0046798

LOCKHEED MARTIN

# Lockheed Analytical Services

OCT 1996
RECEIVED
Data
Log In

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

## ANALYTICAL DATA REPORT

## FOR

## STRONTIUM-90

FEB 1997
RECEIVED

| | |
|---|---|
| LOG-IN NUMBER: | L7919 |
| QUOTATION NUMBER: | Q400000-B |
| SAF: | B96-147 |
| DOCUMENT FILE NUMBER: | 0913596 |
| BHI DOCUMENT FILE NO.: | 405 |
| SDG NUMBER: | LK7919 |

COPY

000001

*Lockheed Analytical Services*

BECHTEL HANFORD

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Sample Delivery Group. LK7919


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This package contains a total of 33 pages.

Lockheed Environmental Systems & Technologies Co
Lockheed Analytical Services
[illegible] Johnson Drive Las Vegas, Nevada 89119-3705
Telephone 702-361-0220 800-582-7985 Facsimile 702-361-8146

LOCKHEED MARTIN

October 28, 1996

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

| | | |
|---|---|---|
| RE: | Log-in No.: | L7919 |
| | Quotation No.: | Q400000-B |
| | SAF: | B96-147 |
| | Document File No.: | 0913596 |
| | BHI Document File No.: | 405 |
| | SDG No.: | LK7919 |

The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on September 13, 1996. The temperature of the cooler upon receipt was 4°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, extension 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,

Mary K. Wolf

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, [illegible] written approval of LAS.

# 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.

**Holding Time Requirements**

All holding time requirements were met.

*Analytical Method Total Strontium*

The total strontium analysis was performed using standard operating procedure, LAL-92-SOP-0196. The samples were analyzed in workgroup 42720. The instrument calibration verification met criteria. The method blank was within QC criteria. The laboratory control sample recovery was within QC criteria. The duplicate recoveries were within QC criteria. No re-analyses were performed.

Andrea Tippett
Prepared By

October 28, 1996
Date

*Lockheed Analytical Services*

# DATA QUALIFIERS FOR RADIOCHEMICAL ANALYSES

*[Revised 04/05/96]*

| For Use on the Analytical Data Reporting Forms | |
|---|---|
| B | Any constituent that was detected in the associated method blank at a concentration was greater than the reporting detection limit (RDL). |
| C | The minimum detectable activity exceeded the RDL due to the residue weight limitations forcing a volume reduction. |
| D | Constituent detected in the diluted sample. |
| E | Constituent concentration exceeded the calibration or attenuation curve range. |
| F | *For Alpha Spectrometry Only*-- Full width half max exceeded the acceptance limits. |
| H | Sample analysis performed outside of method-specified maximum holding time requirement. |
| Y | Chemical yield exceeded acceptance limits. |
| **For Use on the QC Data Reporting Forms** | |
| * | QC data (i.e., percent recovery data for laboratory control standard and matrix spike; and RPD for replicate analyses) exceeded acceptance limits. |
| a[1] | The spike recovery and/or RPD for matrix spike and duplicates cannot be evaluated due to insufficient spiking level compared to the elevated sample analyte concentration. |
| b[1] | The RPD cannot be computed because the sample and/or duplicate concentration was below the MDA. |

[1] Used as foot note designations on the QC summary form.

# SAMPLE RECEIPT LOG-IN AND CHAIN-OF-CUSTODY

LOCKHEED ANALYTICAL SERVICES
LOGIN CHAIN OF CUSTODY REPORT (ln01)
Oct 01 1996, 09:17 am

Login Number: L7919
Account: 596 Bechtel Hanford, Inc. * Richland, WA
Project: BECHTEL-HANFORD Bechtel Hanford Project

| Laboratory Sample Number | Client Sample Number | Collect Date | Receive Date | PR | Due Date |
|---|---|---|---|---|---|
| L7919-1 | B0J0K5 | 10-SEP-96 | 13-SEP-96 | | 28-OCT-96 |
| temp 4 | | | | | |
| Location: 156-018 | | | | | |
| Water 1 S SCREENING | | Hold: 09-MAR-97 | | | |
| L7919-2 | B0J0K5 | 10-SEP-96 | 13-SEP-96 | | 28-OCT-96 |
| temp 4 | | | | | |
| Location: 156V-A031 | | | | | |
| Water 1 S SR-90 LAL-0196 | | Hold: 09-MAR-97 | | | |
| L7919-3 | B0J0K5 | 10-SEP-96 | 13-SEP-96 | | 28-OCT-96 |
| temp 4 | | | | | |
| Location: 156V-A031 | | | | | |
| L7919-4 | B0J0K5 | 10-SEP-96 | 13-SEP-96 | | 28-OCT-96 |
| temp 4 | | | | | |
| Location: 156V-A031 | | | | | |
| L7919-5 | B0J0K5 | 10-SEP-96 | 13-SEP-96 | | 28-OCT-96 |
| temp 4 | | | | | |
| Location: 156V-A031 | | | | | |
| L7919-6 | REPORT TYPE | 13-SEP-96 | 13-SEP-96 | | 28-OCT-96 |
| Location: | | | | | |
| Water 1 S EDD - DISK DEL. | | | | | |
| Water 1 S RAD RPT TYPE 2 | | | | | |
| Water 1 S WOLF | | | | | |

