GENERAL CHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE:
B098Z1-TMA-636 (923-E418 636GEN.UP2)

9413225.2207

MEMORANDUM

MAR 1994
RECEIVED
TQO

TO: 200 UP-2 Project QA Record

March 7, 1994

FR: Thomas Stapp, Golder Associates Inc.

RE: GENERAL CHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE B098Z1-TMA-636 (923-E418 636GEN.UP2)

9413225.2208

## INTRODUCTION

This memo presents the results of data validation on data package B098Z1-TMA-636 prepared by TMA laboratory. A list of samples validated along with the analyses reported and the methods of analysis is provided in the following table.

| SAMPLE ID | SAMPLE DATE | MEDIA | ANALYSES |
|---|---|---|---|
| B098Z1 | 10/11/93 | SOIL | SEE NOTE 1 |
| B098Z2 | 10/12/93 | SOIL | |
| B098Z3 | 10/14/93 | SOIL | |
| B098Z4 | 10/15/93 | SOIL | |
| B098Z5 | 10/19/93 | SOIL | |
| B098Z6 | 10/21/93 | SOIL | |
| B098Z7 | 10/21/93 | SOIL | |
| B098Z8 | 10/22/93 | SOIL | |
| B098Z9 | 10/22/93 | SOIL | |
| B09901 | 10/25/93 | SOIL | |
| B09903 | 10/25/93 | SOIL | |

Notes:

1. Indicates the samples were analyzed for Nitrate/Nitrite as N.

Data validation was conducted in accordance with the WHC statement of work (WHC 1993a) and validation procedures (WHC 1993b). Attachments 1 through 5 provide the following information as indicated below:

Attachment 1. Glossary of Data Reporting Qualifiers
Attachment 2. Summary of Data Qualifications
Attachment 3. Qualified Data Summary and Annotated Laboratory Reports
Attachment 4. Laboratory Narrative and Chain-of-Custody Documentation
Attachment 5. Data Validation Supporting Documentation

## DATA QUALITY OBJECTIVES

**Precision.** Goals for precision were met.

**Accuracy.** Goals for accuracy were met.

**Sample Result Verification.** All sample results were supported in the raw data.

**Detection Limits.** Detection limit goals were met.

**Completeness.** The data package was complete for all requested analyses. A total of eleven (11) samples were validated in this data package with a total of eleven determinations reported, all of which were deemed valid. This results in a completeness of 100 percent which meets the work plan completeness objective of 90 percent.

## MAJOR DEFICIENCIES

No major deficiencies were identified during data validation which required qualification of data as unusable.

## MINOR DEFICIENCIES

No minor deficiencies were identified during data validation which required qualification of data.

## REFERENCES

WHC, 1993a, Validation of 200 UP-2 Data, Statement of Work, Analytical Laboratory Data Validation, Task Order S-94-18, December 14, 1993, Purchase Order M073750. Westinghouse Hanford Company, Richland, Washington.

WHC, 1993b, Data Validation Procedures for Chemical Analyses, WHC-SD-EN-SPP-002, Rev. 2, 1993. Westinghouse Hanford Company, Richland, Washington.

9413225.2209

ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

9413225.2210

## GLOSSARY OF INORGANIC DATA REPORTING QUALIFIERS

B - Indicates the constituent was analyzed for and detected. The concentration reported is less than the contract required detection limit (CRDL) but greater than the instrument detection limit (IDL). The associated data should be considered usable for decision making purposes.

U - Indicates the constituent was analyzed for and not detected. The concentration reported is the sample detection limit corrected for aliquot size, dilution and percent solids (in the case of solid matrices) by the laboratory. The associated data should be considered usable for decision making purposes.

UJ - Indicates the constituent was analyzed for and not detected. Due to a minor quality control deficiency identified during data validation the concentration may not accurately reflect the sample detection limit. The associated data have been qualified as estimated but should be considered usable for decision making purposes.

BJ - Indicates the constituent was analyzed for and detected at a concentration less than the contract required detection limit (CRDL) but greater than the instrument detection limit (IDL). Due to a minor quality control deficiency identified during data validation the associated data have been qualified as estimated, but should be considered usable for decision making purposes.

J - Indicates the constituent was analyzed for and detected. Due to a minor quality control deficiency identified during data validation the associated data have been qualified as estimated, but should be considered usable for decision making purposes.

UR - Indicates the constituent was analyzed for and not detected. Due to a major quality control deficiency identified during data validation, the associated data have been qualified as unusable for decision making purposes.

R - Indicates the constituent was analyzed for and detected. Due to a major quality control deficiency identified during data validation, the associated data have been qualified as unusable for decision making purposes.

9413225.2211

ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

9413225.2212

# DATA QUALIFICATION SUMMARY - FORM B-7

| SDG: B098Z1-TMA-636 | REVIEWER: T. STAPP | DATE: 3-04-94 | PAGE 1 OF 1 |
|---|---|---|---|
| COMMENTS: WET CHEMISTRY | | | |
| COMPOUND/ANALYTE | QUALIFIER | SAMPLES AFFECTED | REASON |
| ALL NITRATE/NITRITE VALUES REPORTED AS LESS THAN (<) | U | B098Z6<br>B098Z7<br>B098Z8<br>B098Z9<br>B09901 | QUALIFIER APPLIED TO BE CONSISTENT WITH NORMAL REPORTING PRACTICE |
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9413225.2213

ATTACHMENT 3

QUALIFIED DATA SUMMARY and ANNOTATED LABORATORY REPORTS

9W3225.2214

Validated Data Summary, Data Package: B09BZ1-1MA-636

| | Samp# | B09BZ1 | | B09BZ2 | | B09BZ3 | | B09BZ4 | | B09BZ5 | | B09BZ6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Date | 10-11-93 | | 10-12-93 | | 10-14-93 | | 10-15-93 | | 10-19-93 | | 10-21-93 | |
| | Location | --- | | --- | | --- | | --- | | --- | | --- | |
| | Depth | --- | | --- | | --- | | --- | | --- | | --- | |
| | Type | --- | | --- | | --- | | --- | | --- | | --- | |
| | Comments | --- | | --- | | --- | | --- | | --- | | --- | |
| Parameter | Units | Result | Q | Result | Q | Result | Q | Result | Q | Result | Q | Result | Q |
| NITRATE+NITRITE-N | MG N/KG | 12.300 | | 35.700 | | 55.300 | | 24.100 | | 117.000 | | 2.500 | U |

Verified 95 3-7-94

9413225.2216

Validated Data Summary, Data Package: B09BZ1-THA-636

| | Samp# | B09BZ7 | | B09BZ8 | | B09BZ9 | | B09901 | | B09903 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Date | 10-21-93 | | 10-22-93 | | 10-22-93 | | 10-25-93 | | 10-25-93 | |
| | Location | --- | | --- | | --- | | --- | | --- | |
| | Depth | --- | | --- | | --- | | --- | | --- | |
| | Type | --- | | --- | | --- | | --- | | --- | |
| | Comments | --- | | --- | | --- | | --- | | --- | |
| Parameter | Units | Result | Q | Result | Q | Result | Q | Result | Q | Result | Q |
| NITRATE+NITRITE-N | MG-N/KG | 2.490 | U | 2.500 | U | 2.490 | U | 2.500 | U | 86.400 | |

Verified

RS 3-1-94

Received: 11/01/93 Results by Sample

Q

SAMPLE ID B098Z1 SAMPLE # 01 FRACTIONS: A
Date & Time Collected 10/11/93 Category SOIL

NITR_S 12.3
mg N/kg

SAMPLE ID B098Z2 SAMPLE # 02 FRACTIONS: A
Date & Time Collected 10/12/93 Category SOIL

NITR_S 35.7
mg N/kg

SAMPLE ID B098Z3 SAMPLE # 03 FRACTIONS: A
Date & Time Collected 10/14/93 Category SOIL

NITR_S 55.3
mg N/kg

SAMPLE ID 3098Z4 SAMPLE # 04 FRACTIONS: A
Date & Time Collected 10/15/93 Category SOIL

NITR_S 24.1
mg N/kg

SAMPLE ID 3098Z5 SAMPLE # 05 FRACTIONS: A
Date & Time Collected 10/19/93 Category SOIL

NITR_S 117
mg N/kg

SAMPLE ID 3098Z6 SAMPLE # 06 FRACTIONS: A
Date & Time Collected 10/21/93 Category SOIL

NITR_S <2.50 U
mg N/kg

SAMPLE ID 3098Z7 SAMPLE # 07 FRACTIONS: A
Date & Time Collected 10/21/93 Category SOIL

NITR_S <2.49 U
mg N/kg

Verified 3-7-94

9413225.2217

This report is rendered upon all of the following conditions: Skinner & Sherman Laboratories, Inc., retains ownership of this report until associated submitted invoice is satisfied. Expert witness services shall be available in conjunction with this report only if prior notification of this potential requirement was made and accepted, before the analysis. Client will be responsible for Skinner & Sherman costs and consulting fees if our services are required by subpoena or otherwise in legal proceedings. Total liability is limited to the invoice amount. The results listed refer only to tested samples and applicable parameters. Samples are not analyzed in accordance with New York State protocol unless indicated. Product endorsement is neither inferred nor implied. Skinner & Sherman Laboratories, Inc., will exercise due diligence but will not be responsible for lost or destroyed samples or evidence unless client makes appropriate insurance coverage arrangements. Samples are held for thirty days following issuance of report. Samples will be stored at client's expense, if authorized in writing.

TMA
Thermo Analytical Inc.
Skinner & Sherman Laboratories Inc.
300 Second Avenue, P.O. Box 521, Waltham, Massachusetts 02254-0521 (617) 890-7200
1-800-41 LAB TEST FAX (617) 890-3883

Received: 11/01/93 Results by Sample

Q

SAMPLE ID B09828 SAMPLE # 08 FRACTIONS: A
Date & Time Collected 10/22/93 Category SOIL

NITR_S <2.50 U
mg N/kg

SAMPLE ID B09829 SAMPLE # 09 FRACTIONS: A
Date & Time Collected 10/22/93 Category SOIL

NITR_S <2.49 U
mg N/kg

SAMPLE ID B09901 SAMPLE # 10 FRACTIONS: A
Date & Time Collected 10/25/93 Category SOIL

NITR_S <2.50 U
mg N/kg

SAMPLE ID B09903 SAMPLE # 11 FRACTIONS: A
Date & Time Collected 10/25/93 Category SOIL

NITR_S 86.4
mg N/kg

SAMPLE ID B09903D SAMPLE # 11 FRACTIONS: B
Date & Time Collected 10/25/93 Category SOIL

NITR_S 39.4
mg N/kg

SAMPLE ID B09903S SAMPLE # 11 FRACTIONS: C
Date & Time Collected 10/25/93 Category SOIL

NITR_S 109
mg N/kg

SAMPLE ID LCSS SAMPLE # 12 FRACTIONS: A
Date & Time Collected not specified Category SOIL

NITR_S 2.00
mg N/L

Verified 3-7-94

This report is rendered upon all of the following conditions: Skinner & Sherman Laboratories, Inc., retains ownership of this report until associated submitted invoice is satisfied. Expert witness services shall be available in conjunction with this report only if prior notification of this potential requirement was made and accepted, before the analysis. Client will be responsible for Skinner & Sherman costs and consulting fees if our services are required by subpoena or otherwise in legal proceedings. Total liability is limited to the invoice amount. The results listed refer only to tested samples and applicable parameters. Samples are not analyzed in accordance with New York State protocol unless indicated. Product endorsement is neither inferred nor implied. Skinner & Sherman Laboratories, Inc., will exercise due diligence but will not be responsible for lost or destroyed samples or evidence unless client makes appropriate insurance coverage arrangements. Samples are held for thirty days following issuance of report. Samples will be stored at client's expense, if authorized in writing.

TMA
Thermo Analytical Inc.
Skinner & Sherman Laboratories Inc.
300 Second Avenue, P.O. Box 521, Waltham, Massachusetts 02254-0521 (617) 890-7200
1-800-4 LAB TEST FAX (617) 890-3883

PW 3225.2218

ATTACHMENT 4

LABORATORY NARRATIVE and CHAIN-OF-CUSTODY DOCUMENTATION

9413225.2219

Received: 11/01/93 Test Methodology

TEST CODE NITR S NAME Nitrate/Nitrite in Soils

The sample was extracted with deionized water and analyzed in accordance with Method for Chemical Analysis of Water and Wastes EPA-600/4-79-020, March 1979, Method 353.2 (modified)

9413225.2220

This report is rendered upon all of the following conditions: Skinner & Sherman Laboratories, Inc., retains ownership of this report until associated submitted invoice is satisfied. Expert witness services shall be available in conjunction with this report only if prior noufication of this potential requirement was made and accepted, before the analysis. Client will be responsible for Skinner & Sherman costs and consulting fees if our services are required by suopoena or otherwise in legal proceedings. Total liability is limited to the invoice amount. The results listed refer only to tested samples and applicable parameters. Samples are not analyzed in accordance with New York State protocol unless indicated. Product endorsement is neither inferred nor implied. Skinner & Sherman Laboratories, Inc., will exercise due diligence but will not be responsible for lost or destroyed samples or evidence unless client makes appropriate insurance coverage arrangements. Samples are held for thirty days following issuance of report. Samples will be stored at client's expense, if authorized in writing.

TMA
Thermo Analytical Inc.
Skinner & Sherman Laboratories Inc. 300 Second Avenue, P.O. Box 521, Waltham, Massachusetts 02254-0521 (617) 890-7200

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator L E ROGERS

Company Contact L E ROGERS — Telephone 376-7690

Project Designation/Sampling Locations 200-UP-2 — Collection Date 10-11-93

Ice Chest No. KENT — Field Logbook No. EFL-1091

Bill of Lading/Airbill No. — Offsite Property No.

Method of Shipment OVERNIGHT AIR SERVICE

Shipped to TMA

Possible Sample Hazards/Remarks Keep samples at 4C (SOIL) RADIOACTIVE

**Sample Identification**

1) B098Z1

1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

2) ~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~
~~1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)~~

3) ~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~
~~1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)~~

JER 10-11-93

[] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 0920 Loren E. Rogers 10-28-93 | [signature] | 10-29-93 10:20 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

Final Sample Disposition

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

~~026~~ XS 3-7-94

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

9413225.2221

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator L E ROGERS

Company Contact L E ROGERS

Telephone 376-7690

Project Designation/Sampling Locations 200-UP-2

Collection Date 10-12-93

Ice Chest No. KENT

Field Logbook No. EFL-1091

Bill of Lading/Airbill No.

Offsite Property No.

Method of Shipment OVERNIGHT AIR SERVICE

Shipped to TMA

Possible Sample Hazards/Remarks Keep samples at 4C (SOIL) RADIOACTIVE

Sample Identification

1) B09822

1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

2)

~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

3)

1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

KEH 10-12-93

[] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 10-28-93 Lorene E. Rogers 0920 | [signature] | 10-29-93 10:20 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

Final Sample Disposition

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

9413225.2222

~~026B~~ 3-7-94

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator L E ROGERS

Company Contact L E ROGERS — Telephone 376-7690

Project Designation/Sampling Locations 200-UP-2 — Collection Date 10-14-93

Ice Chest No. SML-349 — Field Logbook No. EFL-1091

Bill of Lading/Airbill No. — Offsite Property No.

Method of Shipment OVERNIGHT AIR SERVICE

Shipped to TMA

Possible Sample Hazards/Remarks Keep samples at 4C (SOIL) RADIOACTIVE

Sample Identification

1) B098Z3
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

2)
~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~
~~1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)~~

3)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

JER 10-14-93

9413225.2223

| [] Field Transfer of Custody | Chain of Possession | (Sign and Print Names) |
|---|---|---|
| Relinquished by: 10-28-93 Leon E. Rogers 0930 | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

Final Sample Disposition

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

~~026~~ 3-7-94

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS — Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2 — Collection Date: 10-14-93

Ice Chest No.: SML-349 — Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.: — Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) RADIOACTIVE

Sample Identification

1) B098Z3
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

2)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

3) SER 10-14-93
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

[] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 10-28-93 Leon E. Rogers 0930 | Lucise, TMA/NORCAL | 10-29-93 12:35 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

Final Sample Disposition

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

026F 3-7-94

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

9413225.2224

| Westinghouse Hanford Company | 10-15-93 | CHAIN OF CUSTODY |
|---|---|---|

Custody Form Initiator ~~L E ROGERS~~ W.S. Thompson

Company Contact L E ROGERS — Telephone 376-7690

Project Designation/Sampling Locations 200-UP-2 — Collection Date 10-15-93 TIME: 1051

Ice Chest No. SMC-349 — Field Logbook No. EFL-1091

Bill of Lading/Airbill No. — Offsite Property No.

