9713534.2047

START

LOCKHEED MARTIN

LK8205-LAS 13

0046812

# Lockheed Analytical Services


Ms. Joan Kessner
Bechtel Hanford, Inc.
3350 George Washington Way
MISN B1-35
Richland, WA 99352

**ANALYTICAL DATA REPORT**

**FOR**

**CHLORIDE, FLUORIDE, NITRATE, SULFATE, METALS, GROSS ALPHA/BETA, STRONTIUM-90 AND TRITIUM**

| | |
|---|---|
| LOG-IN NUMBER: | L8205 |
| QUOTATION NUMBER: | Q400000-B |
| SAF: | B97-036 |
| DOCUMENT FILE NUMBER: | 1025596 |
| BHI DOCUMENT FILE NO.: | 409 |
| SDG NUMBER: | LK8205 |

9713534.2048

Lockheed Environmental Systems & Technologies Co.
Lockheed Analytical Services
975 Kelly Johnson Drive Las Vegas, Nevada 89119-3705
Telephone 702-361-0220 800-582-7605 Facsimile 702-361-8146

LOCKHEED MARTIN

December 2, 1996

DEC 1996
RECEIVED
Data
Log In

Ms. Joan Kessner
Bechtel Hanford, Inc.
3350 George Washington Way
MISN B1-35
Richland, WA 99352

| | | |
|---|---|---|
| RE: | Log-in No.: | L8205 |
| | Quotation No.: | Q400000-B |
| | SAF: | B97-036 |
| | Document File No.: | 1025596 |
| | BHI Document File No.: | 409 |
| | SDG No.: | LK8205 |

The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on October 25, 1996. The temperature of the cooler upon receipt was 2°C. Sample containers received agree with the chain-of-custody documentation. All sample containers were received intact. Samples were received in time to meet the analytical holding time requirements.

The case narratives included in the following attachments provide a detailed description of all events that occurred during sample preparation, analysis, and data review specific to the samples and analytical methods requested.

A list of data qualifiers, chain-of-custody forms, sample receiving checklist, and log-in report are also enclosed representing the samples received within this group.

If you have any questions concerning the analysis or the data please call Mary Wolf at (702) 361-3955 ext. 311. If you are unable to contact the client services representative, please call Mary B. Ford, client services manager, at extension 326.

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

Sincerely,

for Jenny L. Dawson
Mary K. Wolf
Client Services Representative

cc: Client Services
Document Control

A2LA, ISO/IEC Guide 25, Section 13.2: The following results relate only to those samples tested. This report shall not be reproduced except in full, without the written approval of LAS.

**Lockheed Analytical Services**

Log-in No.: L8205
Quotation No.: Q400000-B
SAF: B97-036
Document File No.: 1025596
BHI Document File No.: 409
SDG No.: LK8205


## CASE NARRATIVE
## INORGANIC NON METALS ANALYSES

The routine calibration and quality control analyses performed for this batch include as applicable: initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), matrix spike (predigestion) sample(s), duplicate sample(s).

**Preparation and Analysis Requirements**

- One water sample was received for LK8205 and analyzed in batch 1025 wh for selected analytes to be analyzed in client-specified order as requested on the chain of custody. Quality control analysis was performed on the following samples:

| Client ID | LAL # | | Method |
|---|---|---|---|
| BOJDY9 | L8205-3 | DUP, MS | 300.0 Chloride, Fluoride, Nitrate-Nitrogen and Sulfate |

**Holding Time Requirements**

- The samples were received and analyzed within method-specific holding time.

**Method Blanks**

- The concentration levels of all the requested analytes in the method blank were below the reporting detection limits.

**Internal Quality Control**

- All Internal Quality Control were within acceptance limits.

Kay McCann
**Prepared By**

November 4, 1996
**Date**

9713534.2050



# CASE NARRATIVE
## INORGANIC METALS ANALYSES

The routine calibration and quality control analyses performed for this batch include as applicable: instrument tune (ICP/MS only), initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), ICP interference check samples (ICP only), serial dilutions, analytical (post-digestion) spike samples, matrix spike (predigestion) sample(s), duplicate sample(s).

**Preparation and Analysis Requirements**

All samples were received on October 25 1996. The samples were logged in as L8205 and were prepared and analyzed in batches 1025 btT for total metals and 1025 btD for dissolved metals. The samples were analyzed by Method 6010 ICP Trace for antimony, arsenic, lead, selenium and thallium, Method 7470 Mercury and Method 6010 ICP Metals for all other analytes.

**Holding Time Requirements**

- All samples were analyzed within the method-specific holding times.