analysis changed to reflect COC 9-30-96 MW



Signature: Mary K Wall
Date: 9-30-96 000008

913596

| Bechtel Hanford Inc. | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST L7919 | B96-147-45 | Page 1 of 1 |
|---|---|---|---|

| | | | |
|---|---|---|---|
| **Collector** A. Acosc | **Company Contact** Borghese, JV | **Telephone No.** (509) 373-4790 | **Data Turnaround** 15 Days |
| **Project Designation** 100-NR-2 Pump and Treat Treatability Study | **Sampling Location** 100 N | **SAF No.** B96-147 | |
| **Ice Chest No.** PNL-EM-040 | **Field Logbook No.** EFL-1248 | **Method of Shipment** Federal Express | |
| **Shipped To** Lockheed | **Offsite Property No.** W96-0-0314-8 | **Bill of Lading/Air Bill No.** 2771631922 | |

**POSSIBLE SAMPLE HAZARDS/REMARKS**

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

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Preservation** | None | HNO3 to pH <2 | | | | | | | | | |
| **Type of Container** | P | P | | | | | | | | | |
| **No. of Container(s)** | 1 | 4 | | | | | | | | | |
| **Volume** | 20ml | 1000ml | | | | | | | | | |
| **SAMPLE ANALYSIS** | Activity Scan | Strontium-89,90 -- Total Sr | | | | | | | | | |

| Sample No. | Matrix * | Sample Date | Sample Time | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 80J0K5 | Water | 9/10/96 | 0950 | X | X | | | | | | | | |
| | | | | | | | | | | | | | |
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**CHAIN OF POSSESSION** — **Sign/Print Names**

| Relinquished By | Date/Time | Received By | Date/Time |
|---|---|---|---|
| AGhez (EBS) | 9-12-96 1130 | EBS Bwhitten | 9-12-96 1130 |
| EBS Bwhitten | 9-12-96 1140 | AG | |
| | | | |
| | | | |

**SPECIAL INSTRUCTIONS**
Data turnaround is 72 hours

**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 ALMcDb | Title Sample Custodian | Date/Time 9-13-96/0900 |
| **FINAL SAMPLE DISPOSITION** | Disposal Method | Disposed By | Date/Time |

9/13/96

# SAMPLE CHECK-IN LIST

Date/Time Received: 9-13-96/0700 SDG#: N/A

Work Order Number: N/A SAF #: B96-147

Shipping Container ID: PNL-EM-040 Chain of Custody # N/A

1. Custody Seals on shipping container intact? Yes [X] No [ ]
2. Custody Seals dated and signed? Yes [X] No [ ]
3. Sample temperature 4°C
4. Vermiculite/packing materials is Wet [ ] Dry [X]
5. Each sample is in a plastic bag? Yes [X] No [ ]
6. Sample holding times exceeded? Yes [X] No [ ]

7. Samples have:
   - ____ tape
   - X custody seals
   - ____ hazard labels
   - X appropriate sample labels

8. Samples are:
   - X in good condition
   - ____ broken
   - ____ leaking
   - ____ have air bubbles

9. Is the information on the COC and Sample bottles in agreement?

   Yes [X] No [ ]

Notes: _____

Sample Custodian/Laboratory: [signature] Date: 9-13-96

Telephoned To: N/A On _____ By _____



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**LOCKHEED MARTIN**

## Sample Login
## Login Review Checklist

**Lot Number** 67919

The login review should be conducted by that person logging in the samples as well as a peer. Please use this checklist to ensu that such reviews occur in a uniform basis. Please sign and date below to verify that a login review has occurred. This checkli should be affixed to each login package prior to distribution.