Method of Shipment OVERNIGHT AIR SERVICE

Shipped to TMA

Possible Sample Hazards/Remarks Keep samples at 4C (SOIL) RADIOACTIVE

Sample Identification

1) B09874
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

2)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

3)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

[] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| W.S. Thompson 1130 10-15-93 | Roy T Gelette | 10-15-93 1130 |
| Roy T Gelette 10-25-93 0820 | 10-25-93 Loren E Rogers 0820 | 10-25-93 0820 |
| Loren E Rogers 10-28-93 0930 | TRANSCRIBAL | 10-29-93 12:35 |
| | | |

Final Sample Disposition

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|
| | | |

Comments:

9413225.2225

026H 3-7-94

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS

Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2

Collection Date: 10-19-93

Ice Chest No.: SML-349

Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.:

Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: WESTON

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) NONE NOTED

Sample Identification

1) B09BZ5

1,120ml P/G:Anions NO2,NO3 (EPA 353.1)
1,1000ml P/G:Gross beta (PRO-032-15), U-235,U-234,U-238 (PRO-052-32) Tc-99 (PRO-032-78)

2)

1,120ml P/G:Anions NO2,NO3 (EPA 353.1)
1,1000ml P/G:Gross beta (PRO-032-15), U-235,U-234,U-238 (PRO-052-32) Tc-99 (PRO-032-78)

3) LER 10-19-93

1,120ml P/G:Anions NO2,NO3 (EPA 353.1)
1,1000ml P/G:Gross beta (PRO-032-15), U-235,U-234,U-238 (PRO-052-32) Tc-99 (PRO-032-78)

| [] Field Transfer of Custody | Chain of Possession | (Sign and Print Names) |
|---|---|---|
| Relinquished by: 10-20-93 09:30 | Received by: TMA/NCRCAL | Date/Time: 10-20-93 12:35 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

Final Sample Disposition

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

9413225.2226

~~0260~~ 3-7-94

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS — Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2 — Collection Date: 10-21-93

Ice Chest No.: SMB-413 — Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.: — Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) NONE NOTED

**Sample Identification**

1) B09BZ6
   - 1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
   - 1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

2) B09BZ7
   - 1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
   - 1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

~~3)~~
   - ~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~ 10-21-93
   - ~~1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)~~

[] Field Transfer of Custody

| Chain of Possession (Sign and Print Names) | | |
|---|---|---|
| Relinquished by: 10-28-93 | Received by: TMA/NORCAL | Date/Time: 10-29-93 12:35 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

**Final Sample Disposition**

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

~~026~~ 3-7-94

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

9413225.2227

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS

Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2

Collection Date: 10-22-93

Ice Chest No.: SML-413

Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.:

Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) NONE NOTED

Sample Identification

1) B098Z8
- 1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
- 1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

2) B098Z9
- 1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
- 1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

3) ~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~ LR 10-22-93
- 1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

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[] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 10-28-93 Loren E. Rogers 0930 | Louise TMA/HORCAL | 10-29-93 12:35 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

Final Sample Disposition

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

~~026 N~~ 3-7-94

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS

Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2

Collection Date: 10-25-93

Ice Chest No.: SML-415

Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.:

Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL)

**Sample Identification**

1) B0990 1

1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

2) ~~B0990 3~~ B0990 3

1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

~~3)~~

~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~
~~1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)~~

[] Field Transfer of Custody

| Chain of Possession (Sign and Print Names) | | |
|---|---|---|
| Relinquished by: 10-28-93 Gene E. Rogers 0930 | Received by: Janice TMA/NORCAL | Date/Time: 10-29-93 12:35 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

**Final Sample Disposition**

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

~~0267~~ FC 3-7-94

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A-6000-407 (12/90) (EF) WEF061
Chain of Custody

ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

9413225.2230

# GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

| VALIDATION LEVEL: | A | B | C | D | E |
|---|---|---|---|---|---|

| | | | |
|---|---|---|---|
| PROJECT: 200 UP-2 | | DATA PACKAGE: B098Z1-TMA-636 | |
| VALIDATOR: T. Stapp | LAB: TMA / Skinner & Sh. | DATE: 3-3-94 | |
| CASE: N3-10-162 | | SDG: ~~N3-10-162~~ | |

ANALYSES PERFORMED

| | | | | | |
|---|---|---|---|---|---|
| ☐ Anions/IC | ☐ TOC | ☐ TOX | ☐ TPH-418.1 | Oil and Grease | Alkalinity |
| ☐ Ammonia | ☐ BOD/COD | ☐ Chloride | ☐ Chromium-VI | ☐ pH | ☒ $NO_3/NO_2$ |
| ☐ Sulfate | ☐ TDS | ☐ TKN | ☐ Phosphate | ☐ | ☐ |
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

SAMPLES/MATRIX B098Z1 B098Z2 B098Z3 B098Z4 B098Z5 B098Z6 B098Z7 B098Z8 B098Z9 B09901 B09903 / SOIL

9413225.2231

## 1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . Yes No N/A

Is a case narrative present? . . . . . Yes ~~No~~ N/A 3-7-94

Comments: Performed by WHC

## 2. HOLDING TIMES

Are sample holding times acceptable? . . . . . Yes No N/A

Comments: See HOLDING TIME SUMMARY on ~~page A-26 of checklist~~ from B-1. 3-7-94

GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

3. INSTRUMENT CALIBRATION

Was initial calibration performed for all applicable analyses? (Yes) No N/A

Are initial calibration results acceptable? . . . . . (Yes) No N/A

Was a calibration check performed for all applicable analyses? (Yes) No N/A

Are calibration check results acceptable? . . . . . (Yes) No N/A

Comments:

4. BLANKS

Were laboratory blanks analyzed? . . . . . (Yes) No N/A

Are laboratory blank results acceptable? . . . . . (Yes) No N/A

Were field/trip blanks analyzed? . . . . . Yes No (N/A)

Are field/trip blank results acceptable? . . . . . Yes No (N/A)

Comments: Field QC, including field/trip blanks, were not identified at the time of this review. Field QC identification has been requested and will be included at the time of final data summary.

5. ACCURACY

Were spike samples analyzed at the required frequency? . . . . (Yes) No N/A

Are spike recoveries acceptable? . . . . . (Yes) No N/A

Were LCS analyses performed at the required frequency? See Note . . . . (Yes) No N/A

Are LCS recoveries acceptable? . . . . . (Yes) No N/A

Comments: Raw data is not available for LCS. ~~All results are qualified "UJ" estimated~~ No qualification has been applied. Reported results are acceptable.. 3-7.

6. PRECISION

Were laboratory duplicate samples analyzed at the required frequency? . . . . . (Yes) No N/A

Are laboratory duplicate sample RPD values acceptable? . . . (Yes) No N/A

Are field duplicate RPD values acceptable? . . . . . Yes No (N/A)

Are field split RPD values acceptable? . . . . . Yes No (N/A)

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GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

Comments: Field QC including field duplicates/splits were not identified at the time of this review. Field QC identification has been requested and will be included at the time of final data summary

**7. ANALYTE QUANTITATION**

Was analyte quantitation performed properly? . . . . . Yes No N/A

Comments:

**8. REPORTED RESULTS AND DETECTION LIMITS**

Are results reported for all requested analyses? . . . . . Yes No N/A

Are results supported in the raw data? . . . . . Yes No N/A

Are results calculated properly? . . . . . Yes No N/A

Do results meet the CRDLs? . . ~~See Note 1.~~ . . . . . Yes ~~No~~ N/A 3-7-94

Comments:

~~1. The CRQL of 0.1 mg/L is not satisfied for soil samples analyzed. Equivalent CRDL = 0.1 mg/kg No qualification applied.~~

3-7-94

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# HOLDING TIME SUMMARY

| SDG: B098Z1-TMA-636 | VALIDATOR: Tom Stapp | DATE: 3-7-94 | PAGE 1 OF 1 |
|---|---|---|---|
| COMMENTS: General Chemistry | | | |

| FIELD SAMPLE ID | ANALYSIS TYPE | DATE SAMPLED | DATE PREPARED | DATE ANALYZED | PREP. HOLDING TIME, DAYS | ANALYSIS HOLDING TIME, DAYS | QUALIFIER |
|---|---|---|---|---|---|---|---|
| B098Z1 | $NO_2/NO_3$ | 10-11-93 | 11-2-93 | 11-3-93 | 22 | 23 | NONE |
| Z2 | | 10-12-93 | | | 21 | 22 | |
| Z3 | | 10-14-93 | | | 19 | 20 | |
| Z4 | | 10-15-93 | | | 18 | 19 | |
| Z5 | | 10-19-93 | | | 14 | 15 | |
| Z6 | | 10-21-93 | | | 12 | 13 | |
| Z7 | | 10-21-93 | | | 12 | 13 | |
| Z8 | | 10-22-93 | | | 11 | 12 | |
| Z9 | | 10-22-93 | | | 11 | 12 | |
| B09901 | | 10-25-93 | | | 8 | 9 | |
| B09903 | | 10-25-93 | | | 8 | 9 | |

RADIOCHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE:
B098Z1-TMA-636 (923-E418 Filename B098Z1.RAD)

9413225.2235

MEMORANDUM

MAR 1994 RECEIVED TQO

TO: 200-UP-2 Project QA Record

March 25, 1994

FR: Susan Winter, Golder Associates Inc.

RE: RADIOCHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE: B098Z1-TMA-636 (923-E418, Filename B098Z1.RAD)

## INTRODUCTION

This memo presents the results of data validation on data package B098Z1-TMA-636 prepared by the Thermo Analytical (TMA) laboratory. A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

| SAMPLE ID | SAMPLE DATE | MEDIA | ANALYSIS |
|---|---|---|---|
| B098Z1 | 10/11/93 | SOIL | Note 1 |
| B098Z2 | 10/12/93 | SOIL | |
| B098Z3 | 10/14/93 | SOIL | |
| B098Z4 | 10/15/93 | SOIL | |
| B098Z5 | 10/19/93 | SOIL | |
| B098Z6 | 10/21/93 | SOIL | |
| B098Z7 | 10/21/93 | SOIL | |
| B098Z8 | 10/22/93 | SOIL | |
| B098Z9 | 10/22/93 | SOIL | |
| B09901 | 10/25/93 | SOIL | |
| B09903 | 10/25/93 | SOIL | |

Note 1. All samples were analyzed for gross alpha, gross beta, technetium-99, isotopic uranium, and total uranium.

RECEIVED MAR 28 1994 VALIDATION DOCUMENTATION SDLA

Data validation was conducted in accordance with the WHC statement of work (WHC 1993a) and validation procedures (WHC 1993b). Attachments 1 through 5 provide the following information as indicated below:

Attachment 1. Glossary of Data Reporting Qualifiers
Attachment 2. Summary of Data Qualifications
Attachment 3. Qualified Data Summary and Annotated Laboratory Reports
Attachment 4. Laboratory Narrative and Chain-of-Custody Documentation
Attachment 5. Data Validation Supporting Documentation

## DATA QUALITY OBJECTIVES

**Precision.** Goals for precision were met.

**Accuracy.** Goals for accuracy were met with the exception of the deficiencies summarized below.

**Sample Result Verification.** All sample results were supported in the raw data.

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**Detection Limits.** Detection limit goals were met with the exception of the following:

| SAMPLE ID | ANALYTE | MDA | RDL |
|---|---|---|---|
| B098Z4 | TECHNETIUM-99 | 0.7 pCi/g | 0.5 pCi/g |

**Completeness.** The data package was complete for all requested analyses. A total of eleven samples were validated in this data package with a total of 77 determinations reported, all of which were deemed valid. This results in a completeness of 100 percent, which meets normal work plan objectives of 90%.

## MAJOR DEFICIENCIES

No major deficiencies were identified during data validation which required qualification of data as unusable.

## MINOR DEFICIENCIES

The following minor deficiencies were identified during data validation which required qualification of data.

Chemical Yield

- Technetium-99 chemical yield for sample B098Z4 was unacceptable. Attachments 2 and 5 provide a summary of the samples affected, data qualifications applied and supporting documentation.

## REFERENCES

WHC 1993a, Validation of 200-UP-2 Data, Statement of Work, Analytical Laboratory Data Validation, Task Order S-94-18, December 14, 1993, Purchase Order M073750. Westinghouse Hanford Company, Richland, Washington.

WHC 1993b, Data Validation Procedures for Radiochemical Analyses, WHC-SD-EN-SPP-001, Rev. 1, 1993. Westinghouse Hanford Company, Richland, Washington.

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ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

9413225.2238

GLOSSARY OF RADIOCHEMISTRY DATA REPORTING QUALIFIERS

U - Indicates the constituent was analyzed for, but was not detected at a concentration above the minimum detectable activity (MDA). The concentration reported is the MDA corrected for sample aliquot size, dilution factors and percent solids (in the case of solid matrices) by the laboratory. The associated data should be considered usable for decision making purposes.

UJ - Indicates the constituent was analyzed for and was not detected at a concentration above the MDA. Due to a quality control deficiency identified during data validation, the concentration reported may not accurately reflect the sample MDA. The associated data should be considered usable for decision making purposes.

J - Indicates the constituent was analyzed for and detected. The concentration reported is qualified as estimated due to a quality control deficiency identified during data validation. The associated data should be considered usable for decision making purposes.

UR - Indicates the constituent was analyzed for and not detected. The concentration reported is qualified as unusable due to a quality control deficiency identified during data validation. The associated data should be considered unusable for decision making purposes.

R - Indicates the constituent was analyzed for and detected. The concentration reported is qualified as unusable due to a quality control deficiency identified during data validation. The associated data should be considered unusable for decision making purposes.

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ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

9413225.2240

DATA QUALIFICATION SUMMARY

B09871-TMA-636

| SDG: | VALIDATOR: [illegible] | DATE: 03/22/94 | PAGE 1 OF 1 |
|---|---|---|---|
| COMMENTS: Radiochemistry | | | |
| COMPOUND | QUALIFIER | SAMPLES AFFECTED | REASON |
| Tc-99 | J | B09874 | Chemical Recovery <30% but >10%. |

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ATTACHMENT 3

QUALIFIED DATA SUMMARY AND ANNOTATED LABORATORY REPORTS

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Validated Data Summary, Data Package: B098Z1-IMA-636

| | Sample# | B098Z1 | | B098Z2 | | B098Z3 | | B098Z4 | | B098Z5 | | B098Z6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Date | 10-11-93 | | 10-12-93 | | 10-14-93 | | 10-15-93 | | 10-19-93 | | 10-21-93 | |
| | Location | --- | | --- | | --- | | --- | | --- | | --- | |
| | Depth | --- | | --- | | --- | | --- | | --- | | --- | |
| | Type | --- | | --- | | --- | | --- | | --- | | --- | |
| | Comments | --- | | --- | | --- | | --- | | --- | | --- | |
| Parameter | Units | Result | Q | Result | Q | Result | Q | Result | Q | Result | Q | Result | Q |
| GROSS ALPHA | pCi/g | 5.000 | U | 8.200 | | 4.000 | U | 7.200 | | 9.300 | | 5.000 | U |
| GROSS BETA | pCi/g | 460.000 | | 170.000 | | 23.000 | | 30.000 | | 20.000 | | 23.000 | |
| TECHNETIUM-99 | pCi/g | 0.300 | U | 0.940 | | 0.600 | | 0.870 | J | 0.580 | | 0.470 | |
| URANIUM-233/234 | pCi/g | 0.880 | | 2.300 | | 0.730 | | 0.580 | | 0.380 | | 0.450 | |
| URANIUM-235 | pCi/g | 0.140 | | 0.240 | | 0.100 | U | 0.100 | U | 0.100 | U | 0.100 | U |
| URANIUM-238 | pCi/g | 1.000 | | 2.200 | | 0.680 | | 0.620 | | 0.490 | | 0.500 | |
| TOTAL URANIUM | UG/G | 2.900 | | 5.100 | | 2.100 | | 1.500 | | NR | | 1.500 | |

Verified

3/25/94

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Validated Data Summary, Data Package: B098Z1-1MA-636

| | Samp# | B098Z7 | | B098Z8 | | B098Z9 | | B09901 | | B09903 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Date | 10-21-93 | | 10-22-93 | | 10-22-93 | | 10-25-93 | | 10-25-93 | |
| | Location | --- | | --- | | --- | | --- | | --- | |
| | Depth | --- | | --- | | --- | | --- | | --- | |
| | Type | --- | | --- | | --- | | --- | | --- | |
| | Comments | --- | | --- | | --- | | --- | | --- | |
| Parameter | Units | Result | Q | Result | Q | Result | Q | Result | Q | Result | Q |
| GROSS ALPHA | µCi/g | 4.500 | | 9.400 | | 6.100 | | 6.800 | | 11.000 | |
| GROSS BETA | pCi/g | 20.000 | | 22.000 | | 24.000 | | 17.000 | | 15.000 | |
| TECHNETIUM-99 | µCi/g | 0.230 | | 0.230 | | 0.300 | U | 0.270 | | 0.200 | U |
| URANIUM-233/234 | µCi/g | 0.560 | | 0.560 | | 0.300 | | 0.780 | | 0.560 | |
| URANIUM-235 | µCi/g | 0.100 | U | 0.100 | U | 0.100 | U | 0.200 | U | 0.200 | U |
| URANIUM-238 | µCi/g | 0.630 | | 0.760 | | 0.640 | | 0.840 | | 0.610 | |
| TOTAL URANIUM | UG/G | 1.500 | | 1.700 | | 1.600 | | 1.900 | | 1.900 | |

Verified
[illegible] 3/25/94

| N310164-01 |
|---|

# TMA NORCAL
REPORTING GROUP 7285

# DATA SHEET

| B098Z1 |
|---|

| | | | |
|---|---|---|---|
| SDG | 7285 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N310164-01 | Client sample id | B098Z1 |
| Dept sample id | 7285-001 | Location/Matrix | 200-UP-2 SOLID |
| Received | 10/29/93 | Collected | 10/11/93 |
| % moisture | 2.6 | Chain of custody id | EFL-1091 |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALIFIERS | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | -2.5 | 4.7 | 5 | 10 | U | 80A |
| Gross Beta | Beta | 460 | 14 | 5 | 10 | | 80B |
| Technetium 99 | 14133-76-7 | 0.14 | 0.10 | 0.3 | 0.5 | U | TC |
| Uranium 233/234 | | 0.88 | 0.23 | 0.1 | 0.3 | | U |
| Uranium 235 | 15117-96-1 | 0.14 | 0.10 | 0.1 | 0.3 | | U |
| Uranium 238 | | 1.0 | 0.23 | 0.1 | 0.3 | | U |
| Total Uranium (ug/g) | 7440-61-1 | 2.9 | 0.52 | 0.03 | 0.1 | | U_T |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N310164-01 | 80A/80 | 7285-001 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-01 | 80B/80 | 7285-001 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-01 | TC | 7285-001 | | 2.00 g | 12/08/93 | 12/13/93 | DPK |
| N310164-01 | U | 7285-001 | | 1.00 g | 12/06/93 | 12/08/93 | DPK |
| N310164-01 | U_T | 7285-001 | | 0.250 g | 12/15/93 | 12/21/93 | DPK |

verified

2/23/94

| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/29/93 |

DATA SHEETS
Page 1
SUMMARY DATA SECTION
Page 12



9413225.2245

N310164-02

TMA NORCAL
REPORTING GROUP 7285

DATA SHEET

B098Z2

| | | | |
|---|---|---|---|
| SDG | 7285 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N310164-02 | Client sample id | B098Z2 |
| Dept sample id | 7285-002 | Location/Matrix | 200-UP-2 SOLID |
| Received | 10/29/93 | Collected | 10/12/93 |
| % moisture | 4.7 | Chain of custody id | EFL-1091 |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALIFIERS Q | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 8.2 | 4.8 | 4 | 10 | J | 80A |
| Gross Beta | Beta | 170 | 9.1 | 5 | 10 | | 80B |
| Technetium 99 | 14133-76-7 | 0.94 | 0.15 | 0.2 | 0.5 | | TC |
| Uranium 233/234 | | 2.3 | 0.45 | 0.2 | 0.3 | | U |
| Uranium 235 | 15117-96-1 | 0.24 | 0.14 | 0.1 | 0.3 | J | U |
| Uranium 238 | | 2.2 | 0.44 | 0.1 | 0.3 | | U |
| Total Uranium (ug/g) | 7440-61-1 | 5.1 | 0.93 | 0.03 | 0.1 | * | U_T |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N310164-02 | 80A/80 | 7285-002 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-02 | 80B/80 | 7285-002 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-02 | TC | 7285-002 | | 2.00 g | 12/14/93 | 12/15/93 | DPK |
| N310164-02 | U | 7285-002 | | 1.00 g | 12/06/93 | 12/08/93 | DPK |
| N310164-02 | U_T | 7285-002 | | 0.250 g | 12/15/93 | 12/21/93 | DPK |

Verified

2/22/94

| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/29/93 |



9413225.2246

N310164-03

TMA NORCAL
REPORTING GROUP 7285

DATA SHEET

B098Z3

| | | | |
|---|---|---|---|
| SDG | 7285 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N310164-03 | Client sample id | B098Z3 |
| Dept sample id | 7285-003 | Location/Matrix | 200-UP-2 SOLID |
| Received | 10/29/93 | Collected | 10/14/93 |
| % moisture | 3.6 | Chain of custody id | EFL-1091 |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALIFIERS Q | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 2.1 | 3.1 | 4 | 10 | U | 80A |
| Gross Beta | Beta | 23 | 4.7 | 6 | 10 | | 80B |
| Technetium 99 | 14133-76-7 | 0.60 | 0.17 | 0.4 | 0.5 | | TC |
| Uranium 233/234 | | 0.73 | 0.19 | 0.08 | 0.3 | | U |
| Uranium 235 | 15117-96-1 | 0.053 | 0.054 | 0.1 | 0.3 | U | U |
| Uranium 238 | | 0.68 | 0.19 | 0.08 | 0.3 | | U |
| Total Uranium (ug/g) | 7440-61-1 | 2.1 | 0.37 | 0.03 | 0.1 | ~~*~~ | U_T |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N310164-03 | 80A/80 | 7285-003 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-03 | 80B/80 | 7285-003 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-03 | TC | 7285-003 | | 2.00 g | 12/14/93 | 12/15/93 | DPK |
| N310164-03 | U | 7285-003 | | 1.00 g | 12/06/93 | 12/08/93 | DPK |
| N310164-03 | U_T | 7285-003 | | 0.250 g | 12/15/93 | 12/21/93 | DPK |