**Method Blanks**

- The concentration levels of all the requested analytes in the method blank were below the reporting detection limits.

**Internal Quality Control**

- All Internal Quality Control were within acceptance limits.

Shellee McGrath
**Prepared By**

December 2, 1996
**Date**

9713534.2051



# CASE NARRATIVE
# RADIOCHEMISTRY ANALYSES

The routine calibration and quality control (QC) analyses performed for this batch include as applicable: instrument calibration, initial and continuing calibration verification, quench monitoring standards, instrument background analysis, method blanks, yield tracer, laboratory control samples, matrix spike samples, and duplicate samples.

NOTE: Chemical recoveries and minimum detectable activities (MDAs) can be found on the preparation sheets and calculation sheets on the attached raw data for each method.

**Holding Time Requirements**

All holding time requirements were met.

**Gas Proportional Counter**

*Analytical Method Gross Alpha/Beta*

The gross alpha/beta analysis was performed using standard operating procedure (SOP), LAL-91-SOP-0060. The samples were analyzed in workgroup 43133. The instrument calibration verification met criteria. The method blank was within QC criteria. The beta laboratory control sample (LCS) recovery and the matrix spike (MS) recoveries were within QC criteria. The alpha LCS recovery was slightly out of QC criteria; since all other QC criteria were met, data quality is not believed to be adversely affected. The duplicate (DUP) recoveries were within QC criteria. The MDA exceeded the reporting detection limit due to the residue weight limitations forcing a volume reduction, the associated samples were flagged with a "C" qualifier. No re-analyses were performed.

*Analytical Method Strontium-90*

The strontium-90 analysis was performed using SOP, LAL-91-SOP-0065. The samples were analyzed in workgroups 43149 and 43582. The samples in workgroup 43149 were re-analyzed in workgroup 43582 due to out-of-criteria recoveries for the LCS and MS. No anlayses from workgroup 43199 were reported. The instrument calibration verification met criteria. The method blank was within QC criteria. The LCS and MS recoveries were within QC criteria. The DUP recoveries were within QC criteria. No other re-analyses were performed.

9713534.2052



**Liquid Scintillation Counter**

*Analytical Method Tritium*

The tritium analysis was performed using SOP, LAL-91-SOP-0066. The samples were analyzed in workgroup 43158. The instrument calibration verification met criteria. The method blank was within QC criteria. The LCS and MS recoveries were within QC criteria. The DUP recoveries were within QC criteria. The quench value was within curve limitations. No re-analyses were performed.

Yvonne M. Jacoby
Prepared By

November 22, 1996
Date

| Bechtel Hanford Inc. | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST L8205 | B97-036-22 | Page 1 of 1 |
|---|---|---|---|

| | | | |
|---|---|---|---|
| **Collector** M. Mehlhorn, D. Bowers | **Company Contact** R. E. Peterson | **Telephone No.** (509) 372-9638 | **Project Coordinator** Koerner, CC | **Data Turnaround** 45 Days |
| **Project Designation** 100-HR-3 Groundwater Sampling – 100-D/DR | **Sampling Location** 100 D | | **SAF No.** B97-036 | |
| **Ice Chest No.** ER-20 | **Field Logbook No.** EL-1352 | | **Method of Shipment** Federal Express | |
| **Shipped To** Lockheed | **Offsite Property No.** W97-0001-3 | | **Bill of Lading/Air Bill No.** 2771634363 | |

**POSSIBLE SAMPLE HAZARDS/REMARKS**
None

**Special Handling and/or Storage**
Maintain samples between 2 degrees C and 6 degrees C.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Preservation** | None | None | Cool 4C | HNO3 to pH <2 | HNO3 to pH <2 | HNO3 to pH <2 | HNO3 to pH <2 | | | |
| **Type of Container** | P | G | P | P | P | P | P | | | |
| **No. of Container(s)** | 1 | 1 | 1 | 1 | 1 | 1 | 4 | | | |
| **Volume** | 20ml | 500ml | 500ml | 500ml | 1000ml | 1000ml | 1000ml | | | |
| **SAMPLE ANALYSIS** | Activity Scan | Tritium - H3 | See item (1) in Special Instructions | ICP Metals - 6010A (TAL) | Gross Alpha | Gross Beta | Strontium-89,90 – Total Sr | | | |

| Sample No. | Matrix * | Sample Date | Sample Time | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B0JDY9 | Water | 10-23-96 | 1118 | X | X | X | X | X | X | X | | | |
| B0JDZ0 | Water | 10-23-96 | 1118 | | | | X | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

**CHAIN OF POSSESSION**

| Relinquished By | Date/Time | Received By | Date/Time |
|---|---|---|---|
| Doug Bowers | 10-23-96/1443 | K. Whitten ER | 1443 |
| K. Whitten ER | Date/Time 0800 | B. Whitten | 10-23-96 |
| Relinquished By | Date/Time | Received By | Date/Time |
| Relinquished By | Date/Time | Received By | Date/Time |

**SPECIAL INSTRUCTIONS**
** Sample analysis for nitrate by EPA 300 0 is being requested for Information Only. The ERC Contractor acknowledges the 48-hour holding time will not be met. The Activity Scan is for all samples listed on this form.