For effective login review, at a minimum, five reports form the login process are required. These are the COC (or equivalent the login COC report, the sample summary report, the sample receiving checklist, and the login quotation. Before beginning review, ensure that these five components are available. Jobs with single component samples, the sample summary report may be omitted.

| SAMPLE SUMMARY REPORT | YES | NO | N/A | Comment |
|---|---|---|---|---|
| 1. Are all sample ID's correct? | X | | | |
| 2. Are all samples present? | X | | | |
| 3. Are all matrices indicated correctly? | X | | | |
| 4. Are all analyses on the COC logged in for the appropriate samples? | X | | | |
| 5. Are all analyses logged in for the correct container? | X | | | |
| 6. Are samples logged in according to LAS batching procedures? | X | | | |

| LOGIN CHAIN OF CUSTODY | YES | NO | N/A | Comment |
|---|---|---|---|---|
| 1. Are the collect, receive, and due dates correct for every sample? | X | | | |
| 2. Have all appropriate comments been indicated in the comment section? | | | X | |

| SAMPLE RECEIVING CHECKLIST | YES | NO | N/A | Comment |
|---|---|---|---|---|
| 1. Are all discrepancies between the COC and the login noted (if applicable)? | | | X | |

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[signature] 9-13-96
primary review signature date

Kamela Troyer 9-13-96
secondary review signature date

C913596

# Lockheed Analytical Services
## Sample Receiving Checklist



Client Name: Westinghouse  Job No. L7919  Cooler ID: PNL-EM-040

**COOLER CONDITION UPON RECEIPT**

Temperature of cooler upon receipt: 4°C

temperature of temp. blank upon receipt:

| | Yes | No | * Comments/Discrepancies |
|---|---|---|---|
| custody seals intact | X | | |
| chain of custody present | X | | |
| blue ice (or equiv.) present/frozen | | | |
| rad survey completed | X | | |

**SAMPLE CONDITION UPON RECEIPT**

| | Yes | No | * Comments/Discrepancies |
|---|---|---|---|
| all bottles labeled | X | | |
| samples intact | X | | |
| proper container used for sample type | X | | |
| sample volume sufficient for analysis | X | | |
| proper pres. indicated on the COC | X | | |
| VOA's contain headspace | | | Mt |
| are samples bi-phasic (if so, indicate sample ID'S): | | | Mt |

**MISCELLANEOUS ITEMS**

| | Yes | No | * Comments/Discrepancies |
|---|---|---|---|
| samples with short holding times | | X | |
| samples to subcontract | | X | |

**ADDITIONAL COMMENTS/DISCREPANCIES**

Completed by / date: [signature] 9-13-96

Sent to the client (date/initials):  ** Client's signature upon receipt:

*Notes: * = contact the appropriate CSR of any discrepancies immediately upon receipt*

*** = please review this information and return via facsimile to the appropriate CSR (702) 361-8146*

C413346

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version 2.0 (11/11/94)

# RADIOCHEMISTRY

# SAMPLE RESULT FORMS AND QC SUMMARIES

# 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: BOJOK5
Date Collected: 10-SEP-96
Matrix: Water

Login Number: L7919
Date Received: 13-SEP-96

| Constituent | Method | Batch | Activity | Error | MDA | Qualifier | Units | Analyzed | Lab ID |
|---|---|---|---|---|---|---|---|---|---|
| Sr-89,90 | LAL-0196 | 42720 | 670. | 34. | 0.74 | | pCi/L | 25-OCT-96 | L7919-2 |

# LOCKHEED ANALYTICAL SERVICES

METHOD BLANK DATA SUMMARY

Login/SDG Number: L7919

| Analyte | Batch ID | Date Analyzed | Prep ID | Ana ID | Inst ID | LAL ID | Acceptance Criteria | MBB Result | UNCTY 2 Sigma | MDA | Units | Data Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sr-89,90 | 42720 | 25-OCT-96 | JS | CS | LB1-B3 | 42720MBB1 | 2.0 | 0.234 | 0.472 | 0.806 | pCi/L | |

# LOCKHEED ANALYTICAL SERVICES

LCS DATA SUMMARY

Login/SDG Number: L7919

| Analyte | Batch ID | Date Analyzed | Prep ID | Ana ID | Inst ID | LAL ID | LCS Result | UNCTY 2 Sigma | Known Value | UNCTY 2 Sigma | Units | % Rec | Data Qual | QC Limits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sr-89,90 | 42720 | 25-OCT-96 | JS | CS | LB1-B2 | 42720LCS1 | 51.2 | 3.05 | 50.5 | 2.52 | pCi/L | 101 | | 75-125 |

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# LOCKHEED ANALYTICAL SERVICES

DUPLICATE DATA SUMMARY

Login/SDG Number: L7919

| Analyte | Batch ID | Date Analyzed | Prep ID | Ana ID | Inst ID | Client ID | LAL ID | SMP Result | UNCTY 2 Sigma | DUP Result | UNCTY 2 Sigma | Units | RER | RPD | Data Qual | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sr-89,90 | 42720 | 25-OCT-96 | JS | CS | LB1-B1 | B0J0K5 | L7919-2 | 670. | 34.0 | 683. | 34.6 | pCi/L | 0.185 | 2 | | 25 |

NOTE: Data qualified as out of limits if RPD > 20% and RER > 1.

