSIS | RFW # | MTX | PREP # | COLLECTION | EXTR/PREP | ANALYSIS |
|---|---|---|---|---|---|---|
| B10J10 (F) | | | | | | |
| SILVER, TOTAL | 001 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| SILVER, TOTAL | 001 REP | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| SILVER, TOTAL | 001 MS | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| ALUMINUM, TOTAL | 001 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| ALUMINUM, TOTAL | 001 REP | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| ALUMINUM, TOTAL | 001 MS | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| BARIUM, TOTAL | 001 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| BARIUM, TOTAL | 001 REP | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| BARIUM, TOTAL | 001 MS | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| BERYLLIUM, TOTAL | 001 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| BERYLLIUM, TOTAL | 001 REP | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| BERYLLIUM, TOTAL | 001 MS | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| CALCIUM, TOTAL | 001 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| CALCIUM, TOTAL | 001 REP | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| CALCIUM, TOTAL | 001 MS | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| CADMIUM, TOTAL | 001 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| CADMIUM, TOTAL | 001 REP | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| CADMIUM, TOTAL | 001 MS | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| COBALT, TOTAL | 001 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| COBALT, TOTAL | 001 REP | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| COBALT, TOTAL | 001 MS | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| CHROMIUM, TOTAL | 001 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| CHROMIUM, TOTAL | 001 REP | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| CHROMIUM, TOTAL | 001 MS | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| COPPER, TOTAL | 001 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| COPPER, TOTAL | 001 REP | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| COPPER, TOTAL | 001 MS | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| IRON, TOTAL | 001 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| IRON, TOTAL | 001 REP | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| IRON, TOTAL | 001 MS | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| POTASSIUM, TOTAL | 001 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| POTASSIUM, TOTAL | 001 REP | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| POTASSIUM, TOTAL | 001 MS | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| MAGNESIUM, TOTAL | 001 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| MAGNESIUM, TOTAL | 001 REP | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNUHANFORD C01-007 H1116

DATE RECEIVED: 11/07/00 RFW LOT # :0011L167

| CLIENT ID /ANALYSIS | RFW # | MTX | PREP # | COLLECTION | EXTR/PREP | ANALYSIS |
|---|---|---|---|---|---|---|
| MAGNESIUM, TOTAL | 001 MS | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| MANGANESE, TOTAL | 001 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| MANGANESE, TOTAL | 001 REP | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| MANGANESE, TOTAL | 001 MS | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| SODIUM, TOTAL | 001 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| SODIUM, TOTAL | 001 REP | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| SODIUM, TOTAL | 001 MS | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| NICKEL, TOTAL | 001 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| NICKEL, TOTAL | 001 REP | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| NICKEL, TOTAL | 001 MS | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| ANTIMONY, TOTAL | 001 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| ANTIMONY, TOTAL | 001 REP | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| ANTIMONY, TOTAL | 001 MS | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| STRONTIUM, TOTAL | 001 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| STRONTIUM, TOTAL | 001 REP | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| STRONTIUM, TOTAL | 001 MS | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| VANADIUM, TOTAL | 001 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| VANADIUM, TOTAL | 001 REP | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| VANADIUM, TOTAL | 001 MS | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| ZINC, TOTAL | 001 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| ZINC, TOTAL | 001 REP | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| ZINC, TOTAL | 001 MS | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| B10J11 | | | | | | |
| SILVER, TOTAL | 002 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| ALUMINUM, TOTAL | 002 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| BARIUM, TOTAL | 002 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| BERYLLIUM, TOTAL | 002 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| CALCIUM, TOTAL | 002 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| CADMIUM, TOTAL | 002 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| COBALT, TOTAL | 002 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| CHROMIUM, TOTAL | 002 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| COPPER, TOTAL | 002 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| IRON, TOTAL | 002 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| POTASSIUM, TOTAL | 002 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| MAGNESIUM, TOTAL | 002 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| MANGANESE, TOTAL | 002 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNUHANFORD C01-007 H1116