Verified

2/3/94

| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/29/93 |



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N310164-04

# TMA NORCAL
REPORTING GROUP 7285

## DATA SHEET

B098Z4

| | | | |
|---|---|---|---|
| SDG | 7285 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N310164-04 | Client sample id | B098Z4 |
| Dept sample id | 7285-004 | Location/Matrix | 200-UP-2 SOLID |
| Received | 10/29/93 | Collected | 10/15/93 |
| % moisture | 2.4 | Chain of custody id | EFL-1091 |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALIFIERS | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 7.2 | 4.1 | 4 | 10 | J | 80A |
| Gross Beta | Beta | 30 | 4.7 | 5 | 10 | | 80B |
| Technetium 99 | 14133-76-7 | 0.87 | 0.31 | 0.7 | 0.5 | J | TC |
| Uranium 233/234 | | 0.58 | 0.17 | 0.1 | 0.3 | | U |
| Uranium 235 | 15117-96-1 | 0.037 | 0.050 | 0.1 | 0.3 | U | U |
| Uranium 238 | | 0.62 | 0.18 | 0.08 | 0.3 | | U |
| Total Uranium (ug/g) | 7440-61-1 | 1.5 | 0.27 | 0.03 | 0.1 | * | U_T |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N310164-04 | 80A/80 | 7285-004 | | 0.100 g | 12/09/93 | 12/13/93 | DPK |
| N310164-04 | 80B/80 | 7285-004 | | 0.100 g | 12/09/93 | 12/13/93 | DPK |
| N310164-04 | TC | 7285-004 | | 2.00 g | 12/14/93 | 12/15/93 | DPK |
| N310164-04 | U | 7285-004 | | 1.00 g | 12/06/93 | 12/08/93 | DPK |
| N310164-04 | U_T | 7285-004 | | 0.250 g | 12/15/93 | 12/21/93 | DPK |

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| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/29/93 |



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N310164-05

# TMA NORCAL
REPORTING GROUP 7285

## DATA SHEET

B098Z5

| | | | |
|---|---|---|---|
| SDG | 7285 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N310164-05 | Client sample id | B098Z5 |
| Dept sample id | 7285-005 | Location/Matrix | 200-UP-2 SOLID |
| Received | 10/29/93 | Collected | 10/19/93 |
| % moisture | 6.1 | Chain of custody id | EFL-1091 |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALIFIERS | Q TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 9.3 | 4.9 | 5 | 10 | ~~J~~ | 80A |
| Gross Beta | Beta | 20 | 4.2 | 5 | 10 | | 80B |
| Technetium 99 | 14133-76-7 | 0.58 | 0.16 | 0.3 | 0.5 | | TC |
| Uranium 233/234 | | 0.38 | 0.15 | 0.1 | 0.3 | | U |
| Uranium 235 | 15117-96-1 | 0.025 | 0.050 | 0.1 | 0.3 | U | U |
| Uranium 238 | | 0.49 | 0.15 | 0.08 | 0.3 | | U |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N310164-05 | 80A/80 | 7285-005 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-05 | 80B/80 | 7285-005 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-05 | TC | 7285-005 | | 2.00 g | 12/14/93 | 12/15/93 | DPK |
| N310164-05 | U | 7285-005 | | 1.00 g | 12/08/93 | 12/13/93 | DPK |

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|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/29/93 |

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SUMMARY DATA SECTION
Page 16

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N310164-06

# TMA NORCAL
REPORTING GROUP 7285

## DATA SHEET

B098Z6

| | | | |
|---|---|---|---|
| SDG | 7285 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N310164-06 | Client sample id | B098Z6 |
| Dept sample id | 7285-006 | Location/Matrix | 200-UP-2 SOLID |
| Received | 10/29/93 | Collected | 10/21/93 |
| % moisture | 5.2 | Chain of custody id | EFL-1091 |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALIFIERS | Q TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 2.2 | 3.5 | 5 | 10 | U | 80A |
| Gross Beta | Beta | 23 | 4.5 | 5 | 10 | | 80B |
| Technetium 99 | 14133-76-7 | 0.47 | 0.10 | 0.2 | 0.5 | ~~J~~ | TC |
| Uranium 233/234 | | 0.45 | 0.16 | 0.1 | 0.3 | | U |
| Uranium 235 | 15117-96-1 | 0.081 | 0.081 | 0.1 | 0.3 | U | U |
| Uranium 238 | | 0.50 | 0.16 | 0.1 | 0.3 | | U |
| Total Uranium (ug/g) | 7440-61-1 | 1.5 | 0.27 | 0.03 | 0.1 | ~~*~~ | U_T |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N310164-06 | 80A/80 | 7285-006 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-06 | 80B/80 | 7285-006 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-06 | TC | 7285-006 | | 2.00 g | 12/14/93 | 12/15/93 | DPK |
| N310164-06 | U | 7285-006 | | 1.00 g | 12/08/93 | 12/13/93 | DPK |
| N310164-06 | U_T | 7285-006 | | 0.250 g | 12/15/93 | 12/21/93 | DPK |

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| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/29/93 |



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N310164-07

TMA NORCAL
REPORTING GROUP 7285

DATA SHEET

B098Z7

| | | | |
|---|---|---|---|
| SDG | 7285 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N310164-07 | Client sample id | B098Z7 |
| Dept sample id | 7285-007 | Location/Matrix | 200-UP-2 SOLID |
| Received | 10/29/93 | Collected | 10/21/93 |
| % moisture | 3.8 | Chain of custody id | EFL-1091 |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALIFIERS Q | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 4.5 | 3.7 | 4 | 10 | ~~J~~ | 80A |
| Gross Beta | Beta | 20 | 4.3 | 5 | 10 | | 80B |
| Technetium 99 | 14133-76-7 | 0.23 | 0.065 | 0.1 | 0.5 | ~~J~~ | TC |
| Uranium 233/234 | | 0.56 | 0.16 | 0.08 | 0.3 | | U |
| Uranium 235 | 15117-96-1 | 0 | 0.026 | 0.1 | 0.3 | U | U |
| Uranium 238 | | 0.63 | 0.18 | 0.08 | 0.3 | | U |
| Total Uranium (ug/g) | 7440-61-1 | 1.5 | 0.28 | 0.03 | 0.1 | ~~*~~ | U_T |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N310164-07 | 80A/80 | 7285-007 | | 0.100 g | 12/09/93 | 12/18/93 | DPK |
| N310164-07 | 80B/80 | 7285-007 | | 0.100 g | 12/09/93 | 12/18/93 | DPK |
| N310164-07 | TC | 7285-007 | | 2.00 g | 12/16/93 | 12/16/93 | DPK |
| N310164-07 | U | 7285-007 | | 1.00 g | 12/08/93 | 12/18/93 | DPK |
| N310164-07 | U_T | 7285-007 | | 0.250 g | 12/15/93 | 12/21/93 | DPK |

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|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/29/93 |

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N310164-08

TMA NORCAL
REPORTING GROUP 7285

DATA SHEET

B098Z8

| | | | |
|---|---|---|---|
| SDG | 7285 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N310164-08 | Client sample id | B098Z8 |
| Dept sample id | 7285-008 | Location/Matrix | 200-UP-2 SOLID |
| Received | 10/29/93 | Collected | 10/22/93 |
| % moisture | 4.8 | Chain of custody id | EFL-1091 |

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| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALIFIERS Q | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 9.4 | 4.4 | 4 | 10 | ~~J~~ | 80A |
| Gross Beta | Beta | 22 | 4.4 | 5 | 10 | | 80B |
| Technetium 99 | 14133-76-7 | 0.23 | 0.089 | 0.2 | 0.5 | ~~J~~ | TC |
| Uranium 233/234 | | 0.56 | 0.18 | 0.1 | 0.3 | | U |
| Uranium 235 | 15117-96-1 | 0.038 | 0.051 | 0.1 | 0.3 | U | U |
| Uranium 238 | | 0.76 | 0.20 | 0.08 | 0.3 | | U |
| Total Uranium (ug/g) | 7440-61-1 | 1.7 | 0.31 | 0.03 | 0.1 | ~~X~~ | U_T |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N310164-08 | 80A/80 | 7285-008 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-08 | 80B/80 | 7285-008 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-08 | TC | 7285-008 | | 2.00 g | 12/15/93 | 12/16/93 | DPK |
| N310164-08 | U | 7285-008 | | 1.00 g | 12/08/93 | 12/18/93 | DPK |
| N310164-08 | U_T | 7285-008 | | 0.250 g | 12/15/93 | 12/21/93 | DPK |

Verified

| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/29/93 |



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N310164-09

TMA NORCAL
REPORTING GROUP 7285

DATA SHEET

B098Z9

| | | | |
|---|---|---|---|
| SDG | 7285 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N310164-09 | Client sample id | B098Z9 |
| Dept sample id | 7285-009 | Location/Matrix | 200-UP-2 SOLID |
| Received | 10/29/93 | Collected | 10/22/93 |
| % moisture | 4.8 | Chain of custody id | EFL-1091 |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALIFIERS | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 6.1 | 4.1 | 4 | 10 | ~~J~~ | 80A |
| Gross Beta | Beta | 24 | 4.5 | 5 | 10 | | 80B |
| Technetium 99 | 14133-76-7 | 0.26 | 0.11 | 0.3 | 0.5 | U | TC |
| Uranium 233/234 | | 0.30 | 0.16 | 0.1 | 0.3 | | U |
| Uranium 235 | 15117-96-1 | 0.037 | 0.037 | 0.1 | 0.3 | U | U |
| Uranium 238 | | 0.64 | 0.20 | 0.1 | 0.3 | | U |
| Total Uranium (ug/g) | 7440-61-1 | 1.6 | 0.30 | 0.03 | 0.1 | ~~X~~ | U_T |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N310164-09 | 80A/80 | 7285-009 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-09 | 80B/80 | 7285-009 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-09 | TC | 7285-009 | | 2.00 g | 12/15/93 | 12/20/93 | DPK |
| N310164-09 | U | 7285-009 | | 1.00 g | 12/10/93 | 12/13/93 | DPK |
| N310164-09 | U_T | 7285-009 | | 0.250 g | 12/15/93 | 12/21/93 | DPK |

Verified

| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/29/93 |



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N310164-10

# TMA NORCAL
REPORTING GROUP 7285

## DATA SHEET

B09901

| | | | |
|---|---|---|---|
| SDG | 7285 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N310164-10 | Client sample id | B09901 |
| Dept sample id | 7285-010 | Location/Matrix | 200-UP-2 SOLID |
| Received | 10/29/93 | Collected | 10/25/93 |
| % moisture | 9.5 | Chain of custody id | EFL-1091 |

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| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALIFIERS | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 6.8 | 3.9 | 4 | 10 | | 80A |
| Gross Beta | Beta | 17 | 4.4 | 6 | 10 | | 80B |
| Technetium 99 | 14133-76-7 | 0.27 | 0.062 | 0.1 | 0.5 | | TC |
| Uranium 233/234 | | 0.78 | 0.27 | 0.2 | 0.3 | | U |
| Uranium 235 | 15117-96-1 | 0.076 | 0.10 | 0.2 | 0.3 | U | U |
| Uranium 238 | | 0.84 | 0.28 | 0.2 | 0.3 | | U |
| Total Uranium (ug/g) | 7440-61-1 | 1.9 | 0.34 | 0.03 | 0.1 | | U_T |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N310164-10 | 80A/80 | 7285-010 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-10 | 80B/80 | 7285-010 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-10 | TC | 7285-010 | | 2.00 g | 12/13/93 | 12/16/93 | DPK |
| N310164-10 | U | 7285-010 | | 1.00 g | 12/13/93 | 12/15/93 | DPK |
| N310164-10 | U_T | 7285-010 | | 0.250 g | 12/15/93 | 12/21/93 | DPK |

Verified

| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/29/93 |

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N310164-11

TMA NORCAL
REPORTING GROUP 7285

DATA SHEET

B09903

| | | | |
|---|---|---|---|
| SDG | 7285 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N310164-11 | Client sample id | B09903 |
| Dept sample id | 7285-011 | Location/Matrix | 200-UP-2 SOLID |
| Received | 10/29/93 | Collected | 10/25/93 |
| % moisture | 7.5 | Chain of custody id | EFL-1091 |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALIFIERS Q | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 11 | 4.7 | 4 | 10 | | 80A |
| Gross Beta | Beta | 15 | 4.2 | 5 | 10 | | 80B |
| Technetium 99 | 14133-76-7 | 0.18 | 0.083 | 0.2 | 0.5 | U | TC |
| Uranium 233/234 | | 0.56 | 0.22 | 0.1 | 0.3 | | U |
| Uranium 235 | 15117-96-1 | 0.021 | 0.043 | 0.2 | 0.3 | U | U |
| Uranium 238 | | 0.61 | 0.22 | 0.1 | 0.3 | | U |
| Total Uranium (ug/g) | 7440-61-1 | 1.9 | 0.34 | 0.03 | 0.1 | * | U_T |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N310164-11 | 80A/80 | 7285-011 | | 0.100 g | 12/09/93 | 12/18/93 | DPK |
| N310164-11 | 80B/80 | 7285-011 | | 0.100 g | 12/09/93 | 12/18/93 | DPK |
| N310164-11 | TC | 7285-011 | | 2.00 g | 12/13/93 | 12/20/93 | DPK |
| N310164-11 | U | 7285-011 | | 1.00 g | 12/13/93 | 12/15/93 | DPK |
| N310164-11 | U_T | 7285-011 | | 0.250 g | 12/15/93 | 12/21/93 | DPK |

Verified

| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/29/93 |

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ATTACHMENT 4

LABORATORY NARRATIVE AND CHAIN-OF-CUSTODY DOCUMENTATION

9W/3225.2256

SDG: 7285
Contact: Dinkar Kharkar

TMA NORCAL
REPORTING GROUP 7285

Client: Westinghouse Hanford
Contract: MBH-SVV-069262

# CASE NARRATIVE

## 1.0 GENERAL

TMA/Norcal Sample Delivery Group 7285 is comprised of the samples listed on the Chain-of-Custody documents below. This sample group was processed under the Westinghouse Hanford Company Statement of Work P.O. MBH-SVV-069262.

### 1.1 Chains-of-Custody

This report includes data for the eleven soil samples from location 200-UP-2 delivered under Field Log Book No. EFL-1091. Chain-of-Custody numbers were not provided.

### 1.2 Sample Volume

One thousand mL plastic bottles containing the samples were received for the analyses.

### 1.3 Missing Samples

All samples listed on the Field Log Book documents were received.

### 1.4 Holding Times

The samples were collected on October 11 through October 25, 1993 and sample processing was initiated within 180 days of collection.

## 2.0 QUALITY CONTROL

The internal quality control consisted of one sample each of a laboratory control sample, a blank, and a replicate. All original analyses were performed with QC samples 7285-12 through 7285-14.

The QC samples were prepared by the Quality Control Department. Copies of the QC notebook pages are included in this data package.

### 2.1 Laboratory Control Samples

The LCS recoveries for all nuclides were acceptable. The MDA's of the results for all analyses met the RDL's.

### 2.2 Reagent Blanks

The results were satisfactory for all analyses. The MDA's of the results for all analyses met the RDL's.

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## 2.0 QUALITY CONTROL (cont'd)

### 2.3 Duplicates

Results were satisfactory for all duplicate analyses.

## 3.0 ANALYSIS NOTES

### 3.1 Gross Alpha Analyses

The average MDA for gross alpha was (4 ± 1) pCi/g. Gross alpha activity above the RDL was found in sample BO9903.

### 3.2 Gross Beta Analyses

The average MDA for gross beta was (5 ± 0.9) pCi/g. Gross beta activity above the RDL was found in all of the samples.

### 3.3 Technetium-99 Analyses

The average yield for fourteen analyses was (50 ± 29)%. The lowest yield was 19% and the highest was 75%. The average MDA was (0.3 ± 0.3) pCi/g. Technetium-99 activity above the RDL was found in samples BO98Z2, BO98Z3, BO98Z4, and BO98Z5. The MDA of the result for sample BO98Z4 was higher than the RDL because of a low chemical yield.

### 3.4 Total Uranium Analyses

The average MDA was (0.03 ± 0.01) μg/g. Uranium activity ranging from (1.5 to 5.1) μg/g was found in the samples.

### 3.5 Isotopic Uranium Analyses

The average yield for fourteen analyses was (66 ± 16)%. The lowest yield was 54% and the highest was 77%. The average MDA was (0.1 ± 0.1) pCi/g. Uranium-233/234 and uranium-238 activity above the RDL was found in all of the samples. Samples BO9901 and BO9903 were counted for less than the nominal count time of 150 minutes. MDA's met RDL's despite the slightly shortened count times.

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| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS — Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2 — Collection Date: 10-11-93

Ice Chest No.: KENT — Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.: — Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) RADIOACTIVE

**Sample Identification**

1) B098Z1
   1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
   1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

2) ~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~
   ~~1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)~~

3) 1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
   1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

RER 10-11-93

[] Field Transfer of Custody

| Chain of Possession (Sign and Print Names) | | |
|---|---|---|
| Relinquished by: 0920 Loren E. Rogers 10-28-93 | Received by: | Date/Time: 10-29-93 10:20 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

**Final Sample Disposition**

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

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A-6000-407 (12/90) (EF) WEF061
Chain of Custody

~~C 55~~

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS — Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2 — Collection Date: 10-12-93

Ice Chest No.: KENT — Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.: — Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) RADIOACTIVE

**Sample Identification**

1) B09822
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

2)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

3)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

JER 10-12-93

9413225.2260

[] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 10-28-93 Lorene E. Rogers 0920 | [signature] | 10-28-93 10:20 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

**Final Sample Disposition**

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

~~0-57~~

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator L E ROGERS

Company Contact L E ROGERS — Telephone 376-7690

Project Designation/Sampling Locations 200-UP-2 — Collection Date 10-14-93

Ice Chest No. SML-349 — Field Logbook No. EFL-1091

Bill of Lading/Airbill No. — Offsite Property No.

Method of Shipment OVERNIGHT AIR SERVICE

Shipped to TMA

Possible Sample Hazards/Remarks Keep samples at 4C (SOIL) RADIOACTIVE

**Sample Identification**

1) B098Z3
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

2)
~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~
1,1000ml ~~P/G:Gross beta (EP-10)~~, Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

3)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

LER 10-14-93

[ ] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 10-28-93 Leon E. Rogers 0930 | Lucas TMA/NORCAL | 10-29-93 12:35 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

**Final Sample Disposition**

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

9413225.2261

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

~~0-50~~

-026

| Westinghouse Hanford Company | 10-15-93 CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator ~~L E ROGERS~~ W.S. Thompson

Company Contact L E ROGERS

Telephone 376-7690

Project Designation/Sampling Locations 200-UP-2

Collection Date 10-15-93 TIME: 1051

Ice Chest No. SMC-349

Field Logbook No. EFL-1091

Bill of Lading/Airbill No.

Offsite Property No.