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# STRONTIUM-90
# LAL-91-SOP-0196

# LOCKHEED ANALYTICAL LABORATORY

SAMPLE PREPARATION LOG FOR STRONTIUM ANALYSIS
TOTAL RADIOSTRONTIUM - LAL-91-SOP-0196

Date Prep Started : 10-23-96
WorkGroup : SR-90 LAL-0196 42720

Matrix : Water
Prep Due Date : 10/24/96

| CUSTOMER ID | PARENT LAL ID | NO | QC | CHILD LAL ID | ALIQUOT VOLUME (g or L) | SR CARRIER (mL) | YTTRIUM SEP DATE | YTTRIUM SEP TIME | PLANCHET TARE WT (grams) | PLANCHET GROSS WT (grams) | * * * | RESIDUE WEIGHT (grams) | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L7919-2 | 42720DUP1 | 1 | DUP1 | 42720-01 | 500ml | 0.5ml | 10/24/96 | 21:00 | 6.65231 | 6.66306 | | | |
| Lab Ctrl Sample | 42720LCS1 | 2 | LCS1 | 42720-02 | | | | 20:59 | 6.61827 | 6.62921 | | | |
| Method Blank | 42720MBB | 3 | MBB1 | 42720-03 | | | | 21:00 | 6.56366 | 6.57440 | | | |
| B0J0K5 | L7919-2 | 4 | SMP1 | 42720-04 | | | | 21:01 | 6.56910 | 6.58040 | | | |
| B0J1P1 | L8049-27 | 5 | | 42720-05 | | | | 21:02 | 6.56675 | 6.57826 | | | |
| B0J1P0 | L8049-31 | 6 | | 42720-06 | | | | 21:02 | 6.84930 | 6.86061 | | | |
| | | 7 | | | | | | | | | | | |
| | | 8 | | | | | | | | | | | |
| | | 9 | | | | | | | | | | | |
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| | | 23 | | | | | | | | | | | |
| | | 24 | | | | | | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Conc&Vol of Carrier | SR-90 0.01225g Pr10.5ml 0.5ml | Act & Vol of LCS | SR-90 25.72 Pci/ml 1.0ml | Prep Anlst | S. Rutherford/JS |
| Carrier Exp Date | 9-30-96 | LCS Ref Date | 8-14-96 | Start Date | 10-23-96 |
| Carrier ID# | 94-658-20 | LCS ID# | 95-0721-39-1 | Count Anlst | CS |

Balance Number : 400-200-21 ( ✓ )
( )

Pipette Number : 139740 ( ✓ )
134488 ( ✓ )

Carrier and LCS added by: SR 10-23-96
Witnessed by: [signature] 10-23-96

Comments :

V96024

Analyst : SR JS

Checked by : [signature]

Cnt Rm Custody\Date : [illegible]

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# LOCKHEED ANALYTICAL LABORATORY

SAMPLE PREPARATION LOG FOR STRONTIUM ANALYSIS
TOTAL RADIOSTRONTIUM - LAL-91-SOP-0196

Date Prep Started : 10/23/96 Matrix : Water
WorkGroup : SR-90 LAL-0196 42720 Prep Due Date : 10/24/96

| CUSTOMER ID | PARENT LAL ID | NO | QC | CHILD LAL ID | ALIQUOT VOLUME (L) | SR CARRIER (mL) | YTTRIUM SEP DATE | YTTRIUM SEP TIME | PLANCHET TARE WT (grams) | PLANCHET GROSS WT (grams) | * * * | RESIDUE WEIGHT (grams) | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L7919-2 | 42720DUP1 | 1 | DUP1 | 42720-01 | 0.5 | 0.5 | 10/24/96 | 21:00 | 6.65231 | 6.66306 | | 0.01075 | |
| Lab Ctrl Sample | 42720LCS1 | 2 | LCS1 | 42720-02 | 0.5 | 0.5 | 10/24/96 | 20:59 | 6.61827 | 6.62921 | | 0.01094 | |
| Method Blank | 42720MBB | 3 | MBB1 | 42720-03 | 0.5 | 0.5 | 10/24/96 | 21:00 | 6.56366 | 6.5744 | | 0.01074 | |
| B0J0K5 | L7919-2 | 4 | SMP1 | 42720-04 | 0.5 | 0.5 | 10/24/96 | 21:01 | 6.5691 | 6.5804 | | 0.0113 | |
| B0J1P1 | L8049-27 | 5 | | 42720-05 | 0.5 | 0.5 | 10/24/96 | 21:02 | 6.56675 | 6.57826 | | 0.01151 | |
| B0J1P0 | L8049-31 | 6 | | 42720-06 | 0.5 | 0.5 | 10/24/96 | 21:02 | 6.8493 | 6.86061 | | 0.01131 | |
| | | 7 | | | | | | | | | | | |
| | | 8 | | | | | | | | | | | |
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| | | 23 | | | | | | | | | | | |
| | | 24 | | | | | | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Conc&Vol of Carrier | 24.50 mg/mL; 0.5 mL | Act & Vol of LCS | 25.72 pCi/mL; 1.0 mL | Prep Anlst | JS |
| Carrier Exp Date | 30-Sep-96 | LCS Ref Date | 05-Jan-96 | Start Date | 10/23/96 |
| Carrier ID# | 94-658-20 | LCS ID# | 95-721-39 | Count Anlst | CS |