DATE RECEIVED: 11/07/00 RFW LOT # :0011L167

| CLIENT ID /ANALYSIS | RFW # | MTX | PREP # | COLLECTION | EXTR/PREP | ANALYSIS |
|---|---|---|---|---|---|---|
| SODIUM, TOTAL | 002 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| NICKEL, TOTAL | 002 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| ANTIMONY, TOTAL | 002 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| STRONTIUM, TOTAL | 002 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| VANADIUM, TOTAL | 002 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| ZINC, TOTAL | 002 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| B10J12 | | | | | | |
| SILVER, TOTAL | 003 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| ALUMINUM, TOTAL | 003 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| BARIUM, TOTAL | 003 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| BERYLLIUM, TOTAL | 003 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| CALCIUM, TOTAL | 003 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| CADMIUM, TOTAL | 003 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| COBALT, TOTAL | 003 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| CHROMIUM, TOTAL | 003 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| COPPER, TOTAL | 003 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| IRON, TOTAL | 003 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| POTASSIUM, TOTAL | 003 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| MAGNESIUM, TOTAL | 003 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| MANGANESE, TOTAL | 003 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| SODIUM, TOTAL | 003 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| NICKEL, TOTAL | 003 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| ANTIMONY, TOTAL | 003 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| STRONTIUM, TOTAL | 003 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| VANADIUM, TOTAL | 003 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| ZINC, TOTAL | 003 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| B10J13 | | | | | | |
| SILVER, TOTAL | 004 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| ALUMINUM, TOTAL | 004 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| BARIUM, TOTAL | 004 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| BERYLLIUM, TOTAL | 004 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| CALCIUM, TOTAL | 004 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| CADMIUM, TOTAL | 004 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| COBALT, TOTAL | 004 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNUHANFORD C01-007 H1116

DATE RECEIVED: 11/07/00 RFW LOT # :0011L167

| CLIENT ID /ANALYSIS | RFW # | MTX | PREP # | COLLECTION | EXTR/PREP | ANALYSIS |
|---|---|---|---|---|---|---|
| CHROMIUM, TOTAL | 004 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| COPPER, TOTAL | 004 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| IRON, TOTAL | 004 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| POTASSIUM, TOTAL | 004 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| MAGNESIUM, TOTAL | 004 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| MANGANESE, TOTAL | 004 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| SODIUM, TOTAL | 004 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| NICKEL, TOTAL | 004 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| ANTIMONY, TOTAL | 004 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| STRONTIUM, TOTAL | 004 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| VANADIUM, TOTAL | 004 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |
| ZINC, TOTAL | 004 | W | 99L1807 | 10/31/00 | 12/13/00 | 12/16/00 |

LAB QC:

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

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INORGANIC ANALYTICAL DATA PACKAGE FOR
TNUHANFORD C01-007 H1116

DATE RECEIVED: 11/07/00 RFW LOT # :0011L167

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

RECRA
ENVIRONMENTAL
INC.

*Chemical and Environmental Measurement Information*

**Recra LabNet Philadelphia**
**Analytical Report**

**Client:** TNU-HANFORD C01-007
**RFW#:** 0011L167
**SDG/SAF#:** H1116/C01-007

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

## METALS CASE NARRATIVE

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

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

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

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

5. All Initial and Continuing Calibration Verifications (ICV/CCVs) were within the 90-110% control limits (80-120% for Mercury). The CCV for Strontium was outside control limits in file PS1216A. All samples were rerun for Strontium in file PS1216B.

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

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

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

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

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

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

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

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

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

J. Michael Taylor
VP, Laboratory General Manager
Lionville Laboratory

gmb/m11-167

12-22-00
Date

# METALS METHOD GLOSSARY

The following methods are used as reference for the digestion and analysis of samples contained within this Recra Lot#: 00111167