(1) IC Anions - 300 0 {Chloride, Fluoride, Nitrogen in Nitrate, Sulfate}

**Matrix ***

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

**LABORATORY SECTION**
Received By: Paula Dennis — Title: Sample Custodian — Date/Time: 10-25-96/900

**FINAL SAMPLE DISPOSITION**
Disposal Method — Disposed By — Date/Time

B7 3630 3063

0013

# LOCKHEED ANALYTICAL SERVICES

## Sample Results

| | |
|---|---|
| Client Sample ID: B0JDY9 | Date Collected: 23-OCT-96 |
| Matrix: Water | Date Received: 25-OCT-96 |
| Percent Solids: N/A | |

| Constituent | Units | Method | Result | Project Reporting Limit | Data Qualifier(s) | Date Analyzed | LAS Batch ID | LAS Sample ID |
|---|---|---|---|---|---|---|---|---|
| Chloride | mg/L | 300.0 | 35. | 0.020 | | 25-OCT-96 | 42870 | L8205-3 |
| Fluoride | mg/L | 300.0 | 0.026 | 0.10 | B | 28-OCT-96 | 42875 | L8205-3 |
| Nitrate-N | mg/L | 300.0 | 18. | 0.020 | | 25-OCT-96 | 42871 | L8205-3 |
| Sulfate | mg/L | 300.0 | 160 | 0.10 | | 25-OCT-96 | 42874 | L8205-3 |

LOCKHEED ANALYTICAL SERVICES

## Sample Results

| | |
|---|---|
| Client Sample ID: B0JDY9 | Date Collected: 23-OCT-96 |
| Matrix: Water | Date Received: 25-OCT-96 |
| Percent Solids: N/A | |

| Constituent | Units | Method | Result | MDL | RDL | Data Qual | Dilution | Date Analyzed | LAS Batch ID | LAS Sample ID |
|---|---|---|---|---|---|---|---|---|---|---|
| ALUMINUM, TOTAL | mg/l | 6010 | < 0.040 | 0.040 | 0.20 | U | 1 | 15-NOV-96 | 43386 | L8205-4 |
| BARIUM, TOTAL | mg/l | 6010 | 0.098 | 0.0020 | 0.20 | B | 1 | 15-NOV-96 | 43386 | L8205-4 |
| BERYLLIUM, TOTAL | mg/l | 6010 | < 0.0010 | 0.0010 | 0.0050 | U | 1 | 15-NOV-96 | 43386 | L8205-4 |
| CADMIUM, TOTAL | mg/l | 6010 | < 0.0040 | 0.0040 | 0.0050 | U | 1 | 15-NOV-96 | 43386 | L8205-4 |
| CALCIUM, TOTAL | mg/l | 6010 | 100 | 0.024 | 5.0 | | 1 | 15-NOV-96 | 43386 | L8205-4 |
| CHROMIUM, TOTAL | mg/l | 6010 | 0.057 | 0.0040 | 0.010 | | 1 | 15-NOV-96 | 43386 | L8205-4 |
| COBALT, TOTAL | mg/l | 6010 | < 0.0070 | 0.0070 | 0.050 | U | 1 | 15-NOV-96 | 43386 | L8205-4 |
| COPPER, TOTAL | mg/l | 6010 | < 0.0060 | 0.0060 | 0.025 | U | 1 | 15-NOV-96 | 43386 | L8205-4 |
| IRON, TOTAL | mg/l | 6010 | 0.11 | 0.019 | 0.10 | | 1 | 15-NOV-96 | 43386 | L8205-4 |
| MAGNESIUM, TOTAL | mg/l | 6010 | 23. | 0.071 | 5.0 | | 1 | 15-NOV-96 | 43386 | L8205-4 |
| MANGANESE, TOTAL | mg/l | 6010 | 0.0039 | 0.0020 | 0.015 | B | 1 | 15-NOV-96 | 43386 | L8205-4 |
| NICKEL, TOTAL | mg/l | 6010 | < 0.010 | 0.010 | 0.040 | U | 1 | 15-NOV-96 | 43386 | L8205-4 |
| POTASSIUM, TOTAL | mg/l | 6010 | 4.5 | 1.2 | 5.0 | B | 1 | 15-NOV-96 | 43386 | L8205-4 |
| SILVER, TOTAL | mg/l | 6010 | < 0.0050 | 0.0050 | 0.010 | U | 1 | 15-NOV-96 | 43386 | L8205-4 |
| SODIUM, TOTAL | mg/l | 6010 | 13. | 0.075 | 5.0 | | 1 | 15-NOV-96 | 43386 | L8205-4 |
| VANADIUM, TOTAL | mg/l | 6010 | 0.0049 | 0.0040 | 0.050 | B | 1 | 15-NOV-96 | 43386 | L8205-4 |
| ZINC, TOTAL | mg/l | 6010 | 0.0054 | 0.0030 | 0.020 | B | 1 | 15-NOV-96 | 43386 | L8205-4 |
| ANTIMONY, TOTAL | mg/l | 6010 | < 0.0030 | 0.0030 | 0.060 | U | 1 | 17-NOV-96 | 43390 | L8205-4 |
| ARSENIC, TOTAL | mg/l | 6010 | 0.0033 | 0.0020 | 0.010 | B | 1 | 17-NOV-96 | 43390 | L8205-4 |
| LEAD, TOTAL | mg/l | 6010 | < 0.0010 | 0.0010 | 0.0030 | U | 1 | 17-NOV-96 | 43390 | L8205-4 |
| SELENIUM, TOTAL | mg/l | 6010 | 0.0047 | 0.0020 | 0.0050 | B | 1 | 17-NOV-96 | 43390 | L8205-4 |
| THALLIUM, TOTAL | mg/l | 6010 | < 0.0030 | 0.0030 | 0.010 | U | 1 | 17-NOV-96 | 43390 | L8205-4 |
| MERCURY, TOTAL | mg/l | 7470 | < 0.00020 | 0.00020 | 0.00020 | U | 1 | 19-NOV-96 | 43395 | L8205-4 |