Balance Number : 40020021 ( ) Pipette Number : 139746 ( ) Carrier and LCS added by: SR 10/23/96
( ) 134488 ( ) Witnessed by : DM 10/23/96

Comments :

V96024

Analyst : SV for JS Checked by : Cnt Rm Custodv\Date :

T20021

# LOCKHEED ANALYTICAL LABORATORY

## COUNT DATA AND CALCULATIONS FOR STRONTIUM ANALYSIS
## TOTAL RADIOSTRONTIUM - LAL-91-SOP-0196

WorkGroup : SR-90 LAL-0196 42720

| Det | Planchet LAL ID Sr | QC | Chem Recov | Count Time (min) | Beta Counts | Bkg Counts | EFF Sr-90 | Count Start Date | Count Start Time | Yttrium Ingrow To Count | Bkg Corr Activity pCi/L | Count Error 2 Sigma | Total Error 2 Sigma | LLD pCi/L | MDA pCi/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LB1-B1 | 42720-01 | DUP1 | 0.878 | 150 | 50723 | 156 | 0.439 | 10/25/96 | 11:43 | 1.159 | 682.51 | 5.97 | 34.64 | 0.78 | 0.82 |
| LB1-B2 | 42720-02 | LCS1 | 0.893 | 150 | 4079 | 149 | 0.445 | 10/25/96 | 11:43 | 1.159 | 51.21 | 1.66 | 3.05 | 0.74 | 0.77 |
| LB1-B3 | 42720-03 | MBB1 | 0.877 | 150 | 180 | 162 | 0.454 | 10/25/96 | 11:43 | 1.159 | 0.23 | 0.47 | 0.47 | 0.77 | 0.81 |
| LB1-B4 | 42720-04 | SMP1 | 0.922 | 150 | 53728 | 147 | 0.450 | 10/25/96 | 11:43 | 1.159 | 669.79 | 5.70 | 33.97 | 0.71 | 0.74 |
| LB1-A3 | 42720-05 | | 0.940 | 150 | 191 | 151 | 0.454 | 10/25/96 | 11:43 | 1.158 | 0.49 | 0.44 | 0.44 | 0.70 | 0.73 |
| LB1-A4 | 42720-06 | | 0.923 | 150 | 33800 | 161 | 0.450 | 10/25/96 | 11:43 | 1.158 | 420.19 | 4.52 | 21.49 | 0.74 | 0.77 |

COMMENTS : 42720LCS1 LCS Recovery = 51.21/50.46 = 101.5 %.
L7919-2, 42720DUP1 RPD = 1.9 %, RER = 0.19

MBB = 0.234 pCi/L = > less than RDL(HAMDC).

V96024

Date Completed : 10-25-96

Analyst's Signature : SV

Checked by :

# RUN LOGS

PROJECT LB4000.1 OPS

Notebook No. 0971

Continued From Page 0039

| DATE | TIME | CHILD-ID | PARENT-ID | MATRIX | DET | PRESET | FILENAME | AR |
|---|---|---|---|---|---|---|---|---|
| 10-25-96 | 0800 | AC5257-AC5264 | Cal Ver | STD | A1-B4 | 7m | DCAL299.1 | C |
| | 0811 | | | | B1-C4 | | | C |
| | 0820 | | | | C1-D4 | | | C |
| | 0829 | | | | D1-A4 | | | C |
| | 0912 | AC5258 | | | A2 | | DCAL299A.1 | C |
| | | AC5263 | | | B3 | | | C |
| 10-25-96 | 0913 | 42249-04 | 42249 MS1 | Planchet | D1 | 100m | A6142249.1 | C |
| | 0935 | BKG | BKG | None | A1-C4 | 100m | DBKG299.1 | C |
| | 1139 | | | | D1-D4 | | | C |
| 10-25-96 | 1142 | 42720 -01 | 42720 DUP1 | Planchet | B1 | 150m | 19642720.1 | C |
| | | -02 | LCS1 | | B2 | | | |
| | | -03 | MBB1 | | B3 | | | |
| | | -04 | L7919-2 | | B4 | | | |
| | | -05 | L8049-27 | | A3 | | | |
| | | -06 | -31 | | A4 | | | |
| | | 42786 -01 | 42786 DUP1 | | C4 | 100m | 06042786.1 | |
| | | -02 | LCS1 | | C3 | | | |
| | | -03 | MBB1 | | C2 | | | |
| | | -04 | L8110-2 | | C1 | | | C |
| 10-25-96 | 1404 | 426618-01 | 426618 DUP1 | Planchet | C1 | 100m | 06142618.1 | B |
| | | -02 | LCS1 | | C2 | | | |
| | | -03 | MBB | | C3 | | | |
| | | -04 | L8109-1 | | C4 | | | |
| | | -05 | -10 | | D1 | | | |
| | | -06 | -13 | | D3 | | | |
| | | -07 | -16 | | D4 | | | B |
| 10-25-96 | 1503 | 426618-08 | L8109-19 | Planchet | A1 | 100m | 06142618.1 | B |
| | | -09 | -22 | | A2 | | | |
| | | -10 | -25 | | A3 | | | |
| | | -11 | -4 | | A4 | | | |
| | | -12 | -7 | | B1 | | | B |