Method of Shipment OVERNIGHT AIR SERVICE

Shipped to TMA

Possible Sample Hazards/Remarks Keep samples at 4C (SOIL) RADIOACTIVE

Sample Identification

1) 609874
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

2)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

3)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

[] Field Transfer of Custody

| Chain of Possession | | (Sign and Print Names) |
|---|---|---|
| Relinquished by: W.S. Thompson 1130 10-15-93 | Received by: Roy T Sickle | Date/Time: 10-15-93 1130 |
| Relinquished by: 10-28-93 0820 Roy T Sickle | Received by: 10-28-93 0820 Lorene E. Rogers | Date/Time: 10-28-93 0820 |
| Relinquished by: 10-28-93 Lorene E. Rogers 0930 | Received by: TMA/HORCAL | Date/Time: 10-29-93 12:35 |
| Relinquished by: | Received by: | Date/Time: |

Final Sample Disposition

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

9413225.2262

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

~~0 61~~

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS

Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2

Collection Date: 10-19-93

Ice Chest No.: SAL-349

Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.:

Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: WESTON

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) NONE NOTED

**Sample Identification**

1) B09BZ5

1,120ml P/G:Anions NO2,NO3 (EPA 353.1)
1,1000ml P/G:Gross beta (PRO-032-15), U-235,U-234,U-238 (PRO-052-32) Tc-99 (PRO-032-78)

2)

1,120ml P/G:Anions NO2,NO3 (EPA 353.1)
1,1000ml P/G:Gross beta (PRO-032-15), U-235,U-234,U-238 (PRO-052-32) Tc-99 (PRO-032-78)

3) JER 10-19-93

1,120ml P/G:Anions NO2,NO3 (EPA 353.1)
1,1000ml P/G:Gross beta (PRO-032-15), U-235,U-234,U-238 (PRO-052-32) Tc-99 (PRO-032-78)

[ ] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 10-28-93 Joan Rogers 09:30 | TMA/HORCAL | 10-29-93 12:35 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

**Final Sample Disposition**

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

9413225.2263

~~0 65~~

-028

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

Westinghouse Hanford Company

# CHAIN OF CUSTODY

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS

Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2

Collection Date: 10-21-93

Ice Chest No.: SML-413

Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.:

Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) NONE NOTED

**Sample Identification**

1) [illegible]
   1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
   1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

2) B09BZ9
   1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
   1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

~~3)~~ [illegible] 10-21-93
   ~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~
   ~~1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)~~

[] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 10-28-93 Loren E. Rogers 0930 | TMA/NORCAL | 10-29-93 12:35 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

**Final Sample Disposition**

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

9413225.2264

-029

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS

Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2

Collection Date: 10-22-93

Ice Chest No.: SML-413

Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.:

Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) NONE NOTED

**Sample Identification**

1) B098Z8
- 1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
- 1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

2) B098Z9
- 1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
- 1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

3) ~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~ LR 10-22-93
- 1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

[] Field Transfer of Custody

| Chain of Possession (Sign and Print Names) | | |
|---|---|---|
| Relinquished by: 10-28-93 Loren E. Rogers 0930 | Received by: Francis TMA/HORCAL | Date/Time: 10-29-93 12:35 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

**Final Sample Disposition**

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

9413225.2265

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

0-67

-030

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS

Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2

Collection Date: 10-25-93

Ice Chest No.: SML-415

Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.:

Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL)

**Sample Identification**

1) B09901

1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

2) ~~B09902~~ B09903

1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

~~3)~~

~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~
~~1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)~~

[] Field Transfer of Custody

| Chain of Possession (Sign and Print Names) | | |
|---|---|---|
| Relinquished by: 10-28-93 Loren E. Rogers 0930 | Received by: Francisco TMA/NORCAL | Date/Time: 10-29-93 12:35 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

**Final Sample Disposition**

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

9413225.2266

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

0-69

-031

ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

94J3225.2267

# RADIOCHEMICAL DATA VALIDATION CHECKLIST

| VALIDATION LEVEL: | A | B | C | D | E |
|---|---|---|---|---|---|

| | | | |
|---|---|---|---|
| PROJECT: 200-UP-2 | | DATA PACKAGE: B09871-TMA-636 | |
| VALIDATOR: [illegible] | LAB: TMA | | DATE: 02/23/94 |
| CASE: | | SDG: B09871-TMA-636 | |

**ANALYSES PERFORMED**

| | | | | | |
|---|---|---|---|---|---|
| ☒ Gross Alpha/Beta | ☐ Strontium-90 | ☒ Technetium-99 | ☒ Alpha Spectroscopy | ☐ Gamma Spectroscopy | |
| ☐ Total Uranium | ☐ Radium-22 | ☐ Tritium | ☐ | | |

SAMPLES/MATRIX Soils

| | | |
|---|---|---|
| B09871 | B09876 | B09903 |
| B09872 | B09877 | |
| B09873 | B09878 | |
| B09874 | B09879 | |
| B09875 | B09901 | |

1. Completeness . . . . . ☐ N/A

Technical verification forms present? . . . . . (Yes) No N/A

Comments: _____

2. Initial Calibration . . . . . ☐ N/A

Instruments/detectors calibrated within one year of sample analysis? . . . . . Yes (No) N/A

Initial calibration acceptable? . . . . . (Yes) No N/A

Standards NIST traceable? . . . . . (Yes) No N/A

Standards Expired? . . . . . Yes (No) N/A

Comments: The initial calibration for the gas proportional counters used for gross alpha and gross beta analysis was performed more than a year from sample analysis however, since the QCV criteria was met, no qualification is required.



9413225.2268

3. Continuing Calibration . . . . . ☐ N/A

Calibration checked within one week of sample analysis? . . . Yes No N/A
Calibration check acceptable? . . . . . Yes No N/A
Calibration check standards NIST traceable? . . . . . Yes No N/A
Calibration check standards expired? . . . . . Yes No N/A

Comments: The control limits for the LRG detectors were submitted by the lab under separate cover from the data package. No qualifications were required

4. Blanks . . . . . ☐ N/A

Method blank analyzed? . . . . . Yes No N/A
Method blank results acceptable? . . . . . Yes No N/A
Analytes detected in method blank? . . . . . Yes No N/A
Field blank(s) analyzed? . . . . . Yes No N/A
Field blank results acceptable? . . . . . Yes No N/A
Analytes detected in field blank(s)? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments:

5. Matrix Spikes . . . . . ☒ N/A

Matrix spike analyzed? . . . . . Yes No N/A
Spike recoveries acceptable? . . . . . Yes No N/A
Spike source traceable? . . . . . Yes No N/A
Spike source expired? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments:

9413225.2269

6. Laboratory Control Samples . . . . . ☐ N/A

LCS analyzed? . . . . . Yes No N/A
LCS recoveries acceptable? . . . . . Yes No N/A
LCS traceable? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments:

7. Chemical Recovery . . . . . ☐ N/A

Chemical carrier added? . . . . . Yes No N/A
Chemical recovery acceptable? . . . . . Yes No N/A
Chemical carrier traceable? . . . . . Yes No N/A
Chemical carrier expired? . . . . . Yes No N/A
Transcription/Calculation errors? . . . . . Yes No N/A

Comments: All tracer and chemical recoveries are acceptable with the exception of the chemical recovery for sample R09874 at 19% recovery. The Tc-99 result has been qualified as estimated (J).

8. Duplicates . . . . . ☐ N/A

Duplicates Analyzed? . . . . . Yes No N/A
RPD Values Acceptable? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments:

9413225.2270

9. Field QC Samples . . . . . ☒ N/A

Field duplicate sample(s) analyzed? . . . . . Yes No N/A
Field duplicate RPD values acceptable? . . . . . Yes No N/A
Field split sample(s) analyzed? . . . . . Yes No N/A
Field split RPD values acceptable? . . . . . Yes No N/A
Performance audit sample(s) analyzed? . . . . . Yes No N/A
Performance audit sample results acceptable? . . . . . Yes No N/A

Comments: The sample locations are not currently available. However, field duplicate and field split samples will be evaluated in the final summary report.

10. Holding Times

Are sample holding times acceptable? . . . . . (Yes) No N/A

Comments:

11. Results and Detection Limits (Levels D & E) . . . . . ☐ N/A

Results reported for all required sample analyses? . . . . . (Yes) No N/A
Results supported in raw data? . . . . . (Yes) No N/A
Results Acceptable? . . . . . (Yes) No N/A
Transcription/Calculation errors? . . . . . Yes (No) N/A
MDA's meet required detection limits? . . . . . Yes (No) N/A
Transcription/calculation errors? . . . . . Yes (No) N/A

Comments: The MDA does not meet the RDL for the following samples:

| Parameter | SampleID | MDA | RDL | Units |
|---|---|---|---|---|
| Tc-99 | B09874 | 0.7 | 0.5 | pCi/g |

9413225.2271

# TMA NORCAL

REPORTING GROUP 7285

## WORK SUMMARY

SDG 7285
Contact Dinkar Kharkar

Client Westinghouse Hanford
Contract MBH-SVV-069262

| CLIENT SAMPLE ID / LOCATION / CUSTODY | MATRIX / SAS NO | LAB SAMPLE ID / COLLECTED / RECEIVED | PLANCHET | TEST | SUF-FIX | ANALYZED | # Days ~~REVIEWED BY~~ @ 3/25/94 | METHOD |
|---|---|---|---|---|---|---|---|---|
| B098Z1 | | N310164-01 | 7285-001 | 80A/80 | | 12/08/93 | 58 | Gross Alpha in Soil |
| 200-UP-2 | SOLID | 10/11/93 | 7285-001 | 80B/80 | | 12/08/93 | 58 | Gross Beta in Soil |
| EFL-1091 | | 10/29/93 | 7285-001 | TC | | 12/08/93 | 58 | Technetium 99 in Soil |
| | | | 7285-001 | U | | 12/06/93 | 56 | Uranium, Isotopic in Soil |
| | | | 7285-001 | U_T | | 12/15/93 | 65 | Uranium, Total in Soil |
| B098Z2 | | N310164-02 | 7285-002 | 80A/80 | | 12/08/93 | 57 | Gross Alpha in Soil |
| 200-UP-2 | SOLID | 10/12/93 | 7285-002 | 80B/80 | | 12/08/93 | 57 | Gross Beta in Soil |
| EFL-1091 | | 10/29/93 | 7285-002 | TC | | 12/14/93 | 63 | Technetium 99 in Soil |
| | | | 7285-002 | U | | 12/06/93 | 55 | Uranium, Isotopic in Soil |
| | | | 7285-002 | U_T | | 12/15/93 | 64 | Uranium, Total in Soil |
| B098Z3 | | N310164-03 | 7285-003 | 80A/80 | | 12/08/93 | 55 | Gross Alpha in Soil |
| 200-UP-2 | SOLID | 10/14/93 | 7285-003 | 80B/80 | | 12/08/93 | 55 | Gross Beta in Soil |
| EFL-1091 | | 10/29/93 | 7285-003 | TC | | 12/14/93 | 61 | Technetium 99 in Soil |
| | | | 7285-003 | U | | 12/06/93 | 53 | Uranium, Isotopic in Soil |
| | | | 7285-003 | U_T | | 12/15/93 | 62 | Uranium, Total in Soil |
| B098Z4 | | N310164-04 | 7285-004 | 80A/80 | | 12/09/93 | 55 | Gross Alpha in Soil |
| 200-UP-2 | SOLID | 10/15/93 | 7285-004 | 80B/80 | | 12/09/93 | 55 | Gross Beta in Soil |
| EFL-1091 | | 10/29/93 | 7285-004 | TC | | 12/14/93 | 60 | Technetium 99 in Soil |
| | | | 7285-004 | U | | 12/06/93 | 52 | Uranium, Isotopic in Soil |
| | | | 7285-004 | U_T | | 12/15/93 | 61 | Uranium, Total in Soil |
| B098Z5 | | N310164-05 | 7285-005 | 80A/80 | | 12/08/93 | 50 | Gross Alpha in Soil |
| 200-UP-2 | SOLID | 10/19/93 | 7285-005 | 80B/80 | | 12/08/93 | 50 | Gross Beta in Soil |
| EFL-1091 | | 10/29/93 | 7285-005 | TC | | 12/14/93 | 56 | Technetium 99 in Soil |
| | | | 7285-005 | U | | 12/08/93 | 50 | Uranium, Isotopic in Soil |
| B098Z6 | | N310164-06 | 7285-006 | 80A/80 | | 12/08/93 | 48 | Gross Alpha in Soil |
| 200-UP-2 | SOLID | 10/21/93 | 7285-006 | 80B/80 | | 12/08/93 | 48 | Gross Beta in Soil |
| EFL-1091 | | 10/29/93 | 7285-006 | TC | | 12/14/93 | 54 | Technetium 99 in Soil |
| | | | 7285-006 | U | | 12/08/93 | 48 | Uranium, Isotopic in Soil |
| | | | 7285-006 | U_T | | 12/15/93 | 55 | Uranium, Total in Soil |

3/25/94

Lab id TMAN
Protocol WHC-HASM
Version Ver 1.0
Form DVD-CWS
Version 2.27
Report date 12/29/93



9413225.2272

# TMA NORCAL

REPORTING GROUP 7285

SDG 7285
Contact Dinkar Kharkar

## WORK SUMMARY, cont.

Client Westinghouse Hanford
Contract MBH-SVV-069262

| CLIENT SAMPLE ID / LOCATION / CUSTODY | MATRIX / SAS NO | LAB SAMPLE ID / COLLECTED / RECEIVED | PLANCHET | TEST | SUF-FIX | ANALYZED | ~~REVIEWED BY~~ # Days @ 3/25/94 | METHOD |
|---|---|---|---|---|---|---|---|---|
| B098Z7 | | N310164-07 | 7285-007 | 80A/80 | | 12/09/93 | 49 | Gross Alpha in Soil |
| 200-UP-2 | SOLID | 10/21/93 | 7285-007 | 80B/80 | | 12/09/93 | 49 | Gross Beta in Soil |
| EFL-1091 | | 10/29/93 | 7285-007 | TC | | 12/16/93 | 56 | Technetium 99 in Soil |
| | | | 7285-007 | U | | 12/08/93 | 48 | Uranium, Isotopic in Soil |
| | | | 7285-007 | U_T | | 12/15/93 | 55 | Uranium, Total in Soil |
| B098Z8 | | N310164-08 | 7285-008 | 80A/80 | | 12/08/93 | 47 | Gross Alpha in Soil |
| 200-UP-2 | SOLID | 10/22/93 | 7285-008 | 80B/80 | | 12/08/93 | 47 | Gross Beta in Soil |
| EFL-1091 | | 10/29/93 | 7285-008 | TC | | 12/15/93 | 54 | Technetium 99 in Soil |
| | | | 7285-008 | U | | 12/08/93 | 47 | Uranium, Isotopic in Soil |
| | | | 7285-008 | U_T | | 12/15/93 | 54 | Uranium, Total in Soil |
| B098Z9 | | N310164-09 | 7285-009 | 80A/80 | | 12/08/93 | 47 | Gross Alpha in Soil |
| 200-UP-2 | SOLID | 10/22/93 | 7285-009 | 80B/80 | | 12/08/93 | 47 | Gross Beta in Soil |
| EFL-1091 | | 10/29/93 | 7285-009 | TC | | 12/15/93 | 54 | Technetium 99 in Soil |
| | | | 7285-009 | U | | 12/10/93 | 49 | Uranium, Isotopic in Soil |
| | | | 7285-009 | U_T | | 12/15/93 | 54 | Uranium, Total in Soil |
| B09901 | | N310164-10 | 7285-010 | 80A/80 | | 12/08/93 | 44 | Gross Alpha in Soil |
| 200-UP-2 | SOLID | 10/25/93 | 7285-010 | 80B/80 | | 12/08/93 | 44 | Gross Beta in Soil |
| EFL-1091 | | 10/29/93 | 7285-010 | TC | | 12/13/93 | 49 | Technetium 99 in Soil |
| | | | 7285-010 | U | | 12/13/93 | 49 | Uranium, Isotopic in Soil |
| | | | 7285-010 | U_T | | 12/15/93 | 51 | Uranium, Total in Soil |
| B09903 | | N310164-11 | 7285-011 | 80A/80 | | 12/09/93 | 45 | Gross Alpha in Soil |
| 200-UP-2 | SOLID | 10/25/93 | 7285-011 | 80B/80 | | 12/09/93 | 45 | Gross Beta in Soil |
| EFL-1091 | | 10/29/93 | 7285-011 | TC | | 12/13/93 | 49 | Technetium 99 in Soil |
| | | | 7285-011 | U | | 12/13/93 | 49 | Uranium, Isotopic in Soil |
| | | | 7285-011 | U_T | | 12/15/93 | 51 | Uranium, Total in Soil |
| Reagent Blank | | N310164-13 | 7285-013 | 80A/80 | | 12/09/93 | | Gross Alpha in Soil |
| | SOLID | | 7285-013 | 80B/80 | | 12/09/93 | | Gross Beta in Soil |
| | | | 7285-013 | TC | | 12/16/93 | | Technetium 99 in Soil |
| | | | 7285-013 | U | | 12/13/93 | | Uranium, Isotopic in Soil |
| | | | 7285-013 | U_T | | 12/15/93 | | Uranium, Total in Soil |

3/25/94

Lab id TMAN
Protocol WHC-HASM
Version Ver 1.0
Form DVD-CWS
Version 2.27
Report date 12/29/93



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SAMPLE RESULT VERIFICATION, DATA PACKAGE B098Z1-TMA-636

B098Z1-TMA-636
Gross Alpha/Beta

| Sample ID: | B098Z1 | B098Z2 | B098Z3 | B098Z4 | B098Z5 | B098Z6 | B098Z7 | B098Z8 | B098Z9 | B09901 | B09803 | LCS | BLANK | B098Z2 DUP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aliquot: | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Detector: | 104 | 109 | 110 | 101 | 101 | 102 | 104 | 104 | 109 | 110 | 102 | 102 | 110 | 104 |
| Count time: | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Alpha cpm: | 0.27 | 0.38 | 0.14 | 0.34 | 0.38 | 0.16 | 0.2 | 0.37 | 0.23 | 0.28 | 0.37 | 6.06 | 0.04 | 0.38 |
| Alpha, Bkgd: | 0.072 | 0.057 | 0.064 | 0.092 | 0.091 | 0.086 | 0.064 | 0.072 | 0.057 | 0.064 | 0.062 | 0.066 | 0.051 | 0.072 |
| Alpha, Xtalk: | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 |
| Alpha, Eff: | 0.113 | 0.124 | 0.132 | 0.143 | 0.125 | 0.126 | 0.125 | 0.137 | 0.117 | 0.135 | 0.125 | 0.106 | 0.106 | 0.11 |
| Alpha Result Calc.: | -2.28 | 8.29 | 2.15 | 7.27 | 9.28 | 2.18 | 4.49 | 9.39 | 6.16 | 6.88 | 10.80 | 248.60 | -0.48 | 9.16 |
| Alpha Result Rptd.: | -2.50 | 8.21 | 2.13 | 7.24 | 9.30 | 2.17 | 4.47 | 9.40 | 6.11 | 6.83 | 10.70 | 24.80 | -0.05 | 9.11 |
| Alpha MDA Calc.: | 4.98 | 4.04 | 4.02 | 4.45 | 5.07 | 4.89 | 4.25 | 4.11 | 4.28 | 3.93 | 4.18 | 5.81 | 4.47 | 5.12 |
| Alpha MDA Rptd.: | 4.98 | 4.06 | 4.05 | 4.44 | 5.09 | 4.88 | 4.24 | 4.10 | 4.27 | 3.93 | 4.19 | 0.58 | 0.45 | 5.10 |
| Beta cpm: | 43.53 | 16.89 | 3.44 | 3.86 | 2.92 | 3.31 | 2.94 | 3.13 | 3.25 | 2.94 | 2.59 | 23.5 | 1.29 | 15.11 |
| Bkgd: | 1.009 | 1.032 | 1.257 | 0.953 | 0.947 | 1.123 | 1.01 | 1.009 | 1.032 | 1.257 | 1.122 | 1.123 | 1.261 | 1.009 |
| Xtalk: | 0.282 | 0.277 | 0.271 | 0.264 | 0.276 | 0.275 | 0.276 | 0.268 | 0.28 | 0.269 | 0.276 | 0.291 | 0.291 | 0.283 |
| Eff: | 0.416 | 0.418 | 0.419 | 0.421 | 0.418 | 0.418 | 0.418 | 0.42 | 0.417 | 0.42 | 0.418 | 0.413 | 0.414 | 0.415 |
| Beta Result Calc.: | 459.82 | 169.93 | 23.25 | 30.40 | 20.46 | 23.35 | 20.39 | 21.89 | 23.44 | 17.43 | 14.90 | 225.07 | 0.35 | 152.11 |
| Beta Result Rptd: | 461.00 | 170.00 | 23.30 | 30.40 | 20.50 | 23.40 | 20.40 | 21.90 | 23.50 | 17.50 | 14.90 | 22.50 | 0.04 | 152.00 |
| Beta MDA Calc: | 5.07 | 5.10 | 5.62 | 4.87 | 4.89 | 5.32 | 5.05 | 5.02 | 5.11 | 5.60 | 5.32 | 5.39 | 5.69 | 5.08 |
| Beta MDA rptd: | 5.08 | 5.10 | 5.61 | 4.87 | 4.89 | 5.32 | 5.05 | 5.02 | 5.12 | 5.60 | 5.32 | 0.54 | 0.57 | 5.08 |