LOCKHEED ANALYTICAL SERVICES

## Sample Results

| | |
|---|---|
| Client Sample ID: B0JDZ0 | Date Collected: 23-OCT-96 |
| Matrix: Filt H2O | Date Received: 25-OCT-96 |
| Percent Solids: N/A | |

| Constituent | Units | Method | Result | MDL | RDL | Data Qual | Dilution | Date Analyzed | LAS Batch ID | LAS Sample ID |
|---|---|---|---|---|---|---|---|---|---|---|
| ALUMINUM, DISSOLVED | mg/l | 6010 | 0.044 | 0.040 | 0.20 | B | 1 | 19-NOV-96 | 43387 | L8205-5 |
| BARIUM, DISSOLVED | mg/l | 6010 | 0.10 | 0.0020 | 0.20 | B | 1 | 19-NOV-96 | 43387 | L8205-5 |
| BERYLLIUM, DISSOLVED | mg/l | 6010 | < 0.0010 | 0.0010 | 0.0050 | U | 1 | 19-NOV-96 | 43387 | L8205-5 |
| CADMIUM, DISSOLVED | mg/l | 6010 | < 0.0040 | 0.0040 | 0.0050 | U | 1 | 19-NOV-96 | 43387 | L8205-5 |
| CALCIUM, DISSOLVED | mg/l | 6010 | 110 | 0.024 | 5.0 | | 1 | 19-NOV-96 | 43387 | L8205-5 |
| CHROMIUM, DISSOLVED | mg/l | 6010 | 0.059 | 0.0040 | 0.010 | | 1 | 19-NOV-96 | 43387 | L8205-5 |
| COBALT, DISSOLVED | mg/l | 6010 | < 0.0070 | 0.0070 | 0.050 | U | 1 | 19-NOV-96 | 43387 | L8205-5 |
| COPPER, DISSOLVED | mg/l | 6010 | < 0.0060 | 0.0060 | 0.025 | U | 1 | 19-NOV-96 | 43387 | L8205-5 |
| IRON, DISSOLVED | mg/l | 6010 | < 0.019 | 0.019 | 0.10 | U | 1 | 19-NOV-96 | 43387 | L8205-5 |
| MAGNESIUM, DISSOLVED | mg/l | 6010 | 23. | 0.071 | 5.0 | | 1 | 19-NOV-96 | 43387 | L8205-5 |
| MANGANESE, DISSOLVED | mg/l | 6010 | 0.0024 | 0.0020 | 0.015 | B | 1 | 19-NOV-96 | 43387 | L8205-5 |
| NICKEL, DISSOLVED | mg/l | 6010 | < 0.010 | 0.010 | 0.040 | U | 1 | 19-NOV-96 | 43387 | L8205-5 |
| POTASSIUM, DISSOLVED | mg/l | 6010 | 6.2 | 1.2 | 5.0 | | 1 | 19-NOV-96 | 43387 | L8205-5 |
| SILVER, DISSOLVED | mg/l | 6010 | < 0.0050 | 0.0050 | 0.010 | U | 1 | 19-NOV-96 | 43387 | L8205-5 |
| SODIUM, DISSOLVED | mg/l | 6010 | 13. | 0.075 | 5.0 | | 1 | 19-NOV-96 | 43387 | L8205-5 |
| VANADIUM, DISSOLVED | mg/l | 6010 | 0.0080 | 0.0040 | 0.050 | B | 1 | 19-NOV-96 | 43387 | L8205-5 |
| ZINC, DISSOLVED | mg/l | 6010 | < 0.0030 | 0.0030 | 0.020 | U | 1 | 19-NOV-96 | 43387 | L8205-5 |
| ANTIMONY, DISSOLVED | mg/l | 6010 | < 0.0030 | 0.0030 | 0.060 | U | 1 | 26-NOV-96 | 43391 | L8205-5 |
| ARSENIC, DISSOLVED | mg/l | 6010 | 0.0084 | 0.0020 | 0.010 | B | 1 | 26-NOV-96 | 43391 | L8205-5 |
| LEAD, DISSOLVED | mg/l | 6010 | < 0.0010 | 0.0010 | 0.0030 | U | 1 | 26-NOV-96 | 43391 | L8205-5 |
| SELENIUM, DISSOLVED | mg/l | 6010 | 0.0038 | 0.0020 | 0.0050 | B | 1 | 26-NOV-96 | 43391 | L8205-5 |
| THALLIUM, DISSOLVED | mg/l | 6010 | < 0.0030 | 0.0030 | 0.010 | U | 1 | 26-NOV-96 | 43391 | L8205-5 |
| MERCURY, DISSOLVED | mg/l | 7470 | < 0.00020 | 0.00020 | 0.00020 | U | 1 | 19-NOV-96 | 43396 | L8205-5 |