BV 10-25-96

Read and Understood By

BV 10-25-96

Signed Date Signed

# STANDARDS

## Strontium Carrier Standardization

Strontium Carrier (10 mg/mL):

Use commercially available 10,000 $\mu$g Sr/mL ICP Standard or equivalent. Alternately, Dissolve 24.16 g of $Sr(NO_3)_2$ in water and dilute to 1 L in a volumetric flask with water.

Perform calibration check on a 0.5 mL pipet and then carefully pipet 3 - 0.5 mL portions of the strontium carrier solution into separate cleaned dried and tared planchets. Dry the planchet under a drying lamp. Cool the planchets in a desiccator and weigh.

| | Calib # 1 | Calib # 2 | Calib # 3 |
|---|---|---|---|
| Carrier plus planchet wt. (mg) | 6865.84 | 6562.93 | 6540.56 |
| Tare wt. of planchet (mg) | 6853.57 | ~~68~~ 6550.76 | 6528.26 ~~[illegible]~~ |
| Net wt. of carrier added (mg) | 12.27 | 12.17 | 12.30 |

AVERAGE $Sr(NO_3)_2$ ± STD DEV. = 12.25 ± 0.0681 (0.01225g ± 0.0001g per 0.5mL)

*Expected mg of* $Sr(NO_3)_2$ = *cert.value(≈10mgofSr/mL)* * 0.5 *mL* * 2.41

Within 3% of expected (12.08 mg/0.5 mL) value (yes/no) yes

Initial and Date: WL 10-5-95

# 94-651 2c

Walter [illegible] 10-11-95

Continued on Page

Read and Understood By

| | | | |
|---|---|---|---|
| WL | 10-11-95 | Agnes Wong | 1-16-96 |
| Signed | Date | Signed | Date |

# CERTIFICATE OF ANALYSIS

Catalog Number: PLSR2-3X Lot No. G3-153SR
Element and Matrix: $Sr/HNO_3/H_2O$
Starting Material: Strontium Carbonate $SrCO_3$
Starting Material Lot Number: 05941D

Trace Metallic Impurities in the actual solution via ICP of the concentrate.

| Element | PPM | Element | PPM | Element | PPM |
|---|---|---|---|---|---|
| Ag | <.05 | Cu | <.05 | P | <.05 |
| Al | <.05 | Fe | <.05 | Pb | .06 |
| As | <.05 | Ga | <.05 | Sb | <.10 |
| B | <.05 | In | <.05 | Si | <.05 |
| Ba | <.05 | K | <.05 | Sn | <.10 |
| Be | <.05 | Li | <.05 | Ti | <.05 |
| Bi | <.05 | Mg | <.05 | Tl | <.05 |
| Ca | <.05 | Mn | <.05 | V | <.05 |
| Cd | <.05 | Mo | <.10 | Zn | <.05 |
| Co | <.05 | Na | <.05 | Zr | <.10 |
| Cr | <.05 | Ni | <.05 | | |

Traceability Documentation For Solution Standard:

1. Classical Wet Assay: 10,050 ppm.

   Titrimetry: EDTA titration using Methyl Thymol Blue as indicator. EDTA standardized against NIST $Pb(NO_3)_2$ SRM 928.

2. Instrumentation Analysis By Inductively Coupled Plasma Spectrometer[ICP]: 10,009 ppm via NIST SRM 3153a.

3. Balances are calibrated with NIST weight sets N.J. #92589 and #92550, according to NIST circular 547 3.4.3.

SPEX plasma solution standards are guaranteed stable and accurate to ± 0.5% of labeled concentration for one year from date of shipment. This value is the sum of cumulative errors associated with analytical determinations, pipetting and diluting to final volume. For these solutions we use high purity acids, 18 megohm double deionized water and triple rinsed bottles. All glassware used is class A.