SAMPLE RESULT VERIFICATION, DATA PACKAGE B098Z1-TMA-636

B098Z1-TMA-636
Technetium 99

| Sample ID: | B098Z1 | B098Z2 | B098Z3 | B098Z4 | B098Z5 | B098Z6 | B098Z7 | B098Z8 | B098Z9 | B09901 | B09903 | LCS | BLANK | B098Z2 DUP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detector: | LBG 14 | LBG 9 | LBG 10 | LBG 11 | LBG 12 | LBG 13 | LBG 11 | LBG 11 | LBG 12 | LBG 11 | LBG 12 | LBG 13 | LBG 9 | LBG 12 |
| Net, cpm: | 0.17 | 1 | 0.42 | 0.31 | 0.42 | 0.55 | 0.25 | 0.33 | 0.27 | 0.28 | 0.14 | 13.49 | 0.08 | 1.27 |
| Days: | 58.971 | 57.971 | 55.971 | 57.547 | 53.547 | 51.547 | 51.547 | 50.547 | 54.619 | 49.856 | 49.856 | 0 | 0 | 65.619 |
| Lambda: | 8.9E-09 | 8.9E-09 | 8.9E-09 | 8.9E-09 | 8.9E-09 | 8.9E-09 | 8.9E-09 | 8.9E-09 | 8.9E-09 | 8.9E-09 | 8.9E-09 | 8.9E-09 | 8.9E-09 | 8.9E-09 |
| Decay: | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Yield: | 0.6187 | 0.5607 | 0.3747 | 0.1887 | 0.3859 | 0.6138 | 0.574 | 0.7517 | 0.5674 | 0.5524 | 0.3915 | 0.3167 | 0.5386 | 0.5237 |
| Aliquot: | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| P-Factor: | 2.340 | 2.340 | 2.340 | 2.340 | 2.340 | 2.340 | 2.340 | 2.340 | 2.340 | 2.340 | 2.340 | 2.340 | 2.340 | 2.340 |
| Count, time: | 103.8 | 195.7 | 195.7 | 195.7 | 195.7 | 195.7 | 504 | 136.4 | 136.4 | 761.8 | 761.8 | 761.8 | 183.8 | 504 |
| Bkg., cpm: | 0.49 | 0.54 | 0.55 | 0.5 | 0.55 | 0.45 | 0.5 | 0.5 | 0.55 | 0.5 | 0.55 | 0.45 | 0.54 | 0.55 |
| Result, calc.: | 0.14 | 0.94 | 0.59 | 0.87 | 0.57 | 0.47 | 0.23 | 0.23 | 0.25 | 0.27 | 0.19 | 22.45 | 0.08 | 1.28 |
| Result, rptd.: | 0.14 | 0.94 | 0.60 | 0.87 | 0.58 | 0.47 | 0.23 | 0.23 | 0.26 | 0.27 | 0.18 | 22.45 | 0.08 | 1.28 |
| MDA, calc.: | 0.27 | 0.23 | 0.35 | 0.66 | 0.34 | 0.19 | 0.13 | 0.20 | 0.27 | 0.11 | 0.17 | 0.19 | 0.25 | 0.15 |
| MDA, rptd.: | 0.30 | 0.26 | 0.38 | 0.70 | 0.35 | 0.21 | 0.14 | 0.21 | 0.29 | 0.12 | 0.17 | 0.20 | 0.27 | 0.18 |

SAMPLE RESULT VERIFICATION, DATA PACKAGE B098Z1-TMA-636

B098Z1-TMA-636
Uranium 233/4/5/8

| Sample ID: | B098Z1 | B098Z2 | B098Z3 | B098Z4 | B098Z5 | B098Z6 | B098Z7 | B098Z8 | B098Z9 | B09901 | B09903 | LCS | BLANK | B098Z2 DUP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detector: | SS-19 | SS-20 | SS-21 | SS-24 | SS-19 | SS-20 | SS-21 | SS-26 | SS-26 | SS-20 | SS-21 | SS-23 | SS-26 | SS-20 |
| Sample count time: | 214.2 | 214.2 | 214.2 | 214.2 | 231.08 | 231.08 | 231.08 | 231.08 | 165.42 | 149.42 | 149.42 | 386.6 | 149.08 | 141.43 |
| GMT count: | 340.953 | 340.953 | 340.953 | 340.953 | 343.013 | 343.013 | 343.013 | 343.013 | 344.683 | 347.997 | 347.997 | 356.82 | 347.997 | 351 |
| Zero time: | 284.292 | 285.292 | 287.292 | 288.292 | 292.292 | 294.292 | 294.292 | 295.292 | 295.292 | 298.292 | 298.292 | 356.82 | 347.997 | 284.292 |
| Corr. tracer dpm: | 10.49 | 10.49 | 10.49 | 10.49 | 10.49 | 10.49 | 10.49 | 10.49 | 10.49 | 10.49 | 10.49 | 10.49 | 10.49 | 10.49 |
| Bkgd count time: | 2666.37 | 2666.37 | 2666.37 | 2666.37 | 2666.37 | 2666.37 | 2666.37 | 2666.37 | 2666.37 | 2383.07 | 2383.07 | 1132.27 | 2383.07 | 2383.07 |
| Net tracer counts: | 445 | 330 | 429 | 457 | 457 | 423 | 435 | 451 | 310 | 225 | 269 | 917 | 242 | 219 |
| Detector eff.: | 0.261 | 0.2675 | 0.2479 | 0.3185 | 0.2647 | 0.2675 | 0.2476 | 0.2803 | 0.284 | 0.2671 | 0.2463 | 0.3121 | 0.2833 | 0.2654 |
| Yield: | 0.7599 | 0.5499 | 0.7715 | 0.6396 | 0.7135 | 0.6534 | 0.7281 | 0.6648 | 0.6302 | 0.5385 | 0.6981 | 0.7259 | 0.5472 | 0.5573 |
| U-238, gross counts: | 98 | 167 | 62 | 61 | 48 | 47 | 58 | 74 | 42 | 40 | 35 | 1120 | 4 | 128 |
| U-238, bkgd counts: | 2 | 2 | 0 | 1 | 1 | 2 | 0 | 1 | 0 | 0 | 0 | 62 | 0 | 1 |
| U-238, Lambda: | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 |
| U-238, Decay corr: | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| U-235, gross counts: | 12 | 15 | 5 | 4 | 3 | 7 | 1 | 3 | 2 | 3 | 1 | 614 | 0 | 10 |
| U-235, bkgd counts: | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| U-235, Lambda: | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 |
| U-235, Decay corr: | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| U-235, branch ratio: | 0.826 | 0.826 | 0.826 | 0.826 | 0.826 | 0.826 | 0.826 | 0.826 | 0.826 | 0.826 | 0.826 | 0.826 | 0.826 | 0.826 |
| U-233/4, gross counts: | 89 | 169 | 68 | 60 | 42 | 44 | 54 | 58 | 22 | 38 | 33 | 1030 | 7 | 112 |
| U-233/4, bkgd counts: | 5 | 5 | 2 | 4 | 5 | 4 | 2 | 4 | 2 | 1 | 1 | 72 | 2 | 2 |
| U-233/4, Lambda: | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 |
| U-233/4, Decay corr: | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Aliquot: | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| U-238, result calc.: | 1.02 | 2.22 | 0.68 | 0.62 | 0.49 | 0.50 | 0.63 | 0.76 | 0.64 | 0.84 | 0.61 | 5.44 | 0.08 | 2.73 |
| U-238, result rptd: | 1.02 | 2.22 | 0.68 | 0.62 | 0.49 | 0.50 | 0.63 | 0.76 | 0.64 | 0.84 | 0.61 | 5.44 | 0.08 | 2.74 |
| U-238 MDA calc.: | 0.08 | 0.11 | 0.08 | 0.08 | 0.08 | 0.09 | 0.08 | 0.08 | 0.12 | 0.16 | 0.13 | 0.19 | 0.15 | 0.17 |
| U-238, MDA rptd.: | 0.08 | 0.11 | 0.08 | 0.08 | 0.08 | 0.09 | 0.08 | 0.08 | 0.12 | 0.16 | 0.13 | 0.19 | 0.15 | 0.17 |
| U-235, result calc.: | 0.14 | 0.24 | 0.05 | 0.04 | 0.02 | 0.08 | 0.00 | 0.04 | 0.04 | 0.08 | 0.02 | 3.81 | 0.00 | 0.26 |
| U-235, result rptd.: | 0.14 | 0.24 | 0.05 | 0.04 | 0.02 | 0.08 | 0.00 | 0.04 | 0.04 | 0.08 | 0.02 | 3.81 | 0.00 | 0.26 |
| U-235, MDA calc.: | 0.10 | 0.13 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.14 | 0.19 | 0.16 | 0.05 | 0.18 | 0.20 |
| U-235, MDA rptd.: | 0.10 | 0.13 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.14 | 0.19 | 0.16 | 0.05 | 0.18 | 0.20 |
| U-233/4, result calc.: | 0.89 | 2.34 | 0.73 | 0.58 | 0.38 | 0.45 | 0.56 | 0.56 | 0.30 | 0.78 | 0.56 | 4.93 | 0.10 | 2.37 |
| U-233/4, result rptd.: | 0.88 | 0.23 | 0.73 | 0.58 | 0.38 | 0.45 | 0.56 | 0.56 | 0.30 | 0.78 | 0.56 | 4.93 | 0.10 | 2.37 |
| U-233/4, MDA calc.: | 0.11 | 0.15 | 0.08 | 0.10 | 0.11 | 0.10 | 0.08 | 0.10 | 0.12 | 0.16 | 0.13 | 0.20 | 0.15 | 0.17 |
| U-233/4, MDA rptd.: | 0.14 | 0.18 | 0.08 | 0.11 | 0.13 | 0.12 | 0.08 | 0.12 | 0.15 | 0.16 | 0.13 | 0.22 | 0.19 | 0.21 |

SAMPLE RESULT VERIFICATION, DATA PACKAGE B098Z1-TMA-636

B098Z1-TMA-636
Total Uranium

| Standard | Intensity | Sample ID | Intens. | ug/L Calc. | ug/L Rptd | Amount of Smpl | Prep. Volume | Dilution | Calc Result | Rptd Rslt |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.049 | 534 | B098Z1 | 28475 | 3.261 | 3.58478 | 0.25 | 0.02 | 10 | 2.87 | 2.90 |
| 0.156 | 1346 | B098Z2 | 50969 | 5.837 | 6.33276 | 0.25 | 0.02 | 10 | 5.07 | 5.09 |
| 0.521 | 4460 | B098Z3 | 20939 | 2.398 | 2.57217 | 0.25 | 0.02 | 10 | 2.06 | 2.06 |
| 0.976 | 8440 | B098Z4 | 15355 | 1.758 | 1.86486 | 0.25 | 0.02 | 10 | 1.49 | 1.49 |
| 2.603 | 21956 | B098Z6 | 15286 | 1.750 | 1.8764 | 0.25 | 0.02 | 10 | 1.50 | 1.50 |
| 4.881 | 41542 | B098Z7 | 16125 | 1.847 | 1.91936 | 0.25 | 0.02 | 10 | 1.54 | 1.54 |
| 16.27 | 129728 | B098Z8 | 17565 | 2.011 | 2.14731 | 0.25 | 0.02 | 10 | 1.72 | 1.72 |
| | | B098Z9 | 17066 | 1.954 | 2.05607 | 0.25 | 0.02 | 10 | 1.64 | 1.65 |
| Slope: | 1.1E-04 | B09901 | 19289 | 2.209 | 2.35082 | 0.25 | 0.02 | 10 | 1.88 | 1.88 |
| | | B09903 | 18409 | 2.108 | 2.32018 | 0.25 | 0.02 | 10 | 1.86 | 1.86 |
| | | LCS | 33587 | 3.846 | 3.78175 | 0.25 | 0.02 | 10 | 3.03 | 3.02 |
| | | BLANK | -584 | -0.067 | 0.036 | 0.25 | 0.02 | 1 | 0.003 | 0.003 |
| | | B098Z2 DUP | 51139 | 5.856 | 6.57246 | 0.25 | 0.02 | 10 | 5.26 | 5.26 |

RADIOCHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE:
B098Z1-TMA-636 (923-E418, Filename B098Z1.RAD)

9453549.2278

MEMORANDUM

MAR 1994 RECEIVED TQO

TO: 200-UP-2 Project QA Record

March 25, 1994

FR: Susan Winter, Golder Associates Inc.

RE: RADIOCHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE: B098Z1-TMA-636 (923-E418, Filename B098Z1.RAD)

## INTRODUCTION

This memo presents the results of data validation on data package B098Z1-TMA-636 prepared by the Thermo Analytical (TMA) laboratory. A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

| SAMPLE ID | SAMPLE DATE | MEDIA | ANALYSIS |
|---|---|---|---|
| B098Z1 | 10/11/93 | SOIL | SEE NOTE 1 |
| B098Z2 | 10/12/93 | SOIL | |
| B098Z3 | 10/14/93 | SOIL | |
| B098Z4 | 10/15/93 | SOIL | |
| B098Z5 | 10/19/93 | SOIL | |
| B098Z6 | 10/21/93 | SOIL | |
| B098Z7 | 10/21/93 | SOIL | |
| B098Z8 | 10/22/93 | SOIL | |
| B098Z9 | 10/22/93 | SOIL | |
| B09901 | 10/25/93 | SOIL | |
| B09903 | 10/25/93 | SOIL | |

Note 1. All samples were analyzed for gross alpha, gross beta, technetium-99, isotopic uranium, and total uranium.

RECEIVED MAR 23 1994 VALIDATION DOCUMENT SDLA

Data validation was conducted in accordance with the WHC statement of work (WHC 1993a) and validation procedures (WHC 1993b). Attachments 1 through 5 provide the following information as indicated below:

Attachment 1. Glossary of Data Reporting Qualifiers
Attachment 2. Summary of Data Qualifications
Attachment 3. Qualified Data Summary and Annotated Laboratory Reports
Attachment 4. Laboratory Narrative and Chain-of-Custody Documentation
Attachment 5. Data Validation Supporting Documentation

## DATA QUALITY OBJECTIVES

**Precision.** Goals for precision were met.

**Accuracy.** Goals for accuracy were met with the exception of the deficiencies summarized below.

**Sample Result Verification.** All sample results were supported in the raw data.

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**Detection Limits.** Detection limit goals were met with the exception of the following:

| SAMPLE ID | ANALYTE | MDA | RDL |
|---|---|---|---|
| B098Z4 | TECHNETIUM-99 | 0.7 pCi/g | 0.5 pCi/g |

**Completeness.** The data package was complete for all requested analyses. A total of eleven samples were validated in this data package with a total of 77 determinations reported, all of which were deemed valid. This results in a completeness of 100 percent, which meets normal work plan objectives of 90%.

## MAJOR DEFICIENCIES

No major deficiencies were identified during data validation which required qualification of data as unusable.

## MINOR DEFICIENCIES

The following minor deficiencies were identified during data validation which required qualification of data.

Chemical Yield

- Technetium-99 chemical yield for sample B098Z4 was unacceptable. Attachments 2 and 5 provide a summary of the samples affected, data qualifications applied and supporting documentation.

## REFERENCES

WHC 1993a, Validation of 200-UP-2 Data, Statement of Work, Analytical Laboratory Data Validation, Task Order S-94-18, December 14, 1993, Purchase Order M073750. Westinghouse Hanford Company, Richland, Washington.

WHC 1993b, Data Validation Procedures for Radiochemical Analyses, WHC-SD-EN-SPP-001, Rev. 1, 1993. Westinghouse Hanford Company, Richland, Washington.

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ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

9W3225.2281

## GLOSSARY OF RADIOCHEMISTRY DATA REPORTING QUALIFIERS

U - Indicates the constituent was analyzed for, but was not detected at a concentration above the minimum detectable activity (MDA). The concentration reported is the MDA corrected for sample aliquot size, dilution factors and percent solids (in the case of solid matrices) by the laboratory. The associated data should be considered usable for decision making purposes.

UJ - Indicates the constituent was analyzed for and was not detected at a concentration above the MDA. Due to a quality control deficiency identified during data validation, the concentration reported may not accurately reflect the sample MDA. The associated data should be considered usable for decision making purposes.

J - Indicates the constituent was analyzed for and detected. The concentration reported is qualified as estimated due to a quality control deficiency identified during data validation. The associated data should be considered usable for decision making purposes.

UR - Indicates the constituent was analyzed for and not detected. The concentration reported is qualified as unusable due to a quality control deficiency identified during data validation. The associated data should be considered unusable for decision making purposes.

R - Indicates the constituent was analyzed for and detected. The concentration reported is qualified as unusable due to a quality control deficiency identified during data validation. The associated data should be considered unusable for decision making purposes.