# LOCKHEED ANALYTICAL SERVICES

RADIOCHEMISTRY DATA REPORT
Account Name: Bechtel Hanford, Inc. * Richland, WA
Project Name: BECHTEL-HANFORD
Project Desc: Bechtel Hanford Project

Client Sample ID: B0JDY9
Date Collected: 23-OCT-96
Matrix: Water

Login Number: L8205
Date Received: 25-OCT-96

| Constituent | Method | Batch | Activity | Error | MDA | Qualifier | Units | Analyzed | Lab ID |
|---|---|---|---|---|---|---|---|---|---|
| H-3 | LAL-0066 | 43158 | 17800 | 1200 | 210 | | pCi/L | 07-NOV-96 | L8205-2 |

# LOCKHEED ANALYTICAL SERVICES

RADIOCHEMISTRY DATA REPORT
Account Name: Bechtel Hanford, Inc. * Richland, WA
Project Name: BECHTEL-HANFORD
Project Desc: Bechtel Hanford Project

Client Sample ID: B0JDY9
Date Collected: 23-OCT-96
Matrix: Water

Login Number: L8205
Date Received: 25-OCT-96

| Constituent | Method | Batch | Activity | Error | MDA | Qualifier | Units | Analyzed | Lab ID |
|---|---|---|---|---|---|---|---|---|---|
| Gross Alpha | LAL-0060 | 43133 | 0.9 | 1.9 | 3.6 | C | pCi/L | 13-NOV-96 | L8205-6 |
| Gross Beta | LAL-0060 | 43133 | 63.9 | 5.4 | 3.2 | | pCi/L | 13-NOV-96 | L8205-6 |

# LOCKHEED ANALYTICAL SERVICES

RADIOCHEMISTRY DATA REPORT
Account Name: Bechtel Hanford, Inc. * Richland, WA
Project Name: BECHTEL-HANFORD
Project Desc: Bechtel Hanford Project

Client Sample ID: B0JDY9
Date Collected: 23-OCT-96
Matrix: Water

Login Number: L8205
Date Received: 25-OCT-96

| Constituent | Method | Batch | Activity | Error | MDA | Qualifier | Units | Analyzed | Lab ID |
|---|---|---|---|---|---|---|---|---|---|
| Sr-89,90 | LAL-0065 | 43582 | 25.7 | 1.6 | 0.53 | | pCi/L | 19-NOV-96 | L8205-8 |