Leaching Procedure: __1310 __1311 __1312 __Other:_____

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

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

## Metals Analysis Methods

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

Other:_____ Method:_____

L-WI-033/M-11/99

# METHOD REFERENCES AND DATA QUALIFIERS

## DATA QUALIFIERS

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

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

## ABBREVIATIONS

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

## ANALYTICAL METAL METHODS

1. Not included in the method element list.

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

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

4. Flame AA.

5. Graphite Furnace AA.

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

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 12/19/00

CLIENT: TNUHANFORD C01-007 H1116 RECRA LOT #: 0011L167

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

| SAMPLE | SITE ID | ANALYTE | RESULT | | UNITS | REPORTING LIMIT | DILUTION FACTOR |
|---|---|---|---|---|---|---|---|
| -001 | B10J10 (F) | Silver, Total | 2.5 | u | UG/L | 2.5 | 1.0 |
| | | Aluminum, Total | 19.1 | u | UG/L | 19.1 | 1.0 |
| | | Barium, Total | 31.0 | | UG/L | 3.0 | 1.0 |
| | | Beryllium, Total | 0.60 | u | UG/L | 0.60 | 1.0 |
| | | Calcium, Total | 58200 | | UG/L | 15.4 | 1.0 |
| | | Cadmium, Total | 3.4 | u | UG/L | 3.4 | 1.0 |
| | | Cobalt, Total | 5.6 | u | UG/L | 5.6 | 1.0 |
| | | Chromium, Total | 6.3 | | UG/L | 4.9 | 1.0 |
| | | Copper, Total | 2.6 | u | UG/L | 2.6 | 1.0 |
| | | Iron, Total | 15.2 | | UG/L | 3.8 | 1.0 |
| | | Potassium, Total | 4580 | | UG/L | 303 | 1.0 |
| | | Magnesium, Total | 12300 | | UG/L | 27.4 | 1.0 |
| | | Manganese, Total | 81.8 | | UG/L | 2.3 | 1.0 |
| | | Sodium, Total | 5800 | | UG/L | 22.9 | 1.0 |
| | | Nickel, Total | 135 | | UG/L | 12.5 | 1.0 |
| | | Antimony, Total | 21.0 | | UG/L | 17.0 | 1.0 |
| | | Strontium, Total | 220 | | UG/L | 5.5 | 1.0 |
| | | Vanadium, Total | 4.8 | u | UG/L | 4.8 | 1.0 |
| | | Zinc, Total | 2.7 | u | UG/L | 2.7 | 1.0 |

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 12/19/00

CLIENT: TNUHANFORD C01-007 H1116 RECRA LOT #: 0011L167

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

| SAMPLE | SITE ID | ANALYTE | RESULT | | UNITS | REPORTING LIMIT | DILUTION FACTOR |
|---|---|---|---|---|---|---|---|
| -002 | B10J11 | Silver, Total | 2.5 | u | UG/L | 2.5 | 1.0 |
| | | Aluminum, Total | 4650 | | UG/L | 19.1 | 1.0 |
| | | Barium, Total | 78.1 | | UG/L | 3.0 | 1.0 |
| | | Beryllium, Total | 0.60 | u | UG/L | 0.60 | 1.0 |
| | | Calcium, Total | 64600 | | UG/L | 15.4 | 1.0 |
| | | Cadmium, Total | 3.4 | u | UG/L | 3.4 | 1.0 |
| | | Cobalt, Total | 8.6 | | UG/L | 5.6 | 1.0 |
| | | Chromium, Total | 754 | | UG/L | 4.9 | 1.0 |
| | | Copper, Total | 17.3 | | UG/L | 2.6 | 1.0 |
| | | Iron, Total | 8680 | | UG/L | 3.8 | 1.0 |
| | | Potassium, Total | 5310 | | UG/L | 303 | 1.0 |
| | | Magnesium, Total | 14100 | | UG/L | 27.4 | 1.0 |
| | | Manganese, Total | 248 | | UG/L | 2.3 | 1.0 |
| | | Sodium, Total | 6810 | | UG/L | 22.9 | 1.0 |
| | | Nickel, Total | 288 | | UG/L | 12.5 | 1.0 |
| | | Antimony, Total | 17.0 | u | UG/L | 17.0 | 1.0 |
| | | Strontium, Total | 270 | | UG/L | 5.5 | 1.0 |
| | | Vanadium, Total | 25.4 | | UG/L | 4.8 | 1.0 |
| | | Zinc, Total | 32.1 | | UG/L | 2.7 | 1.0 |