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ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

9413225.2283

DATA QUALIFICATION SUMMARY

B09BZ1-TMA-636

| SDG: | VALIDATOR: | DATE: 03/22/94 | PAGE 1 OF 1 |
|---|---|---|---|
| COMMENTS: Radiochemistry | | | |
| COMPOUND | QUALIFIER | SAMPLES AFFECTED | REASON |
| Tc-99 | J | B09BZ4 | Chemical Recovery <30% but >10%. |

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ATTACHMENT 3

QUALIFIED DATA SUMMARY AND ANNOTATED LABORATORY REPORTS

911 3225.2285

Validated Data Summary, Data Package: B098Z1-TMA-636

| | Samp# | B098Z1 | | B098Z2 | | B098Z3 | | B098Z4 | | B098Z5 | | B098Z6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Date | 10-11-93 | | 10-12-93 | | 10-14-93 | | 10-15-93 | | 10-19-93 | | 10-21-93 | |
| | Location | --- | | --- | | --- | | --- | | --- | | --- | |
| | Depth | --- | | --- | | --- | | --- | | --- | | --- | |
| | Type | --- | | --- | | --- | | --- | | --- | | --- | |
| | Comments | --- | | --- | | --- | | --- | | --- | | --- | |
| Parameter | Units | Result | Q | Result | Q | Result | Q | Result | Q | Result | Q | Result | Q |
| GROSS ALPHA | pCi/g | 5.000 | U | 8.200 | | 4.000 | U | 7.200 | | 9.300 | | 5.000 | U |
| GROSS BETA | pCi/g | 460.000 | | 170.000 | | 23.000 | | 30.000 | | 20.000 | | 23.000 | |
| TECHNETIUM-99 | pCi/g | 0.300 | U | 0.940 | | 0.600 | | 0.870 | J | 0.580 | | 0.470 | |
| URANIUM-233/234 | pCi/g | 0.880 | | 2.300 | | 0.730 | | 0.580 | | 0.380 | | 0.450 | |
| URANIUM-235 | pCi/g | 0.140 | | 0.240 | | 0.100 | U | 0.100 | U | 0.100 | U | 0.100 | U |
| URANIUM-238 | pCi/g | 1.000 | | 2.200 | | 0.680 | | 0.620 | | 0.490 | | 0.500 | |
| TOTAL URANIUM | UG/G | 2.900 | | 5.100 | | 2.100 | | 1.500 | | NR | | 1.500 | |

Verified
3/25/94

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Validated Data Summary, Data Package: B098Z1-TMA-636

| | Samp# | B098Z7 | | B098Z8 | | B098Z9 | | B09901 | | B09903 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Date | 10-21-93 | | 10-22-93 | | 10-22-93 | | 10-25-93 | | 10-25-93 | |
| | Location | --- | | --- | | --- | | --- | | --- | |
| | Depth | --- | | --- | | --- | | --- | | --- | |
| | Type | --- | | --- | | --- | | --- | | --- | |
| | Comments | --- | | --- | | --- | | --- | | --- | |
| Parameter | Units | Result | Q | Result | Q | Result | Q | Result | Q | Result | Q |
| GROSS ALPHA | pCi/g | 4.500 | | 9.400 | | 6.100 | | 6.800 | | 11.000 | |
| GROSS BETA | pCi/g | 20.000 | | 22.000 | | 24.000 | | 17.000 | | 15.000 | |
| TECHNETIUM-99 | pCi/g | 0.230 | | 0.230 | | 0.300 | U | 0.270 | | 0.200 | U |
| URANIUM-233/234 | pCi/g | 0.560 | | 0.560 | | 0.300 | | 0.780 | | 0.560 | |
| URANIUM-235 | pCi/g | 0.100 | U | 0.100 | U | 0.100 | U | 0.200 | U | 0.200 | U |
| URANIUM-238 | pCi/g | 0.630 | | 0.760 | | 0.640 | | 0.840 | | 0.610 | |
| TOTAL URANIUM | UG/G | 1.500 | | 1.700 | | 1.600 | | 1.900 | | 1.900 | |

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N310164-01

# TMA NORCAL
REPORTING GROUP 7285

## DATA SHEET

B098Z1

| | | | |
|---|---|---|---|
| SDG | 7285 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N310164-01 | Client sample id | B098Z1 |
| Dept sample id | 7285-001 | Location/Matrix | 200-UP-2 SOLID |
| Received | 10/29/93 | Collected | 10/11/93 |
| % moisture | 2.6 | Chain of custody id | EFL-1091 |

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| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALIFIERS | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | -2.5 | 4.7 | 5 | 10 | U | 80A |
| Gross Beta | Beta | 460 | 14 | 5 | 10 | | 80B |
| Technetium 99 | 14133-76-7 | 0.14 | 0.10 | 0.3 | 0.5 | U | TC |
| Uranium 233/234 | | 0.88 | 0.23 | 0.1 | 0.3 | | U |
| Uranium 235 | 15117-96-1 | 0.14 | 0.10 | 0.1 | 0.3 | | U |
| Uranium 238 | | 1.0 | 0.23 | 0.1 | 0.3 | | U |
| Total Uranium (ug/g) | 7440-61-1 | 2.9 | 0.52 | 0.03 | 0.1 | | U_T |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N310164-01 | 80A/80 | 7285-001 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-01 | 80B/80 | 7285-001 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-01 | TC | 7285-001 | | 2.00 g | 12/08/93 | 12/13/93 | DPK |
| N310164-01 | U | 7285-001 | | 1.00 g | 12/06/93 | 12/08/93 | DPK |
| N310164-01 | U_T | 7285-001 | | 0.250 g | 12/15/93 | 12/21/93 | DPK |

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| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/29/93 |

N310164-02

# TMA NORCAL
REPORTING GROUP 7285

## DATA SHEET

B098Z2

| | | | |
|---|---|---|---|
| SDG | 7285 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N310164-02 | Client sample id | B098Z2 |
| Dept sample id | 7285-002 | Location/Matrix | 200-UP-2 SOLID |
| Received | 10/29/93 | Collected | 10/12/93 |
| % moisture | 4.7 | Chain of custody id | EFL-1091 |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALIFIERS Q | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 8.2 | 4.8 | 4 | 10 | J | 80A |
| Gross Beta | Beta | 170 | 9.1 | 5 | 10 | | 80B |
| Technetium 99 | 14133-76-7 | 0.94 | 0.15 | 0.2 | 0.5 | | TC |
| Uranium 233/234 | | 2.3 | 0.45 | 0.2 | 0.3 | | U |
| Uranium 235 | 15117-96-1 | 0.24 | 0.14 | 0.1 | 0.3 | J | U |
| Uranium 238 | | 2.2 | 0.44 | 0.1 | 0.3 | | U |
| Total Uranium (ug/g) | 7440-61-1 | 5.1 | 0.93 | 0.03 | 0.1 | * | U_T |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N310164-02 | 80A/80 | 7285-002 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-02 | 80B/80 | 7285-002 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-02 | TC | 7285-002 | | 2.00 g | 12/14/93 | 12/15/93 | DPK |
| N310164-02 | U | 7285-002 | | 1.00 g | 12/06/93 | 12/08/93 | DPK |
| N310164-02 | U_T | 7285-002 | | 0.250 g | 12/15/93 | 12/21/93 | DPK |

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| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/29/93 |



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N310164-03

# TMA NORCAL
REPORTING GROUP 7285

## DATA SHEET

B098Z3

| | | | |
|---|---|---|---|
| SDG | 7285 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N310164-03 | Client sample id | B098Z3 |
| Dept sample id | 7285-003 | Location/Matrix | 200-UP-2 SOLID |
| Received | 10/29/93 | Collected | 10/14/93 |
| % moisture | 3.6 | Chain of custody id | EFL-1091 |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALI-FIERS Q | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 2.1 | 3.1 | 4 | 10 | U | 80A |
| Gross Beta | Beta | 23 | 4.7 | 6 | 10 | | 80B |
| Technetium 99 | 14133-76-7 | 0.60 | 0.17 | 0.4 | 0.5 | | TC |
| Uranium 233/234 | | 0.73 | 0.19 | 0.08 | 0.3 | | U |
| Uranium 235 | 15117-96-1 | 0.053 | 0.054 | 0.1 | 0.3 | U | U |
| Uranium 238 | | 0.68 | 0.19 | 0.08 | 0.3 | | U |
| Total Uranium (ug/g) | 7440-61-1 | 2.1 | 0.37 | 0.03 | 0.1 | ~~*~~ | U_T |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N310164-03 | 80A/80 | 7285-003 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-03 | 80B/80 | 7285-003 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-03 | TC | 7285-003 | | 2.00 g | 12/14/93 | 12/15/93 | DPK |
| N310164-03 | U | 7285-003 | | 1.00 g | 12/06/93 | 12/08/93 | DPK |
| N310164-03 | U_T | 7285-003 | | 0.250 g | 12/15/93 | 12/21/93 | DPK |

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| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/29/93 |



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N310164-04

# TMA NORCAL
REPORTING GROUP 7285

## DATA SHEET

B098Z4

| | | | |
|---|---|---|---|
| SDG | 7285 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N310164-04 | Client sample id | B098Z4 |
| Dept sample id | 7285-004 | Location/Matrix | 200-UP-2 SOLID |
| Received | 10/29/93 | Collected | 10/15/93 |
| % moisture | 2.4 | Chain of custody id | EFL-1091 |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALIFIERS | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 7.2 | 4.1 | 4 | 10 | | 80A |
| Gross Beta | Beta | 30 | 4.7 | 5 | 10 | | 80B |
| Technetium 99 | 14133-76-7 | 0.87 | 0.31 | 0.7 | 0.5 | | TC |
| Uranium 233/234 | | 0.58 | 0.17 | 0.1 | 0.3 | | U |
| Uranium 235 | 15117-96-1 | 0.037 | 0.050 | 0.1 | 0.3 | U | U |
| Uranium 238 | | 0.62 | 0.18 | 0.08 | 0.3 | | U |
| Total Uranium (ug/g) | 7440-61-1 | 1.5 | 0.27 | 0.03 | 0.1 | | U_T |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N310164-04 | 80A/80 | 7285-004 | | 0.100 g | 12/09/93 | 12/13/93 | DPK |
| N310164-04 | 80B/80 | 7285-004 | | 0.100 g | 12/09/93 | 12/13/93 | DPK |
| N310164-04 | TC | 7285-004 | | 2.00 g | 12/14/93 | 12/15/93 | DPK |
| N310164-04 | U | 7285-004 | | 1.00 g | 12/06/93 | 12/08/93 | DPK |
| N310164-04 | U_T | 7285-004 | | 0.250 g | 12/15/93 | 12/21/93 | DPK |

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|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/29/93 |

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N310164-05

# TMA NORCAL
REPORTING GROUP 7285

## DATA SHEET

B098Z5

| | | | |
|---|---|---|---|
| SDG | 7285 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N310164-05 | Client sample id | B098Z5 |
| Dept sample id | 7285-005 | Location/Matrix | 200-UP-2 SOLID |
| Received | 10/29/93 | Collected | 10/19/93 |
| % moisture | 6.1 | Chain of custody id | EFL-1091 |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALIFIERS | Q | TEST |
|---|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 9.3 | 4.9 | 5 | 10 | ~~J~~ | | 80A |
| Gross Beta | Beta | 20 | 4.2 | 5 | 10 | | | 80B |
| Technetium 99 | 14133-76-7 | 0.58 | 0.16 | 0.3 | 0.5 | | | TC |
| Uranium 233/234 | | 0.38 | 0.15 | 0.1 | 0.3 | | | U |
| Uranium 235 | 15117-96-1 | 0.025 | 0.050 | 0.1 | 0.3 | U | | U |
| Uranium 238 | | 0.49 | 0.15 | 0.08 | 0.3 | | | U |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N310164-05 | 80A/80 | 7285-005 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-05 | 80B/80 | 7285-005 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-05 | TC | 7285-005 | | 2.00 g | 12/14/93 | 12/15/93 | DPK |
| N310164-05 | U | 7285-005 | | 1.00 g | 12/08/93 | 12/13/93 | DPK |

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| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/29/93 |



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N310164-06

# TMA NORCAL
REPORTING GROUP 7285

## DATA SHEET

B098Z6

| | | | |
|---|---|---|---|
| SDG | 7285 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N310164-06 | Client sample id | B098Z6 |
| Dept sample id | 7285-006 | Location/Matrix | 200-UP-2 SOLID |
| Received | 10/29/93 | Collected | 10/21/93 |
| % moisture | 5.2 | Chain of custody id | EFL-1091 |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALI-FIERS | Q TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 2.2 | 3.5 | 5 | 10 | U | 80A |
| Gross Beta | Beta | 23 | 4.5 | 5 | 10 | | 80B |
| Technetium 99 | 14133-76-7 | 0.47 | 0.10 | 0.2 | 0.5 | ~~J~~ | TC |
| Uranium 233/234 | | 0.45 | 0.16 | 0.1 | 0.3 | | U |
| Uranium 235 | 15117-96-1 | 0.081 | 0.081 | 0.1 | 0.3 | U | U |
| Uranium 238 | | 0.50 | 0.16 | 0.1 | 0.3 | | U |
| Total Uranium (ug/g) | 7440-61-1 | 1.5 | 0.27 | 0.03 | 0.1 | ~~*~~ | U_T |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N310164-06 | 80A/80 | 7285-006 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-06 | 80B/80 | 7285-006 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-06 | TC | 7285-006 | | 2.00 g | 12/14/93 | 12/15/93 | DPK |
| N310164-06 | U | 7285-006 | | 1.00 g | 12/08/93 | 12/13/93 | DPK |
| N310164-06 | U_T | 7285-006 | | 0.250 g | 12/15/93 | 12/21/93 | DPK |

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| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/29/93 |

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N310164-07

# TMA NORCAL
REPORTING GROUP 7285

## DATA SHEET

B098Z7

| | | | |
|---|---|---|---|
| SDG | 7285 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N310164-07 | Client sample id | B098Z7 |
| Dept sample id | 7285-007 | Location/Matrix | 200-UP-2 SOLID |
| Received | 10/29/93 | Collected | 10/21/93 |
| % moisture | 3.8 | Chain of custody id | EFL-1091 |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALIFIERS Q | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 4.5 | 3.7 | 4 | 10 | ~~J~~ | 80A |
| Gross Beta | Beta | 20 | 4.3 | 5 | 10 | | 80B |
| Technetium 99 | 14133-76-7 | 0.23 | 0.065 | 0.1 | 0.5 | ~~J~~ | TC |
| Uranium 233/234 | | 0.56 | 0.16 | 0.08 | 0.3 | | U |
| Uranium 235 | 15117-96-1 | 0 | 0.026 | 0.1 | 0.3 | U | U |
| Uranium 238 | | 0.63 | 0.18 | 0.08 | 0.3 | | U |
| Total Uranium (ug/g) | 7440-61-1 | 1.5 | 0.28 | 0.03 | 0.1 | ~~*~~ | U_T |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N310164-07 | 80A/80 | 7285-007 | | 0.100 g | 12/09/93 | 12/18/93 | DPK |
| N310164-07 | 80B/80 | 7285-007 | | 0.100 g | 12/09/93 | 12/18/93 | DPK |
| N310164-07 | TC | 7285-007 | | 2.00 g | 12/16/93 | 12/16/93 | DPK |
| N310164-07 | U | 7285-007 | | 1.00 g | 12/08/93 | 12/18/93 | DPK |
| N310164-07 | U_T | 7285-007 | | 0.250 g | 12/15/93 | 12/21/93 | DPK |

Verified

| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/29/93 |

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N310164-09

# TMA NORCAL
REPORTING GROUP 7285

## DATA SHEET

B098Z9

| | | | |
|---|---|---|---|
| SDG | 7285 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N310164-09 | Client sample id | B098Z9 |
| Dept sample id | 7285-009 | Location/Matrix | 200-UP-2 SOLID |
| Received | 10/29/93 | Collected | 10/22/93 |
| % moisture | 4.8 | Chain of custody id | EFL-1091 |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALIFIERS Q | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 6.1 | 4.1 | 4 | 10 | ~~J~~ | 80A |
| Gross Beta | Beta | 24 | 4.5 | 5 | 10 | | 80B |
| Technetium 99 | 14133-76-7 | 0.26 | 0.11 | 0.3 | 0.5 | U | TC |
| Uranium 233/234 | | 0.30 | 0.16 | 0.1 | 0.3 | | U |
| Uranium 235 | 15117-96-1 | 0.037 | 0.037 | 0.1 | 0.3 | U | U |
| Uranium 238 | | 0.64 | 0.20 | 0.1 | 0.3 | | U |
| Total Uranium (ug/g) | 7440-61-1 | 1.6 | 0.30 | 0.03 | 0.1 | ~~X~~ | U_T |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N310164-09 | 80A/80 | 7285-009 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-09 | 80B/80 | 7285-009 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-09 | TC | 7285-009 | | 2.00 g | 12/15/93 | 12/20/93 | DPK |
| N310164-09 | U | 7285-009 | | 1.00 g | 12/10/93 | 12/13/93 | DPK |
| N310164-09 | U_T | 7285-009 | | 0.250 g | 12/15/93 | 12/21/93 | DPK |

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| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/29/93 |

DATA SHEETS
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SUMMARY DATA SECTION
Page 20

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N310164-10

TMA NORCAL
REPORTING GROUP 7285

DATA SHEET

B09901

| | | | |
|---|---|---|---|
| SDG | 7285 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N310164-10 | Client sample id | B09901 |
| Dept sample id | 7285-010 | Location/Matrix | 200-UP-2 SOLID |
| Received | 10/29/93 | Collected | 10/25/93 |
| % moisture | 9.5 | Chain of custody id | EFL-1091 |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALIFIERS | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 6.8 | 3.9 | 4 | 10 | ~~J~~ | 80A |
| Gross Beta | Beta | 17 | 4.4 | 6 | 10 | | 80B |
| Technetium 99 | 14133-76-7 | 0.27 | 0.062 | 0.1 | 0.5 | ~~J~~ | TC |
| Uranium 233/234 | | 0.78 | 0.27 | 0.2 | 0.3 | | U |
| Uranium 235 | 15117-96-1 | 0.076 | 0.10 | 0.2 | 0.3 | U | U |
| Uranium 238 | | 0.84 | 0.28 | 0.2 | 0.3 | | U |
| Total Uranium (ug/g) | 7440-61-1 | 1.9 | 0.34 | 0.03 | 0.1 | ~~X~~ | U_T |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N310164-10 | 80A/80 | 7285-010 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-10 | 80B/80 | 7285-010 | | 0.100 g | 12/08/93 | 12/09/93 | DPK |
| N310164-10 | TC | 7285-010 | | 2.00 g | 12/13/93 | 12/16/93 | DPK |
| N310164-10 | U | 7285-010 | | 1.00 g | 12/13/93 | 12/15/93 | DPK |
| N310164-10 | U_T | 7285-010 | | 0.250 g | 12/15/93 | 12/21/93 | DPK |

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| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/29/93 |



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N310164-11

# TMA NORCAL
REPORTING GROUP 7285

## DATA SHEET

B09903

| | | | |
|---|---|---|---|
| SDG | 7285 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N310164-11 | Client sample id | B09903 |
| Dept sample id | 7285-011 | Location/Matrix | 200-UP-2 SOLID |
| Received | 10/29/93 | Collected | 10/25/93 |
| % moisture | 7.5 | Chain of custody id | EFL-1091 |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALIFIERS Q | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 11 | 4.7 | 4 | 10 | | 80A |
| Gross Beta | Beta | 15 | 4.2 | 5 | 10 | | 80B |
| Technetium 99 | 14133-76-7 | 0.18 | 0.083 | 0.2 | 0.5 | U | TC |
| Uranium 233/234 | | 0.56 | 0.22 | 0.1 | 0.3 | | U |
| Uranium 235 | 15117-96-1 | 0.021 | 0.043 | 0.2 | 0.3 | U | U |
| Uranium 238 | | 0.61 | 0.22 | 0.1 | 0.3 | | U |
| Total Uranium (ug/g) | 7440-61-1 | 1.9 | 0.34 | 0.03 | 0.1 | * | U_T |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N310164-11 | 80A/80 | 7285-011 | | 0.100 g | 12/09/93 | 12/18/93 | DPK |
| N310164-11 | 80B/80 | 7285-011 | | 0.100 g | 12/09/93 | 12/18/93 | DPK |
| N310164-11 | TC | 7285-011 | | 2.00 g | 12/13/93 | 12/20/93 | DPK |
| N310164-11 | U | 7285-011 | | 1.00 g | 12/13/93 | 12/15/93 | DPK |
| N310164-11 | U_T | 7285-011 | | 0.250 g | 12/15/93 | 12/21/93 | DPK |

Verified

| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/29/93 |

2/23/94

DATA SHEETS
Page 11
SUMMARY DATA SECTION
Page 22



9413225.2297

ATTACHMENT 4

LABORATORY NARRATIVE AND CHAIN-OF-CUSTODY DOCUMENTATION

9413225.2298

SDG: 7285
Contact: Dinkar Kharkar

**TMA NORCAL**
REPORTING GROUP 7285

Client: Westinghouse Hanford
Contract: MBH-SVV-069262

# CASE NARRATIVE

## 1.0 GENERAL

TMA/Norcal Sample Delivery Group 7285 is comprised of the samples listed on the Chain-of-Custody documents below. This sample group was processed under the Westinghouse Hanford Company Statement of Work P.O. MBH-SVV-069262.

