

Lockheed Environmental Systems & Technologies Co.
Lockheed Analytical Services
975 Kelly Johnson Drive Las Vegas, Nevada 89119-3705
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LK 5795
0043527

LOCKHEED MARTIN 
LK5795-LAS

November 22, 1995

Ms. Joan Kessner
Bechtel Hanford, Inc.
1022 Lee Boulevard
P.O. Box 969
Richland, WA 99352



RE: Log-in No.: L5795
Quotation No.: Q400000-B
SAF: B96-036
Document File No.: 1107596
BHI Document File No.: 294
SDG No.: LK5795

The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on 7 November 1995.

The temperature of the cooler upon receipt was 2°C. Sample containers received agree with the chain-of-custody documentation. 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 Kathleen Hall at (509) 375-4741.

Release of this data report has been authorized by the Laboratory Director or the Director's designee as evidenced by the following signature.

Lockheed Analytical Services

Log-in No.: L5795
Quotation No.: Q400000-B
SAF: B96-034
Document File No.: 1107596
WHC Document File No.: 294
SDG No.: LK5795
Page No.: 1

" 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 Manger or a designee, as verified by the following signature."

Sincerely,



Kathleen M. Hall
Client Services Representative

cc: Client Services
Document Control

**CASE NARRATIVE
RADIOCHEMICAL 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, duplicate samples.

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

Holding Time Requirements

All holding times were met.

Analytical Method Strontium-90

The strontium-90 analysis was performed using standard operating procedure, LAL-91-SOP-0196. The samples were analyzed in workgroup 29083. The instrument calibration verification met criteria. The method blank was within QC criteria. The laboratory control sample was within QC criteria. The duplicate recoveries were within QC criteria. Sample BOGRS3 (L5795-2) had a chemical recovery that was slightly below limits (42%). The data is not adversely affected and no re-analyses were performed.

Yvonne M. Jacoby
Prepared By

November 21, 1995
Date

Lockheed Analytical Services
DATA QUALIFIERS FOR RADIOCHEMICAL ANALYSES

[Revised 08/28/92]

For Use on the Analytical Data Reporting Forms	
B	Any constituent that was also detected in the associated blank whose concentration was greater than the reporting detection limit (RDL) and/or minimum detectable activity (MDA).
C	Presence of high TDS in sample required reduction of sample size which increased the MDA.
D	Constituent detected in the diluted sample.
E	Constituent concentration exceeded the calibration or attenuation curve range.
F	<i>For Alpha Spectrometry Only</i> -- FWHM exceeded 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.
a¹	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.
b¹	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.

LOCKHEED ANALYTICAL SERVICES
 LOGIN CHAIN OF CUSTODY REPORT (ln01)
 Nov 07 1995, 10:24 am

Login Number: L5795
 Account: 596 Bechtel Hanford, Inc. * Richland, WA
 Project: BECHTEL-HANFORD Bechtel Hanford Project

Laboratory Sample Number	Client Sample Number	Collect Date	Receive Date	Due PR Date
L5795-1 temp 2 Location: 157 Water 1 S SCREENING	B0GRS3	03-NOV-95	07-NOV-95	22-NOV-95
				Hold:01-MAY-96
L5795-2 temp 2 Location: 157 Water 1 S SR-90 LAL-0196	B0GRS3	03-NOV-95	07-NOV-95	22-NOV-95
				Hold:01-MAY-96
L5795-3 temp 2 Location: 157	B0GRS3	03-NOV-95	07-NOV-95	22-NOV-95
L5795-4 temp 2 Location: 157	B0GRS3	03-NOV-95	07-NOV-95	22-NOV-95
L5795-5 temp 2 Location: 157	B0GRS3	03-NOV-95	07-NOV-95	22-NOV-95
L5795-6 Location: Water 1 S EDD - DISK DEL. Water 1 S RAD RPT TYPE 2	REPORT TYPE	07-NOV-95	07-NOV-95	22-NOV-95

Signature: *Amurillo 07*
 Date: 11-7-95

1107596

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

L5795

Data Turnaround
 Priority
 Normal

Collector <i>A. Rizzo / STEVE GUREK</i>	Company Contact J.V. Borghese	Telephone (509) 373-4790
Project Designation 100-NR-2 Monthly Performance Monitoring - Nov.	Sampling Location 100 N	SAF No. B96-036
Ice Chest No. <i>10WS-015</i>	Field Logbook No. <i>EFL 1058</i>	Method of Shipment Hand Delivered
Shipped To Lockheed	Offsite Property No. <i>W95-0-0640-07</i>	Bill of Lading/Air Bill No. <i>2904645457</i>