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 12/19/00

CLIENT: TNUHANFORD C01-007 H1116 RECRA LOT #: 0011L167

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

| SAMPLE | SITE ID | ANALYTE | RESULT | | UNITS | REPORTING LIMIT | DILUTION FACTOR |
|---|---|---|---|---|---|---|---|
| -003 | B10J12 | Silver, Total | 2.5 | u | UG/L | 2.5 | 1.0 |
| | | Aluminum, Total | 19.1 | u | UG/L | 19.1 | 1.0 |
| | | Barium, Total | 3.0 | u | UG/L | 3.0 | 1.0 |
| | | Beryllium, Total | 0.60 | u | UG/L | 0.60 | 1.0 |
| | | Calcium, Total | 15.4 | u | UG/L | 15.4 | 1.0 |
| | | Cadmium, Total | 3.4 | u | UG/L | 3.4 | 1.0 |
| | | Cobalt, Total | 5.6 | u | UG/L | 5.6 | 1.0 |
| | | Chromium, Total | 4.9 | u | UG/L | 4.9 | 1.0 |
| | | Copper, Total | 2.6 | u | UG/L | 2.6 | 1.0 |
| | | Iron, Total | 10.5 | | UG/L | 3.8 | 1.0 |
| | | Potassium, Total | 303 | u | UG/L | 303 | 1.0 |
| | | Magnesium, Total | 27.4 | u | UG/L | 27.4 | 1.0 |
| | | Manganese, Total | 4.3 | | UG/L | 2.3 | 1.0 |
| | | Sodium, Total | 44.2 | | UG/L | 22.9 | 1.0 |
| | | Nickel, Total | 12.5 | u | UG/L | 12.5 | 1.0 |
| | | Antimony, Total | 17.0 | u | UG/L | 17.0 | 1.0 |
| | | Strontium, Total | 5.5 | u | UG/L | 5.5 | 1.0 |
| | | Vanadium, Total | 4.8 | u | UG/L | 4.8 | 1.0 |
| | | Zinc, Total | 2.7 | u | UG/L | 2.7 | 1.0 |

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 12/19/00

CLIENT: TNUHANFORD C01-007 H1116 RECRA LOT #: 0011L167

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

| SAMPLE | SITE ID | ANALYTE | RESULT | | UNITS | REPORTING LIMIT | DILUTION FACTOR |
|---|---|---|---|---|---|---|---|
| -004 | B10J13 | Silver, Total | 2.5 | u | UG/L | 2.5 | 1.0 |
| | | Aluminum, Total | 21.5 | | UG/L | 19.1 | 1.0 |
| | | Barium, Total | 3.0 | u | UG/L | 3.0 | 1.0 |
| | | Beryllium, Total | 0.60 | u | UG/L | 0.60 | 1.0 |
| | | Calcium, Total | 37.5 | | UG/L | 15.4 | 1.0 |
| | | Cadmium, Total | 3.4 | u | UG/L | 3.4 | 1.0 |
| | | Cobalt, Total | 5.6 | u | UG/L | 5.6 | 1.0 |
| | | Chromium, Total | 6.9 | | UG/L | 4.9 | 1.0 |
| | | Copper, Total | 2.6 | u | UG/L | 2.6 | 1.0 |
| | | Iron, Total | 27.3 | | UG/L | 3.8 | 1.0 |
| | | Potassium, Total | 303 | u | UG/L | 303 | 1.0 |
| | | Magnesium, Total | 39.9 | | UG/L | 27.4 | 1.0 |
| | | Manganese, Total | 4.0 | | UG/L | 2.3 | 1.0 |
| | | Sodium, Total | 117 | | UG/L | 22.9 | 1.0 |
| | | Nickel, Total | 15.9 | | UG/L | 12.5 | 1.0 |
| | | Antimony, Total | 17.0 | u | UG/L | 17.0 | 1.0 |
| | | Strontium, Total | 5.5 | u | UG/L | 5.5 | 1.0 |
| | | Vanadium, Total | 4.8 | u | UG/L | 4.8 | 1.0 |
| | | Zinc, Total | 3.1 | | UG/L | 2.7 | 1.0 |