### 1.1 Chains-of-Custody

This report includes data for the eleven soil samples from location 200-UP-2 delivered under Field Log Book No. EFL-1091. Chain-of-Custody numbers were not provided.

### 1.2 Sample Volume

One thousand mL plastic bottles containing the samples were received for the analyses.

### 1.3 Missing Samples

All samples listed on the Field Log Book documents were received.

### 1.4 Holding Times

The samples were collected on October 11 through October 25, 1993 and sample processing was initiated within 180 days of collection.

## 2.0 QUALITY CONTROL

The internal quality control consisted of one sample each of a laboratory control sample, a blank, and a replicate. All original analyses were performed with QC samples 7285-12 through 7285-14.

The QC samples were prepared by the Quality Control Department. Copies of the QC notebook pages are included in this data package.

### 2.1 Laboratory Control Samples

The LCS recoveries for all nuclides were acceptable. The MDA's of the results for all analyses met the RDL's.

### 2.2 Reagent Blanks

The results were satisfactory for all analyses. The MDA's of the results for all analyses met the RDL's.

9413225.2299

## 2.0 QUALITY CONTROL (cont'd)

### 2.3 Duplicates

Results were satisfactory for all duplicate analyses.

## 3.0 ANALYSIS NOTES

### 3.1 Gross Alpha Analyses

The average MDA for gross alpha was (4 ± 1) pCi/g. Gross alpha activity above the RDL was found in sample BO9903.

### 3.2 Gross Beta Analyses

The average MDA for gross beta was (5 ± 0.9) pCi/g. Gross beta activity above the RDL was found in all of the samples.

### 3.3 Technetium-99 Analyses

The average yield for fourteen analyses was (50 ± 29)%. The lowest yield was 19% and the highest was 75%. The average MDA was (0.3 ± 0.3) pCi/g. Technetium-99 activity above the RDL was found in samples BO98Z2, BO98Z3, BO98Z4, and BO98Z5. The MDA of the result for sample BO98Z4 was higher than the RDL because of a low chemical yield.

### 3.4 Total Uranium Analyses

The average MDA was (0.03 ± 0.01) μg/g. Uranium activity ranging from (1.5 to 5.1) μg/g was found in the samples.

### 3.5 Isotopic Uranium Analyses

The average yield for fourteen analyses was (66 ± 16)%. The lowest yield was 54% and the highest was 77%. The average MDA was (0.1 ± 0.1) pCi/g. Uranium-233/234 and uranium-238 activity above the RDL was found in all of the samples. Samples BO9901 and BO9903 were counted for less than the nominal count time of 150 minutes. MDA's met RDL's despite the slightly shortened count times.

9413225.2300

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator L E ROGERS

Company Contact L E ROGERS — Telephone 376-7690

Project Designation/Sampling Locations 200-UP-2 — Collection Date 10-11-93

Ice Chest No. KENT — Field Logbook No. EFL-1091

Bill of Lading/Airbill No. — Offsite Property No.

Method of Shipment OVERNIGHT AIR SERVICE

Shipped to TMA

Possible Sample Hazards/Remarks Keep samples at 4C (SOIL) RADIOACTIVE

**Sample Identification**

1) B098Z1
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

2)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

3) RER 10-11-93
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

[] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 0920 Karen E. Rogers 10-28-93 | [signature] | 10-29-93 10:20 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

**Final Sample Disposition**

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

9413225.2301

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

~~C 55~~

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS — Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2 — Collection Date: 10-12-93

Ice Chest No.: KENT — Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.: — Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) RADIOACTIVE

**Sample Identification**

1) B09822
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

2) ~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~
~~1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)~~

3) ~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~
~~1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)~~

JER 10-12-93

[] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 10-28-93 Loren E. Rogers 0920 | [signature] | 10-28-93 10:20 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

**Final Sample Disposition**

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

9413225.2302

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

0 57

-025

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS

Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2

Collection Date: 10-14-93

Ice Chest No.: SML-349

Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.:

Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) RADIOACTIVE

**Sample Identification**

1) B09873
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

2)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

3)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

SER 10-14-93

[ ] Field Transfer of Custody

| Chain of Possession (Sign and Print Names) | | |
|---|---|---|
| Relinquished by: 10-28-93 Leon E. Rogers 0930 | Received by: Lucise TMA/NORCAL | Date/Time: 10-29-93 12:35 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

**Final Sample Disposition**

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

9413225.2303

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

0-59

-026

| Westinghouse Hanford Company | 10-15-93 CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator ~~L E ROGERS~~ W.S. Thompson

Company Contact L E ROGERS

Telephone 376-7690

Project Designation/Sampling Locations 200-UP-2

Collection Date 10-15-93 TIME: 1051

Ice Chest No. SMH-349

Field Logbook No. EFL-1091

Bill of Lading/Airbill No.

Offsite Property No.

Method of Shipment OVERNIGHT AIR SERVICE

Shipped to TMA

Possible Sample Hazards/Remarks Keep samples at 4C (SOIL) RADIOACTIVE

Sample Identification

1) B09874
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

2)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

3)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

[] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| W.S. Thompson 1130 10-15-93 | Roy T Steele | 10-15-93 1130 |
| Roy T Steele 10-28-93 0820 Roy T Steele | 10-28-93 Lorene Rogers 0820 | 10-28-93 0820 |
| 10-28-93 Lorene Rogers 0930 | TMA/NORCAL | 10-29-93 12:35 |
| | | |

Final Sample Disposition

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|
| | | |

Comments:

9413225.2304

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator L E ROGERS

Company Contact L E ROGERS

Telephone 376-7690

Project Designation/Sampling Locations 200-UP-2

Collection Date 10-19-93

Ice Chest No. SML-349

Field Logbook No. EFL-1091

Bill of Lading/Airbill No.

Offsite Property No.

Method of Shipment OVERNIGHT AIR SERVICE

Shipped to WESTON

Possible Sample Hazards/Remarks Keep samples at 4C (SOIL) NONE NOTED

Sample Identification

1) B09BZ5

1,120ml P/G:Anions NO2,NO3 (EPA 353.1)
1,1000ml P/G:Gross beta (PRO-032-15), U-235,U-234,U-238 (PRO-052-32) Tc-99 (PRO-032-78)

2)

1,120ml P/G:Anions NO2,NO3 (EPA 353.1)
1,1000ml P/G:Gross beta (PRO-032-15), U-235,U-234,U-238 (PRO-052-32) Tc-99 (PRO-032-78)

3) LER 10-19-93

1,120ml P/G:Anions NO2,NO3 (EPA 353.1)
1,1000ml P/G:Gross beta (PRO-032-15), U-235,U-234,U-238 (PRO-052-32) Tc-99 (PRO-032-78)

[] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 10-28-93 Leon E Rogers 0930 | TMA/HORCAL | 10-29-93 12:35 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

Final Sample Disposition

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

9413225.2305

~~0 60~~

-028

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

Westinghouse Hanford Company

# CHAIN OF CUSTODY

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS

Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2

Collection Date: 10-21-93

Ice Chest No.: SML-413

Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.:

Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) NONE NOTED

Sample Identification

1) B09B26
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

2) B09BZ7
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

~~3)~~
~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~ KR 10-21-93
~~1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)~~

[] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 10-28-93 Loren E. Rogers 0930 | TMA/NORCAL | 10-29-93 12:35 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

Final Sample Disposition

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

9413225.2306

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

0-65

-029

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS — Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2 — Collection Date: 10-22-93

Ice Chest No.: SML-413 — Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.: — Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) NONE NOTED

**Sample Identification**

1) B098Z8
- 1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
- 1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

2) B098Z9
- 1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
- 1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

3) ~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~ SR 10-22-93
- ~~1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)~~

[] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 10-28-93 Loren E. Rogers 0930 | Francisco TMA/HORCAL | 10-29-93 12:35 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

**Final Sample Disposition**

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

9413225.2307

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS

Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2

Collection Date: 10-25-93

Ice Chest No.: SML-415

Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.:

Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL)

Sample Identification

1) B09901

1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

2) ~~B09902~~ B09903

1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)

~~3)~~

~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~
~~1,1000ml P/G:Gross beta (EP-10), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5),Tc-99 (RC-24, RC-604)~~

[] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 10-28-93 Karen E. Rogers 0930 | Francisco TMA/NORCAL | 10-29-93 12:35 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

Final Sample Disposition

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

9413225.2308

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

0 60

-031

ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

9413225.2309

# RADIOCHEMICAL DATA VALIDATION CHECKLIST

| VALIDATION LEVEL: | A | B | C | D | E |
|---|---|---|---|---|---|

| | | |
|---|---|---|
| PROJECT: 200-UP-2 | | DATA PACKAGE: B0982I-TMA-636 |
| VALIDATOR: [illegible] | LAB: TMA | DATE: 02/23/94 |
| CASE: | | SDG: B0982I-TMA-636 |

ANALYSES PERFORMED

| | | | | | |
|---|---|---|---|---|---|
| ☒ Gross Alpha/Beta | ☐ Strontium-90 | ☒ Technetium-99 | ☒ Alpha Spectroscopy | ☐ Gamma Spectroscopy | |
| ☐ Total Uranium | ☐ Radium-22 | ☐ Tritium | ☐ | | |

SAMPLES/MATRIX Soils

| | | |
|---|---|---|
| B0982I | B09826 | B09903 |
| B09822 | B09827 | |
| B09823 | B09828 | |
| B09824 | B09829 | |
| B09825 | B09901 | |

1. Completeness . . . . . ☐ N/A

Technical verification forms present? . . . . . (Yes) No N/A

Comments: _____

2. Initial Calibration . . . . . ☐ N/A

Instruments/detectors calibrated within one year of sample analysis? . . . . . Yes (No) N/A

Initial calibration acceptable? . . . . . (Yes) No N/A

Standards NIST traceable? . . . . . (Yes) No N/A

Standards Expired? . . . . . Yes (No) N/A

Comments: The initial calibration for the gas proportional counters used for gross alpha and gross beta analysis was performed more than a year from sample analysis. However, since the ECV criteria was met, no qualification is required.





9413225.2310

3. Continuing Calibration . . . . . ☐ N/A

Calibration checked within one week of sample analysis? . . . Yes No N/A
Calibration check acceptable? . . . . . Yes No N/A
Calibration check standards NIST traceable? . . . . . Yes No N/A
Calibration check standards expired? . . . . . Yes No N/A

Comments: The control limits for the LRG detectors were submitted by the lab under separate cover from the data package. No qualifications were required

4. Blanks . . . . . ☐ N/A

Method blank analyzed? . . . . . Yes No N/A
Method blank results acceptable? . . . . . Yes No N/A
Analytes detected in method blank? . . . . . Yes No N/A
Field blank(s) analyzed? . . . . . Yes No N/A
Field blank results acceptable? . . . . . Yes No N/A
Analytes detected in field blank(s)? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments:

5. Matrix Spikes . . . . . ☒ N/A

Matrix spike analyzed? . . . . . Yes No N/A
Spike recoveries acceptable? . . . . . Yes No N/A
Spike source traceable? . . . . . Yes No N/A
Spike source expired? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments:

9413225.2311

6. Laboratory Control Samples . . . . . ☐ N/A

LCS analyzed? . . . . . Yes No N/A
LCS recoveries acceptable? . . . . . Yes No N/A
LCS traceable? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments:

7. Chemical Recovery . . . . . ☐ N/A

Chemical carrier added? . . . . . Yes No N/A
Chemical recovery acceptable? . . . . . Yes No N/A
Chemical carrier traceable? . . . . . Yes No N/A
Chemical carrier expired? . . . . . Yes No N/A
Transcription/Calculation errors? . . . . . Yes No N/A

Comments: All tracer and chemical recoveries are acceptable with the exception of the chemical recovery for sample B09BZ4 at 19% recovery. The Tc-99 result has been qualified as estimated (J).

8. Duplicates . . . . . ☐ N/A

Duplicates Analyzed? . . . . . Yes No N/A
RPD Values Acceptable? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments:

9413225.2312

9. Field QC Samples . . . . . ☒ N/A

Field duplicate sample(s) analyzed? . . . . . Yes No N/A
Field duplicate RPD values acceptable? . . . . . Yes No N/A
Field split sample(s) analyzed? . . . . . Yes No N/A
Field split RPD values acceptable? . . . . . Yes No N/A
Performance audit sample(s) analyzed? . . . . . Yes No N/A
Performance audit sample results acceptable? . . . . . Yes No N/A

Comments: The sample locations are not currently available. However, field duplicate and field split samples will be evaluated in the final summary report.

10. Holding Times

Are sample holding times acceptable? . . . . . (Yes) No N/A

Comments:

11. Results and Detection Limits (Levels D & E) . . . . . ☐ N/A

Results reported for all required sample analyses? . . . . . (Yes) No N/A
Results supported in raw data? . . . . . (Yes) No N/A
Results Acceptable? . . . . . (Yes) No N/A
Transcription/Calculation errors? . . . . . Yes (No) N/A
MDA's meet required detection limits? . . . . . Yes (No) N/A
Transcription/calculation errors? . . . . . Yes (No) N/A

Comments: The MDA does not meet the RDL for the following samples:

| Parameter | Sample ID | MDA | RDL | Units |
|---|---|---|---|---|
| Tc-99 | B09874 | 0.7 | 0.5 | pCi/g |

- The laboratory reported "J" and "X" qualifiers for all samples in this data pkg. These qualifiers have been crossed off the lab result forms for clarification purposes and are not considered appropriate for radiochemistry validation. 9/24/94



Revised 4/21/94

9413225.2313

036

# TMA NORCAL

REPORTING GROUP 7285

## WORK SUMMARY

SDG 7285
Contact Dinkar Kharkar

Client Westinghouse Hanford
Contract MBH-SVV-069262

| CLIENT SAMPLE ID / LOCATION / CUSTODY | MATRIX / SAS NO | LAB SAMPLE ID / COLLECTED / RECEIVED | PLANCHET | TEST | SUF-FIX | ANALYZED | # Days ~~REVIEWED BY~~ | METHOD |
|---|---|---|---|---|---|---|---|---|
| B098Z1 | | N310164-01 | 7285-001 | 80A/80 | | 12/08/93 | 58 | Gross Alpha in Soil |
| 200-UP-2 | SOLID | 10/11/93 | 7285-001 | 80B/80 | | 12/08/93 | 58 | Gross Beta in Soil |
| EFL-1091 | | 10/29/93 | 7285-001 | TC | | 12/08/93 | 58 | Technetium 99 in Soil |
| | | | 7285-001 | U | | 12/06/93 | 56 | Uranium, Isotopic in Soil |
| | | | 7285-001 | U_T | | 12/15/93 | 65 | Uranium, Total in Soil |
| B098Z2 | | N310164-02 | 7285-002 | 80A/80 | | 12/08/93 | 57 | Gross Alpha in Soil |
| 200-UP-2 | SOLID | 10/12/93 | 7285-002 | 80B/80 | | 12/08/93 | 57 | Gross Beta in Soil |
| EFL-1091 | | 10/29/93 | 7285-002 | TC | | 12/14/93 | 63 | Technetium 99 in Soil |
| | | | 7285-002 | U | | 12/06/93 | 55 | Uranium, Isotopic in Soil |
| | | | 7285-002 | U_T | | 12/15/93 | 64 | Uranium, Total in Soil |
| B098Z3 | | N310164-03 | 7285-003 | 80A/80 | | 12/08/93 | 55 | Gross Alpha in Soil |
| 200-UP-2 | SOLID | 10/14/93 | 7285-003 | 80B/80 | | 12/08/93 | 55 | Gross Beta in Soil |
| EFL-1091 | | 10/29/93 | 7285-003 | TC | | 12/14/93 | 61 | Technetium 99 in Soil |
| | | | 7285-003 | U | | 12/06/93 | 53 | Uranium, Isotopic in Soil |
| | | | 7285-003 | U_T | | 12/15/93 | 62 | Uranium, Total in Soil |
| B098Z4 | | N310164-04 | 7285-004 | 80A/80 | | 12/09/93 | 55 | Gross Alpha in Soil |
| 200-UP-2 | SOLID | 10/15/93 | 7285-004 | 80B/80 | | 12/09/93 | 55 | Gross Beta in Soil |
| EFL-1091 | | 10/29/93 | 7285-004 | TC | | 12/14/93 | 60 | Technetium 99 in Soil |
| | | | 7285-004 | U | | 12/06/93 | 52 | Uranium, Isotopic in Soil |
| | | | 7285-004 | U_T | | 12/15/93 | 61 | Uranium, Total in Soil |
| B098Z5 | | N310164-05 | 7285-005 | 80A/80 | | 12/08/93 | 50 | Gross Alpha in Soil |
| 200-UP-2 | SOLID | 10/19/93 | 7285-005 | 80B/80 | | 12/08/93 | 50 | Gross Beta in Soil |
| EFL-1091 | | 10/29/93 | 7285-005 | TC | | 12/14/93 | 56 | Technetium 99 in Soil |
| | | | 7285-005 | U | | 12/08/93 | 50 | Uranium, Isotopic in Soil |
| B098Z6 | | N310164-06 | 7285-006 | 80A/80 | | 12/08/93 | 48 | Gross Alpha in Soil |
| 200-UP-2 | SOLID | 10/21/93 | 7285-006 | 80B/80 | | 12/08/93 | 48 | Gross Beta in Soil |
| EFL-1091 | | 10/29/93 | 7285-006 | TC | | 12/14/93 | 54 | Technetium 99 in Soil |
| | | | 7285-006 | U | | 12/08/93 | 48 | Uranium, Isotopic in Soil |
| | | | 7285-006 | U_T | | 12/15/93 | 55 | Uranium, Total in Soil |

3/25/94

Lab id TMAN
Protocol WHC-HASM
Version Ver 1.0
Form DVD-CWS
Version 2.27
Report date 12/29/93