Possible Sample Hazards/Remarks	Preservation				HNO ₃	Cool 4°C				
	Type of Container				P/G	P/G				
	No. of Container(s)				4	1				
	Special Handling and/or Storage Maintain samples between 2°C and 6°C.	Volume				1L	20mL			
SAMPLE ANALYSIS										

Sample No.	Matrix*	Date Sampled	Time Sampled							
BOGRS3	W	<i>11-3-95</i>	<i>1110</i>			<i>Y</i>	<i>X</i>			

CHAIN OF POSSESSION		Sign/Print Names		SPECIAL INSTRUCTIONS						Matrix*
Relinquished By <i>Steve Gurek</i>	Date/Time <i>0150</i>	Received By <i>Eric</i>	Date/Time <i>0930</i>							<ul style="list-style-type: none"> 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
Relinquished By <i>S.J. GUREK</i>	Date/Time <i>11/06/95</i>	Received By <i>Bill Whitten</i>	Date/Time <i>11-6-95</i>							
Relinquished By <i>Eric</i>	Date/Time <i>0935</i>	Received By	Date/Time							
Relinquished By <i>Bill Whitten</i>	Date/Time <i>11-6-95</i>	Received By	Date/Time							
Relinquished By	Date/Time	Received By	Date/Time							

LABORATORY SECTION	Received By <i>Hamilton</i>	Title <i>Sample Custodian</i>	Date/Time <i>11-7-95 / 10845</i>
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

101540

LOCKHEED MARTIN



Sample Login Login Review Checklist

Lot Number LS795

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

For effective login review, at a minimum, five reports from 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

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

LOGIN CHAIN OF CUSTODY

	<u>YES</u>	<u>NO</u>	<u>N/A</u>	<u>Comment</u>
1. Are the collect, receive, and due dates correct for every sample?	<u>X</u>	___	___	_____
2. Have all appropriate comments been indicated in the comment section?	___	___	<u>X</u>	_____

SAMPLE RECEIVING CHECKLIST

	<u>YES</u>	<u>NO</u>	<u>N/A</u>	<u>Comment</u>
1. Are all discrepancies between the COC and the login noted (if applicable)?	___	___	<u>X</u>	_____

Amiller
primary review signature

11-7-95
date

Paul D. Davis
secondary review signature

11-07-95 09
date

1107596

Lockheed Analytical Services
Sample Receiving Checklist

Client Name: Westbyham - Bechtel

Job No. LS795

Cooler ID:

COOLER CONDITION UPON RECEIPT

Temperature of cooler upon receipt: 2°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	X		
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			<u>MM</u>
are samples bi-phasic (if so, indicate sample ID'S):			<u>MM</u>

MISCELLANEOUS ITEMS

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

ADDITIONAL COMMENTS/DISCREPANCIES

Completed by / date: [Signature] 11-7-95

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

110754

Lockheed Analytical Laboratory
 SAMPLE SUMMARY REPORT (su02)
 Bechtel Hanford, Inc. * Richland, WA

Client Sample Number	LAL Sample Number	SDG Number	Matrix	Method
BOGRS3 -	L5795-1 L5795-2		Water Water	SCREENING - SR-90 LAL-0196 -
REPORT TYPE -	L5795-6 L5795-6		Water Water	EDD - DISK DEL. - RAD RPT TYPE 2 -

LOCKHEED ANALYTICAL SERVICES

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0GRS3

LAL Sample ID: L5795-2

Date Collected: 03-NOV-95

Date Received: 07-NOV-95

Matrix: Water

Login Number: L5795

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
Total radio-strontium	13-NOV-95	SR-90 LAL-0196_29083	3000	150	1.9		pCi/L

ACSRS
RS

U.S. Environmental Protection Agency
Environmental Monitoring Systems Laboratory-Las Vegas
Nuclear Radiation Assessment Division

Calibration Certificate

Description

Principal radionuclide **Strontium-90** Half life **28.6 years**
Nominal activity **27** nano curies
Nominal volume **5** ml in ampoule/bottle number **94003-1**

Measurement Activity of principal radionuclide

Activity per gram of this solution

5.40 nano curies of **Strontium-90**
at 0400 hours PST on **April 1, 1994**

Activity of daughter radionuclide

The principal activity was accompanied at the quoted time by

5.40 nano curies Per gram
of the daughter nuclide **Yttrium-90**

Total mass of this solution

Approximately 5.0 grams

Method of measurement

The activity of the primary solution was measured by liquid scintillation counting.