Recra LabNet - Lionville

INORGANICS METHOD BLANK DATA SUMMARY PAGE 12/19/00

CLIENT: TNUHANFORD C01-007 H1116 RECRA LOT #: 0011L167

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

| SAMPLE | SITE ID | ANALYTE | RESULT | | UNITS | REPORTING LIMIT | DILUTION FACTOR |
|---|---|---|---|---|---|---|---|
| BLANK1 | 99L1807-MB1 | Silver, Total | 2.5 | u | UG/L | 2.5 | 1.0 |
| | | Aluminum, Total | 19.1 | u | UG/L | 19.1 | 1.0 |
| | | Barium, Total | 3.0 | u | UG/L | 3.0 | 1.0 |
| | | Beryllium, Total | 0.60 | u | UG/L | 0.60 | 1.0 |
| | | Calcium, Total | 15.4 | u | UG/L | 15.4 | 1.0 |
| | | Cadmium, Total | 3.4 | u | UG/L | 3.4 | 1.0 |
| | | Cobalt, Total | 5.6 | u | UG/L | 5.6 | 1.0 |
| | | Chromium, Total | 4.9 | u | UG/L | 4.9 | 1.0 |
| | | Copper, Total | 2.6 | u | UG/L | 2.6 | 1.0 |
| | | Iron, Total | 7.1 | | UG/L | 3.8 | 1.0 |
| | | Potassium, Total | 303 | u | UG/L | 303 | 1.0 |
| | | Magnesium, Total | 28.3 | | UG/L | 27.4 | 1.0 |
| | | Manganese, Total | 2.3 | u | UG/L | 2.3 | 1.0 |
| | | Sodium, Total | 27.3 | | UG/L | 22.9 | 1.0 |
| | | Nickel, Total | 12.5 | u | UG/L | 12.5 | 1.0 |
| | | Antimony, Total | 21.7 | | UG/L | 17.0 | 1.0 |
| | | Strontium, Total | 5.5 | u | UG/L | 5.5 | 1.0 |
| | | Vanadium, Total | 4.8 | u | UG/L | 4.8 | 1.0 |
| | | Zinc, Total | 2.7 | u | UG/L | 2.7 | 1.0 |

Recra LabNet - Lionville

INORGANICS ACCURACY REPORT 12/19/00

CLIENT: TNUHANFORD C01-007 H1116 RECRA LOT #: 0011L167

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

| SAMPLE | SITE ID | ANALYTE | SPIKED SAMPLE | INITIAL RESULT | SPIKED AMOUNT | %RECOV | DILUTION FACTOR(SPK) |
|---|---|---|---|---|---|---|---|
| -001 | B10J10 (F) | Silver, Total | 47.8 | 2.5 u | 50.0 | 95.6 | 1.0 |
| | | Aluminum, Total | 2000 | 19.1 u | 2000 | 100.0 | 1.0 |
| | | Barium, Total | 1930 | 31.0 | 2000 | 95.0 | 1.0 |
| | | Beryllium, Total | 48.0 | 0.60u | 50.0 | 96.0 | 1.0 |
| | | Calcium, Total | 86100 | 58200 | 25000 | 111.5 | 1.0 |
| | | Cadmium, Total | 48.0 | 3.4 u | 50.0 | 96.0 | 1.0 |
| | | Cobalt, Total | 486 | 5.6 u | 500 | 97.2 | 1.0 |
| | | Chromium, Total | 200 | 6.3 | 200 | 96.8 | 1.0 |
| | | Copper, Total | 237 | 2.6 u | 250 | 94.8 | 1.0 |
| | | Iron, Total | 982 | 15.2 | 1000 | 96.7 | 1.0 |
| | | Potassium, Total | 29100 | 4580 | 25000 | 97.9 | 1.0 |
| | | Magnesium, Total | 37200 | 12300 | 25000 | 99.8 | 1.0 |
| | | Manganese, Total | 566 | 81.8 | 500 | 96.9 | 1.0 |
| | | Sodium, Total | 30200 | 5800 | 25000 | 97.4 | 1.0 |
| | | Nickel, Total | 631 | 135 | 500 | 99.2 | 1.0 |
| | | Antimony, Total | 498 | 21.0 | 500 | 95.4 | 1.0 |
| | | Strontium, Total | 1230 | 220 | 1000 | 100.7 | 1.0 |
| | | Vanadium, Total | 482 | 4.8 u | 500 | 96.4 | 1.0 |
| | | Zinc, Total | 480 | 2.7 u | 500 | 96.0 | 1.0 |