Signed by: N. Kocherlakota, Chemical Production Manager, Date: SEP 95

Printed on Recycled Paper

SPEX INDUSTRIES, INC. 3880 PARK AVE. EDISON, N.J. 08820 908-549-7144 FAX: 908-603-9647

# CERTIFICATE OF CALIBRATION
# BETA STANDARD SOLUTION

| | | | |
|---|---|---|---|
| Radionuclide | Sr-90 | Customer: | LOCKHEED ENGINEERING & SCIENCES Co. |
| Half Life: | 28.5 ± 0.2 years | P.O.No.: | 06LAB1245 |
| Catalog No.: | 7090 | Reference Date: | November 1 1991 12:00 PST. |
| Source No.: | 388-99-2 | Contained Radioactivity: | 1.018 µCi. |

**Description of Solution**

| | | |
|---|---|---|
| a. Mass of solution: | 5.0012 | grams. |
| b. Chemical form: | SrCl2 in 0.1N HCl | |
| c. Carrier content: | None added | |
| d. Density: | 0.9996 | gram/ml @ 20°C. |

**Radioimpurities**

None (Y-90 daughter in equilibrium)

**Radioactive Daughters**

Y-90 daughter in equilibrium

**Radionuclide Concentration**

0.203 µCi/gram.

**Method of Calibration**

Weighed aliquots of the solution were assayed using a liquid scintillation counter.

**Uncertainty of Measurement**

| | |
|---|---|
| a. Systematic uncertainty in instrument calibration: | ±1.5% |
| b. Random uncertainty in assay: | ±0.5% |
| c. Random uncertainty in weighing(s): | ±0.0% |
| d. Total uncertainty at the 99% confidence level: | ±2.0% |

**NIST Traceability**

This calibration is implicitly traceable to the National Institute of Standards and Technology.

**Notes**

1. Nuclear data were taken from "Table of Isotopes", Seventh Edition, edited by Virginia S. Shirley.
2. IPL participates in an NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay(and later NIST certification) of Standard Reference Materials. (As in NRC Regulatory Guide 4.15)

Gary A. Gilmore
QUALITY CONTROL

ISOTOPE PRODUCTS LABORATORIES
1800 No. Keystone Street.,
Burbank, California 91504
(818) 843 - 7000

# RADIONUCLIDE REQUEST FORM

To: U.S. EPA EMSL-LV
Nuclear Radiation Assessment Division
NRA - RADQA
P.O. Box 93478
Las Vegas, NV 89193-3478

FAX: 702 798-2236

Please ship the calibrated standards listed below to:

Contact Person: _____

Title: _____

Alternate Person: _____

Title: _____

Laboratory: _____

Address: _____

_____

Telephone: _____

NRC License and/or State License Type: _____

Number: _____ Exp.Date _____

**Note: When requesting radionuclides, a copy of the current NRC license and/or State license must be on file with us.**

RADIONUCLIDE STANDARD DESIRED:

_____ _____ _____

_____ _____ _____

I certify that the calibrated standard(s) requested are to be used only in this laboratory by qualified personnel for the purpose of developing or checking analytical procedures and/or for calibrating instrumentation. I further certify that I am authorized to receive the radionuclides listed above under the license number(s) listed above.

Signature _____ Date _____

Title _____

Lab Code _____

## AVAILABLE RADIONUCLIDES FROM EPA

| | | |
|---|---|---|
| H-3 | I-131 (1/95) | Ra-228 |
| Co-60 | Ba-133 | Th-230 |
| Zn-65 | Cs-134 | U-238 |
| Sr-89 | Cs-137 | Pu-239 (2/95) |
| Sr-90 | Ra-226 | Pu-240 * |
| | | Am-241 |

## SPECIAL REFERENCE MATERIAL *

(DP2) DILUTED PITCHBLENDE

(SM1) STANDARD MONAZITE ORE

(DM2) DILUTED MONAZITE ORE

(MT1) CLIMAX SAND TAILINGS

(MX1) MIXED NUCLIDE STANDARD
(H-3, Sr-90, Cs-134, Ra-226, Ra-228, U-Nat)

(MX2) DILUTED MIXED NUCLIDE STANDARD
(H-3, Sr-90, Cs-134, Ra-226, Ra-228, U-Nat)

U-CHAIN---SPIKED AIR FILTER; U-238 CHAIN
U-238 through Ra-226; 10 to 20 pCi/filter
Pb-210; -440 pCi/filter

* DISCONTINUED WHEN SUPPLY RUNS OUT

*(Approximate activities can be found in the Radioactive Standards Distribution Program brochure.)*