9413225.2314

TMA NORCAL

REPORTING GROUP 7285

SDG 7285
Contact Dinkar Kharkar

# WORK SUMMARY, cont.

Client Westinghouse Hanford
Contract MBH-SVV-069262

| CLIENT SAMPLE ID LOCATION CUSTODY | MATRIX SAS NO | LAB SAMPLE ID COLLECTED RECEIVED | PLANCHET | TEST | SUF-FIX | ANALYZED | # Days REVIEWED BY | METHOD |
|---|---|---|---|---|---|---|---|---|
| B098Z7 | | N310164-07 | 7285-007 | 80A/80 | | 12/09/93 | 49 | Gross Alpha in Soil |
| 200-UP-2 | SOLID | 10/21/93 | 7285-007 | 80B/80 | | 12/09/93 | 49 | Gross Beta in Soil |
| EFL-1091 | | 10/29/93 | 7285-007 | TC | | 12/16/93 | 56 | Technetium 99 in Soil |
| | | | 7285-007 | U | | 12/08/93 | 48 | Uranium, Isotopic in Soil |
| | | | 7285-007 | U_T | | 12/15/93 | 55 | Uranium, Total in Soil |
| B098Z8 | | N310164-08 | 7285-008 | 80A/80 | | 12/08/93 | 47 | Gross Alpha in Soil |
| 200-UP-2 | SOLID | 10/22/93 | 7285-008 | 80B/80 | | 12/08/93 | 47 | Gross Beta in Soil |
| EFL-1091 | | 10/29/93 | 7285-008 | TC | | 12/15/93 | 54 | Technetium 99 in Soil |
| | | | 7285-008 | U | | 12/08/93 | 47 | Uranium, Isotopic in Soil |
| | | | 7285-008 | U_T | | 12/15/93 | 54 | Uranium, Total in Soil |
| B098Z9 | | N310164-09 | 7285-009 | 80A/80 | | 12/08/93 | 47 | Gross Alpha in Soil |
| 200-UP-2 | SOLID | 10/22/93 | 7285-009 | 80B/80 | | 12/08/93 | 47 | Gross Beta in Soil |
| EFL-1091 | | 10/29/93 | 7285-009 | TC | | 12/15/93 | 54 | Technetium 99 in Soil |
| | | | 7285-009 | U | | 12/10/93 | 49 | Uranium, Isotopic in Soil |
| | | | 7285-009 | U_T | | 12/15/93 | 54 | Uranium, Total in Soil |
| B09901 | | N310164-10 | 7285-010 | 80A/80 | | 12/08/93 | 44 | Gross Alpha in Soil |
| 200-UP-2 | SOLID | 10/25/93 | 7285-010 | 80B/80 | | 12/08/93 | 44 | Gross Beta in Soil |
| EFL-1091 | | 10/29/93 | 7285-010 | TC | | 12/13/93 | 49 | Technetium 99 in Soil |
| | | | 7285-010 | U | | 12/13/93 | 49 | Uranium, Isotopic in Soil |
| | | | 7285-010 | U_T | | 12/15/93 | 51 | Uranium, Total in Soil |
| B09903 | | N310164-11 | 7285-011 | 80A/80 | | 12/09/93 | 45 | Gross Alpha in Soil |
| 200-UP-2 | SOLID | 10/25/93 | 7285-011 | 80B/80 | | 12/09/93 | 45 | Gross Beta in Soil |
| EFL-1091 | | 10/29/93 | 7285-011 | TC | | 12/13/93 | 49 | Technetium 99 in Soil |
| | | | 7285-011 | U | | 12/13/93 | 49 | Uranium, Isotopic in Soil |
| | | | 7285-011 | U_T | | 12/15/93 | 51 | Uranium, Total in Soil |
| Reagent Blank | | N310164-13 | 7285-013 | 80A/80 | | 12/09/93 | | Gross Alpha in Soil |
| | SOLID | | 7285-013 | 80B/80 | | 12/09/93 | | Gross Beta in Soil |
| | | | 7285-013 | TC | | 12/16/93 | | Technetium 99 in Soil |
| | | | 7285-013 | U | | 12/13/93 | | Uranium, Isotopic in Soil |
| | | | 7285-013 | U_T | | 12/15/93 | | Uranium, Total in Soil |

3/25/94

3/25/94

Lab id TMAN
Protocol WHC-HASM
Version Ver 1.0
Form DVD-CWS
Version 2.27
Report date 12/29/93



9413225.2315

SAMPLE RESULT VERIFICATION, DATA PACKAGE B098Z1-TMA-636

B098Z1-TMA-636
Gross Alpha/Beta

| Sample ID: | B098Z1 | B098Z2 | B098Z3 | B098Z4 | B098Z5 | B098Z6 | B098Z7 | B098Z8 | B098Z9 | B09901 | B09903 | LCS | BLANK | B098Z2 DUP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aliquot: | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Detector: | 104 | 109 | 110 | 101 | 101 | 102 | 104 | 104 | 109 | 110 | 102 | 102 | 110 | 104 |
| Count time: | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Alpha cpm: | 0.27 | 0.38 | 0.14 | 0.34 | 0.36 | 0.16 | 0.2 | 0.37 | 0.23 | 0.28 | 0.37 | 6.06 | 0.04 | 0.38 |
| Alpha, Bkgd: | 0.072 | 0.057 | 0.064 | 0.092 | 0.091 | 0.086 | 0.064 | 0.072 | 0.057 | 0.064 | 0.062 | 0.086 | 0.051 | 0.072 |
| Alpha, Xtalk: | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 |
| Alpha, Eff: | 0.113 | 0.124 | 0.132 | 0.143 | 0.125 | 0.126 | 0.125 | 0.137 | 0.117 | 0.135 | 0.125 | 0.106 | 0.106 | 0.11 |
| Alpha Result Calc.: | -2.28 | 8.29 | 2.15 | 7.27 | 9.28 | 2.18 | 4.49 | 9.39 | 6.16 | 6.88 | 10.80 | 248.60 | -0.48 | 9.16 |
| Alpha Result Rptd.: | -2.50 | 8.21 | 2.13 | 7.24 | 9.30 | 2.17 | 4.47 | 9.40 | 6.11 | 6.83 | 10.70 | 24.80 | -0.05 | 9.11 |
| Alpha MDA Calc.: | 4.98 | 4.04 | 4.02 | 4.45 | 5.07 | 4.89 | 4.25 | 4.11 | 4.28 | 3.93 | 4.18 | 5.81 | 4.47 | 5.12 |
| Alpha MDA Rptd.: | 4.98 | 4.06 | 4.05 | 4.44 | 5.09 | 4.88 | 4.24 | 4.10 | 4.27 | 3.93 | 4.19 | 0.58 | 0.45 | 5.10 |
| Beta cpm: | 43.53 | 16.89 | 3.44 | 3.86 | 2.92 | 3.31 | 2.94 | 3.13 | 3.25 | 2.94 | 2.59 | 23.5 | 1.29 | 15.11 |
| Bkgd: | 1.009 | 1.032 | 1.257 | 0.953 | 0.947 | 1.123 | 1.01 | 1.009 | 1.032 | 1.257 | 1.122 | 1.123 | 1.261 | 1.009 |
| Xtalk: | 0.282 | 0.277 | 0.271 | 0.264 | 0.276 | 0.275 | 0.276 | 0.268 | 0.28 | 0.269 | 0.276 | 0.291 | 0.291 | 0.283 |
| Eff: | 0.416 | 0.418 | 0.419 | 0.421 | 0.418 | 0.418 | 0.418 | 0.42 | 0.417 | 0.42 | 0.418 | 0.413 | 0.414 | 0.415 |
| Beta Result Calc.: | 459.82 | 169.93 | 23.25 | 30.40 | 20.46 | 23.35 | 20.39 | 21.89 | 23.44 | 17.43 | 14.90 | 225.07 | 0.35 | 152.11 |
| Beta Result Rptd: | 461.00 | 170.00 | 23.30 | 30.40 | 20.50 | 23.40 | 20.40 | 21.90 | 23.50 | 17.50 | 14.90 | 22.50 | 0.04 | 152.00 |
| Beta MDA Calc: | 5.07 | 5.10 | 5.62 | 4.87 | 4.89 | 5.32 | 5.05 | 5.02 | 5.11 | 5.60 | 5.32 | 5.39 | 5.69 | 5.08 |
| Beta MDA rptd: | 5.08 | 5.10 | 5.61 | 4.87 | 4.89 | 5.32 | 5.05 | 5.02 | 5.12 | 5.60 | 5.32 | 0.54 | 0.57 | 5.08 |

SAMPLE RESULT VERIFICATION, DATA PACKAGE B098Z1-TMA-636

B098Z1-TMA-636
Technetium 99

| Sample ID: | B098Z1 | B098Z2 | B098Z3 | B098Z4 | B098Z5 | B098Z6 | B098Z7 | B098Z8 | B098Z9 | B09901 | B09903 | LCS | BLANK | B098Z2 DUP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detector: | LBG 14 | LBG 9 | LBG 10 | LBG 11 | LBG 12 | LBG 13 | LBG 11 | LBG 11 | LBG 12 | LBG 11 | LBG 12 | LBG 13 | LBG 9 | LBG 12 |
| Net, cpm: | 0.17 | 1 | 0.42 | 0.31 | 0.42 | 0.55 | 0.25 | 0.33 | 0.27 | 0.28 | 0.14 | 13.49 | 0.08 | 1.27 |
| Days: | 58.971 | 57.971 | 55.971 | 57.547 | 53.547 | 51.547 | 51.547 | 50.547 | 54.619 | 49.856 | 49.856 | 0 | 0 | 65.619 |
| Lambda: | 8.9E-09 | 8.9E-09 | 8.9E-09 | 8.9E-09 | 8.9E-09 | 8.9E-09 | 8.9E-09 | 8.9E-09 | 8.9E-09 | 8.9E-09 | 8.9E-09 | 8.9E-09 | 8.9E-09 | 8.9E-09 |
| Decay: | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Yield: | 0.6187 | 0.5607 | 0.3747 | 0.1887 | 0.3859 | 0.6138 | 0.574 | 0.7517 | 0.5674 | 0.5524 | 0.3915 | 0.3167 | 0.5386 | 0.5237 |
| Aliquot: | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| P-Factor: | 2.340 | 2.340 | 2.340 | 2.340 | 2.340 | 2.340 | 2.340 | 2.340 | 2.340 | 2.340 | 2.340 | 2.340 | 2.340 | 2.340 |
| Count, time: | 103.6 | 195.7 | 195.7 | 195.7 | 195.7 | 195.7 | 504 | 136.4 | 136.4 | 761.6 | 761.6 | 761.6 | 183.8 | 504 |
| Bkg., cpm: | 0.49 | 0.54 | 0.55 | 0.5 | 0.55 | 0.45 | 0.5 | 0.5 | 0.55 | 0.5 | 0.55 | 0.45 | 0.54 | 0.55 |
| Result, calc.: | 0.14 | 0.94 | 0.59 | 0.87 | 0.57 | 0.47 | 0.23 | 0.23 | 0.25 | 0.27 | 0.19 | 22.45 | 0.08 | 1.28 |
| Result, rptd.: | 0.14 | 0.94 | 0.60 | 0.87 | 0.58 | 0.47 | 0.23 | 0.23 | 0.26 | 0.27 | 0.18 | 22.45 | 0.08 | 1.28 |
| MDA, calc.: | 0.27 | 0.23 | 0.35 | 0.68 | 0.34 | 0.19 | 0.13 | 0.20 | 0.27 | 0.11 | 0.17 | 0.19 | 0.25 | 0.15 |
| MDA, rptd.: | 0.30 | 0.25 | 0.38 | 0.70 | 0.35 | 0.21 | 0.14 | 0.21 | 0.29 | 0.12 | 0.17 | 0.20 | 0.27 | 0.16 |

SAMPLE RESULT VERIFICATION, DATA PACKAGE B098Z1-TMA-636

B098Z1-TMA-636
Uranium 233/4/5/8

| Sample ID: | B098Z1 | B098Z2 | B098Z3 | B098Z4 | B098Z5 | B098Z6 | B098Z7 | B098Z8 | B098Z9 | B09901 | B09903 | LCS | BLANK | B098Z2 DUP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detector: | SS-19 | SS-20 | SS-21 | SS-24 | SS-19 | SS-20 | SS-21 | SS-26 | SS-26 | SS-20 | SS-21 | SS-23 | SS-26 | SS-20 |
| Sample count time: | 214.2 | 214.2 | 214.2 | 214.2 | 231.08 | 231.08 | 231.08 | 231.08 | 165.42 | 149.42 | 149.42 | 386.6 | 149.08 | 141.43 |
| GMT count: | 340.953 | 340.953 | 340.953 | 340.953 | 343.013 | 343.013 | 343.013 | 343.013 | 344.683 | 347.997 | 347.997 | 355.82 | 347.997 | 351 |
| Zero time: | 284.292 | 285.292 | 287.292 | 288.292 | 292.292 | 294.292 | 294.292 | 295.292 | 295.292 | 298.292 | 298.292 | 355.82 | 347.997 | 284.292 |
| Corr. tracer dpm: | 10.49 | 10.49 | 10.49 | 10.49 | 10.49 | 10.49 | 10.49 | 10.49 | 10.49 | 10.49 | 10.49 | 10.49 | 10.49 | 10.49 |
| Bkgd count time: | 2666.37 | 2666.37 | 2666.37 | 2666.37 | 2666.37 | 2666.37 | 2666.37 | 2666.37 | 2666.37 | 2383.07 | 2383.07 | 1132.27 | 2383.07 | 2383.07 |
| Net tracer counts: | 445 | 330 | 429 | 457 | 457 | 423 | 435 | 451 | 310 | 225 | 269 | 917 | 242 | 219 |
| Detector eff.: | 0.261 | 0.2675 | 0.2479 | 0.3185 | 0.2647 | 0.2675 | 0.2476 | 0.2803 | 0.284 | 0.2671 | 0.2463 | 0.3121 | 0.2833 | 0.2654 |
| Yield: | 0.7599 | 0.5499 | 0.7715 | 0.6396 | 0.7135 | 0.6534 | 0.7261 | 0.6648 | 0.6302 | 0.5385 | 0.6981 | 0.7259 | 0.5472 | 0.5573 |
| U-238, gross counts: | 98 | 157 | 62 | 61 | 48 | 47 | 58 | 74 | 42 | 40 | 35 | 1120 | 4 | 128 |
| U-238, bkgd counts: | 2 | 2 | 0 | 1 | 1 | 2 | 0 | 1 | 0 | 0 | 0 | 62 | 0 | 1 |
| U-238, Lambda: | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 |
| U-238, Decay corr: | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| U-235, gross counts: | 12 | 15 | 5 | 4 | 3 | 7 | 1 | 3 | 2 | 3 | 1 | 614 | 0 | 10 |
| U-235, bkgd counts: | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| U-235, Lambda: | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 |
| U-235, Decay corr: | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| U-235, branch ratio: | 0.826 | 0.826 | 0.826 | 0.826 | 0.826 | 0.826 | 0.826 | 0.826 | 0.826 | 0.826 | 0.826 | 0.826 | 0.826 | 0.826 |
| U-233/4, gross counts: | 89 | 169 | 68 | 60 | 42 | 44 | 54 | 58 | 22 | 38 | 33 | 1030 | 7 | 112 |
| U-233/4, bkgd counts: | 5 | 5 | 2 | 4 | 5 | 4 | 2 | 4 | 2 | 1 | 1 | 72 | 2 | 2 |
| U-233/4, Lambda: | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 |
| U-233/4, Decay corr: | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Aliquot: | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| U-238, result calc.: | 1.02 | 2.22 | 0.68 | 0.62 | 0.49 | 0.50 | 0.63 | 0.76 | 0.64 | 0.84 | 0.61 | 5.44 | 0.08 | 2.73 |
| U-238, result rptd: | 1.02 | 2.22 | 0.68 | 0.62 | 0.49 | 0.50 | 0.63 | 0.76 | 0.64 | 0.84 | 0.61 | 5.44 | 0.08 | 2.74 |
| U-238 MDA calc.: | 0.08 | 0.11 | 0.08 | 0.08 | 0.08 | 0.09 | 0.08 | 0.08 | 0.12 | 0.16 | 0.13 | 0.19 | 0.15 | 0.17 |
| U-238, MDA rptd.: | 0.08 | 0.11 | 0.08 | 0.08 | 0.08 | 0.09 | 0.08 | 0.08 | 0.12 | 0.16 | 0.13 | 0.19 | 0.15 | 0.17 |
| U-235, result calc.: | 0.14 | 0.24 | 0.05 | 0.04 | 0.02 | 0.08 | 0.00 | 0.04 | 0.04 | 0.08 | 0.02 | 3.81 | 0.00 | 0.26 |
| U-235, result rptd.: | 0.14 | 0.24 | 0.05 | 0.04 | 0.02 | 0.08 | 0.00 | 0.04 | 0.04 | 0.08 | 0.02 | 3.81 | 0.00 | 0.26 |
| U-235, MDA calc.: | 0.10 | 0.13 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.14 | 0.19 | 0.16 | 0.05 | 0.18 | 0.20 |
| U-235, MDA rptd.: | 0.10 | 0.13 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.14 | 0.19 | 0.16 | 0.05 | 0.18 | 0.20 |
| U-233/4, result calc.: | 0.89 | 2.34 | 0.73 | 0.58 | 0.38 | 0.45 | 0.56 | 0.56 | 0.30 | 0.78 | 0.56 | 4.93 | 0.10 | 2.37 |
| U-233/4, result rptd.: | 0.88 | 0.23 | 0.73 | 0.58 | 0.38 | 0.45 | 0.56 | 0.56 | 0.30 | 0.78 | 0.56 | 4.93 | 0.10 | 2.37 |
| U-233/4, MDA calc.: | 0.11 | 0.15 | 0.08 | 0.10 | 0.11 | 0.10 | 0.08 | 0.10 | 0.12 | 0.16 | 0.13 | 0.20 | 0.15 | 0.17 |
| U-233/4, MDA rptd.: | 0.14 | 0.18 | 0.08 | 0.11 | 0.13 | 0.12 | 0.08 | 0.12 | 0.15 | 0.16 | 0.13 | 0.22 | 0.10 | 0.21 |

SAMPLE RESULT VERIFICATION, DATA PACKAGE B098Z1-TMA-636

B098Z1-TMA-636
Total Uranium

| Standard | Intensity | | | ug/L | ug/L | Amount | Prep. | | Calc | Rptd |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.049 | 534 | Sample ID | Intens. | Calc. | Rptd | of Smpl | Volume | Dilution | Result | Rslt |
| 0.156 | 1346 | B098Z1 | 28475 | 3.261 | 3.58478 | 0.25 | 0.02 | 10 | 2.87 | 2.90 |
| 0.521 | 4460 | B098Z2 | 50969 | 5.837 | 6.33276 | 0.25 | 0.02 | 10 | 5.07 | 5.09 |
| 0.976 | 8440 | B098Z3 | 20939 | 2.398 | 2.57217 | 0.25 | 0.02 | 10 | 2.06 | 2.06 |
| 2.603 | 21956 | B098Z4 | 15355 | 1.758 | 1.86486 | 0.25 | 0.02 | 10 | 1.49 | 1.49 |
| 4.881 | 41542 | B098Z6 | 15286 | 1.750 | 1.8764 | 0.25 | 0.02 | 10 | 1.50 | 1.50 |
| 16.27 | 129728 | B098Z7 | 16125 | 1.847 | 1.91936 | 0.25 | 0.02 | 10 | 1.54 | 1.54 |
| | | B098Z8 | 17565 | 2.011 | 2.14731 | 0.25 | 0.02 | 10 | 1.72 | 1.72 |
| Slope: | 1.1E-04 | B098Z9 | 17066 | 1.954 | 2.05607 | 0.25 | 0.02 | 10 | 1.64 | 1.65 |
| | | B09901 | 19289 | 2.209 | 2.35082 | 0.25 | 0.02 | 10 | 1.88 | 1.88 |
| | | B09903 | 18409 | 2.108 | 2.32018 | 0.25 | 0.02 | 10 | 1.86 | 1.86 |
| | | LCS | 33587 | 3.846 | 3.78175 | 0.25 | 0.02 | 10 | 3.03 | 3.02 |
| | | BLANK | -584 | -0.067 | 0.036 | 0.25 | 0.02 | 1 | 0.003 | 0.003 |
| | | B098Z2 DUP | 51139 | 5.856 | 6.57246 | 0.25 | 0.02 | 10 | 5.26 | 5.26 |