Recra LabNet - Lionville

INORGANICS PRECISION REPORT 12/19/00

CLIENT: TNUHANFORD C01-007 H1116 RECRA LOT #: 0011L167

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

| SAMPLE | SITE ID | ANALYTE | INITIAL RESULT | REPLICATE | RPD | DILUTION FACTOR(REP) |
|---|---|---|---|---|---|---|
| -001REP | B10J10 (F) | Silver, Total | 2.5 u | 2.5 u | NC | 1.0 |
| | | Aluminum, Total | 19.1 u | 23.6 | ~~NC~~ 200 | 1.0 |
| | | Barium, Total | 31.0 | 33.0 | 6.2 | 1.0 |
| | | Beryllium, Total | 0.60u | 0.60u | NC | 1.0 |
| | | Calcium, Total | 58200 | 60100 | 3.1 | 1.0 |
| | | Cadmium, Total | 3.4 u | 3.4 u | NC | 1.0 |
| | | Cobalt, Total | 5.6 u | 5.6 u | NC | 1.0 |
| | | Chromium, Total | 6.3 | 6.7 | 6.2 | 1.0 |
| | | Copper, Total | 2.6 u | 2.6 u | NC | 1.0 |
| | | Iron, Total | 15.2 | 38.0 | 85.7 | 1.0 |
| | | Potassium, Total | 4580 | 4610 | 0.57 | 1.0 |
| | | Magnesium, Total | 12300 | 12700 | 3.7 | 1.0 |
| | | Manganese, Total | 81.8 | 84.6 | 3.4 | 1.0 |
| | | Sodium, Total | 5800 | 6040 | 4.0 | 1.0 |
| | | Nickel, Total | 135 | 141 | 4.5 | 1.0 |
| | | Antimony, Total | 21.0 | 19.4 | 7.9 | 1.0 |
| | | Strontium, Total | 220 | 260 | 16.7 | 1.0 |
| | | Vanadium, Total | 4.8 u | 4.8 u | NC | 1.0 |
| | | Zinc, Total | 2.7 u | 2.7 u | NC | 1.0 |

[illegible] 12/21/00

Recra LabNet - Lionville

INORGANICS LABORATORY CONTROL STANDARDS REPORT 12/19/00

CLIENT: TNUHANFORD C01-007 H1116 RECRA LOT #: 0011L167

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

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

RECRA LabNet Use Only

00116167

# Custody Transfer Record/Lab Work Request

Page 1 of 1

**FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS**

RECRA LabNet

Client TNU - HANFORD C01-007

Est. Final Proj. Sampling Date

Project # 10985-001-001-9999-00

Project Contact/Phone #

RECRA Project Manager OJ

QC Spec Del Std TAT 30 day

Date Rec'd 11-7-00 Date Due 12-7-00

Account #

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

RECRA LabNet Use Only

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

| Lab ID | Client ID/Description | Matrix QC Chosen (✓) MS | MSD | Matrix | Date Collected | Time Collected | Met(1) | IC(1) |
|---|---|---|---|---|---|---|---|---|
| 001 | B10J10 (F) | | | W | 10/31/00 | 1146 | 1 | |
| 002 | 11 | | | | | ↓ | 1 | 1 |
| 003 | 12 | | | | | 1020 | 1 | |
| 004 | 13 | | | | | ↓ | 1 | 1 |

Special Instructions: Saf C01-007

Run Matrix QC

DATE/REVISIONS:

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

RECRA LabNet Use Only

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

COC Tape was: 1) Present on Outer Package (Y) or N
2) Unbroken on Outer Package (Y) or N
3) Present on Sample (Y) or N
4) Unbroken on Sample (Y) or N
COC Record Present Upon Sample Rec't (Y) or N
Cooler Temp. 4.2 °C

| Relinquished by | Received by | Date | Time |
|---|---|---|---|
| FedEx | K. Hernandez | 11/7/00 | 0930 |

| Relinquished by | Received by | Date | Time |
|---|---|---|---|
| COMPOSITE WASTE | ORIGINAL REWRITTEN | | |

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

NOTES:

8214 8983 0592

PNNL

# CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

CHEM SOG H1116

C.O.C. # C01-007-3

Page 1 of 1

| | | |
|---|---|---|
| Collector: D. R. BREWINGTON | Contact/Requester: JH KESSNER | Telephone No.: (509) 375-4688 MSIN FAX |
| SAF No.: C01-007 | Sampling Origin: HANFORD SITE | Purchase Order/Charge Code |
| Project Title: 100 KR4 IAM (1 & 2) | Logbook No.: WM-SAWS-H37 | Ice Chest No.: SML226 Temp. |
| Shipped To (Lab): TMA/RECRA | Method of Shipment: GOVT. VEHICLE | Bill of Lading/Air Bill No.: 4235 7954 0154 |
| Protocol: CERCLA | Data Turnaround: 45 Days | Offsite Property No.: W010 0018 |

POSSIBLE SAMPLE HAZARDS/REMARKS
" "