Revised 19-Jan-1995

Continued From Page

# INITIAL STANDARD DILUTION RECORD

Ignore WO 2-2

**Standard Information:**

| | | | |
|---|---|---|---|
| Isotope: | Sr. 90 | Vendor: | IPL |
| Activity of Standard Received: | ~~5.0012~~ 1.018 uCi | Vendor I.D. # | — |
| Weight of Standard Received (g): | 5.0012 g | LAL I.D. #: | AA00 49 |
| Standard Activity (pCi/g): | 2.036E5 pCi/g | NIST Traceable ? | Yes |
| Halflife in Years or Days: | 29.1 yrs | Certificate #: | 388-99-2 |
| Reference Date: | 11/1/91 | Receiver's Name: | FREE |
| | | Date Received: | 12/91 |

**Primary Dilution**

| | | |
|---|---|---|
| Balance Verification?: | Yes | |
| Diluent Used: | 1 M $HNO_3$ (1.0290 g/ml) | |
| Decay Corrected Standard Activity (pCi/g): | 1.844 E5 | pCi/g @ 1/5/96 |
| Weight of the Source Transferred (g): | 4.949 | g |
| Total diluted weight (g): | 100.01 | g |
| Total Diluted Volume (mL) | 97.19 | mL |
| Activity of Dilution by Weight (pCi/g) [a * b / c]: | 9125.0 | pCi/g @ 1/5/96 |
| Calculated Density of Solution (g/ml) [c / d]: | ~~9389.8~~ 1.0290 | g/mL |
| Activity of Dilution by Volume (pCi/mL) [e * f]: | 9389.8 | pCi/mL |
| Dilution Logbook I.D. #: | 94-0677-91-1 | |

Prepared By: [signature] Preparation Date: 1/5/96

Reviewed By: [signature] Review Date: 1/5/96

Purity/Cross Check Performed By: _____ Check Date: _____

Signed _____ Date _____ Signed _____ Date _____

PROJECT Sr-90 LW

Continued From Page N/A

# SECONDARY/WORKING LEVEL STANDARD DILUTION RECORD

## Dilution Source Information

| | |
|---|---|
| Isotope: | Sr-90 |
| Parent Barcode Number | 94-0677-92-1 |
| Vendor or Certificate I.D. # of Parent Standard: | — |
| Diluted Source Logbook I.D. #: | 94-0677-92-1 |
| Balance Verification?: | Yes |
| Diluent Used: | 1 M $HNO_3$ |

8/14/96

## Dilution

| | | |
|---|---|---|
| *Diluent: | 1 M $HNO_3$ | |
| *Density of diluent (g/ml): | 1.029 | g/ml |
| a: Parent Specific Activity: | 500.09 | pCi/g @ 1/5/96 |
| b: Amount of Source Transferred: | 5.00 | g |
| c: Total amount of Dilution: | 100.05 | g |
| d: Total Volume of Dilution: | 102.95 | ml |
| e: Activity of Dilution (a * b / c): | 24.99 | pCi/g @ 1/5/96 |
| f: Activity of Dilution (a * b / d): | 25.72 | pCi/ml |
| Dilution Logbook I.D. #: | 95-0721-39-1 | |

Prepared By: [signature] Preparation Date: 8/14/96

Reviewed By: Walt A. [signature] Review Date: 8/14/96

*If the diluent remains unchanged from the diluent used for the dilution source, then a weight dilution of a volume unit source can be performed without a density conversion. If the diluent changes, a weighted proportion density conversion is necessary.

Signed Date Signed Date

000032

SUBJECT Sr-90 2° dilution Notebook No. 0677

# SECONDARY/WORKING LEVEL STANDARD DILUTION RECORD

| Dilution Source Information | |
|---|---|
| Isotope: | Sr-90 |
| Parent Barcode Number | AA0049 |
| Vendor or Certificate I.D. # of Parent Standard: | ~~94-0677-91-1~~ 388-99-2 |
| Diluted Source Logbook I.D. #: | 94-0677-91-1 |
| Balance Verification?: | Yes |
| Diluent Used: | 1.0 M $HNO_3$ |

| Dilution | | |
|---|---|---|
| *Diluent: | 1.0 M $HNO_3$ | |
| *Density of diluent (g/ml): | 1.0290 | g/ml |
| a: Parent Specific Activity: | 9125.0 | pCi/g @ 1/5/96 |
| b: Amount of Source Transferred: | 6.012 | g |
| c: Total amount of Dilution: | 109.70 | g |
| d Total Volume of Dilution: | 106.61 | ml |
| e: Activity of Dilution (a * b / c): | 500.09 | pCi/g 1/5/96 |
| f Activity of Dilution (a * b / d): | 514.6 | pCi/ml |
| Dilution Logbook I.D. #: | 94-0677-92-1 | |

Prepared By: [signature] Preparation Date: 1/5/96

Reviewed By: [signature] Review Date: 1/5/96

*If the diluent remains unchanged from the diluent used for the dilution source, then a weight dilution of a volume unit source can be performed without a density conversion. If the diluent changes, a weighted proportion density conversion is necessary.

Read and Understood By

000033

Signed Date Signed Date