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

| Sample No. | Lab ID | * | Date | Time | No/Type Container | Sample Analysis | Preservative |
|---|---|---|---|---|---|---|---|
| B10J10 (F) ✓ | | W | 10-31-00 | 1146 | 1x500-mL G/P ✓ | ICP Metals - 6010A RCRA GW ✓ | HNO3 to pH <2 |
| B10J11 ✓ | | W | | | 1x500-mL G/P ✓ | ICP Metals - 6010A RCRA GW ✓ FOR RECRA | HNO3 to pH <2 |
| B10J11 ✓ | | W | | | 1x500-mL P | IC Anions - 300.0 ✓ | Cool 4C |
| B10J11 ✓ | | W | | | 1x20-mL P | Activity Scan ✓ | None |
| B10J11 ✓ | | W | | | 2x1000-mL G/P | Gross Alpha ✓ | HNO3 to pH <2 |
| B10J11 ✓ | | W | | | 2x1000-mL G/P | Gross Beta ✓ | HNO3 to pH <2 |
| B10J11 ✓ | | W | | | 1x1000-mL G/P | Gamma Spectroscopy(Water) ✓ | HNO3 to pH <2 |
| B10J11 ✓ | | W | | | 2x1000-mL G/P | Strontium-89,90 -- Sr-90 ✓ | HNO3 to pH <2 |
| B10J11 ✓ | | W | | | 1x250-mL P | Tritium - H3 ✓ | None |

| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
|---|---|---|---|---|---|---|---|
| D. R. BREWINGTON | D.R. Brewington | | OCT 31 2000 1146 | FED EX | | | 10/31/00 |
| FED. EXPRESS | | | 11/01/00 10:00 | E. Segura | | | 11/01/00 10:00 |
| JA Corso | JA Corso | | 11-6-00 16:00 | FedEx | | | 11-6-00 |
| | | | | | | | |

Matrix *

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

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

4.2

19

PNNL

# CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

CHEM SOG H1116

C.O.C. # C01-007-4

Page 1 of 1

| | | |
|---|---|---|
| Collector: D. R. BREWINGTON | Contact/Requester: JH KESSNER | Telephone No.: (509) 375-4688 MSIN FAX |
| SAF No.: C01-007 | Sampling Origin: HANFORD SITE | Purchase Order/Charge Code |
| Project Title: 100 KR4 IAM (1 & 2) | Logbook No.: WM-SANS-H37 | Ice Chest No.: SMLZ26 Temp. |
| Shipped To (Lab): TMA/RECRA | Method of Shipment: GOVT. VEHICLE | Bill of Lading/Air Bill No.: 4235 7554 0154 |
| Protocol: CERCLA | Data Turnaround: 45 Days | Offsite Property No.: W010 0018 |

POSSIBLE SAMPLE HAZARDS/REMARKS
** **

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

| Sample No. | Lab ID | * | Date | Time | No/Type Container | Sample Analysis | Preservative |
|---|---|---|---|---|---|---|---|
| B10J12 (F) | | W | 10-31-00 | 1020 | 1x500-mL G/P | ICP Metals - 6010A RCRA GW | HNO3 to pH <2 |
| B10J13 | | W | | | 1x500-mL G/P | ICP Metals - 6010A RCRA GW FOR RECRA | HNO3 to pH <2 |
| B10J13 | | W | | | 1x500-mL P | IC Anions - 300.0 | Cool 4C |
| B10J13 | | W | | | 1x20-mL P | Activity Scan | None |
| B10J13 | | W | | | 2x1000-mL G/P | Gross Alpha | HNO3 to pH <2 |
| B10J13 | | W | | | 2x1000-mL G/P | Gross Beta | HNO3 to pH <2 |
| B10J13 | | W | | | 1x1000-mL G/P | Gamma Spectroscopy(Water) | HNO3 to pH <2 |
| B10J13 | | W | | | 2x1000-mL G/P | Strontium-89,90 -- Sr-90 | HNO3 to pH <2 |
| B10J13 | | W | | | 1x250-mL P | Tritium - H3 | None |

| Relinquished By | Print | Sign | Date/Time | Received By | Print | Sign | Date/Time |
|---|---|---|---|---|---|---|---|
| D. R. BREWINGTON | D. R. Brewington | | OCT 31 2000 1442 | FED EX | | | 10/31/00 |
| FED. EXPRESS | | | 11/01/00 10AM | E. Segura | | | 11/01/00 10AM |
| JR Correo | JR Correo | | 11-6-00 16:00 | Fed Ex | | | 11-6-00 |
| Fed Ex | | | 11/7/00 0930 | [illegible] | | | 11/7/00 0930 |

Matrix *

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

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