The activity of the dilution was measured by liquid scintillation counting.

Useful Life

This radionuclide has decayed through **0.0** half lives since it was obtained by EMSL-LV

We recommend that this solution should not be used after **August 1994**

This dilution was prepared for the 1994 ASTM Collaborative Study of a test method for the determination of Sr-90 in water.

Purity

The manufacturer states that activities other than that of the principal nuclide and of its daughter nuclides, if any, were estimated/known to be

- (1) less than equal to % of the principal activity
- (2) less than equal to % of the principal activity
- (3) less than equal to % of the principal activity

The activity of impurity (1) is not (2) is not (3) is not included in the quoted figures of the principal activity.

Random Errors

The precision of this standard was such that the certified value of the radioactive concentration of the principal activity had a standard error (sm) not greater than $\pm 0.1\%$ (The 99.7% confidence limits are given by $t(sm)$ where t is obtained from the student t factor for the degree of freedom $(n-1)$).

The maximum uncertainty due to the assessable systematic errors (dilution, counting, and known uncertainty of the standard) is obtained by the separate arithmetic summation of the positive and negative systematic error $(+\delta - \delta')$. These have been estimated not to exceed $+3.8\%$ or -3.8%

the overall uncertainty (often called accuracy) is an estimate of the possible divergence of the quoted result from the true value. It is a combination of random error $[t(sm)]$ at the 99.7% confidence limits and the worst case estimate of the systematic errors $(+\delta, -\delta')$. The overall uncertainty is therefore calculated on the basis of $+ [t(sm) + \delta], - [t(sm) + \delta']$ and is $+4.0\%, -4.0\%$ of the quoted radioactive concentration.

Decay Schemes

This standardization is based on the following assumptions of the principle nuclide, its daughter nuclides and impurities (no allowance for error in these assumptions or the assumption of quoted half-life have been included in the statement of accuracy above).

Strontium-90 decays 100 percent by beta emission to yttrium-90. Yttrium-90 also decays 100 percent by beta emission.

Chemical Composition of Solution

Carrier content per gram of solution:
30 micrograms strontium

Other components:
0.1 M HCl

Preservative:

Remarks

Date Certificate Prepared April 26, 1994

Approval Signature

Paul B. Fahn

INITIAL STANDARD DILUTION RECORD

Standard Information:

Isotope:	<u>Sr-90</u>	Vendor:	<u>EPA</u>
Activity of Standard Received:	<u>2.7×10^4 uCi</u>	Vendor I.D. #	<u>94003-1</u>
Weight of Standard Received (g):	<u>50 g</u>	LAL I.D. #:	<u>AC5281</u>
Standard Activity (pCi/g):	<u>5.4×10^3 pCi/g</u>	NIST Traceable ?	<u>yes</u>
Half-life in Years or Days:	<u>28.6 yrs</u>	Certificate #:	<u>94003-1</u>
Reference Date:	<u>4-1-1994</u>	Receiver's Name:	<u>K Free</u>
		Date Received:	<u>5-3-94</u>

Primary Dilution

Balance Verification?:	<u>yes</u>
Diluent Used:	<u>0.1M HCl</u>
a: Decay Corrected Standard Activity (pCi/g):	<u>5.4×10^3 pCi/g</u>
b: Weight of the Source Transferred (g):	<u>4.9670 g</u>
c: Total diluted weight (g):	<u>49.91 g</u>
d: Total Diluted Volume (mL)	<u>50 mL</u>
e: Activity of Dilution by Weight (pCi/g) (a * b / c):	<u>537.4 pCi/g</u>
f: Calculated Density of Solution (g/ml) (c / d):	<u>0.9982 g/mL</u>
g: Activity of Dilution by Volume (pCi/mL) (e * f):	<u>536.44 pCi/mL</u>
h. Dilution Logbook I.D. #:	<u>93-474-81-1 ⁹³⁻⁴⁷⁴⁻⁸²⁻¹ CP4/1/95</u>
Prepared By: <u>Dyane Wong</u>	Preparation Date: <u>6-15-94</u>
Reviewed By: <u>Joe Hutchison</u>	Review Date: <u>6/30/94</u>
Purity/Cross Check Performed By: _____	Check Date: _____

[Handwritten signature]

SECONDARY/WORKING LEVEL STANDARD DILUTION RECORD

Dilution Source Information	
Isotope:	<u>Sr-90</u>
Ref. <u>4-1-94</u> Parent Barcode Number	<u>AC5281</u>
Vendor or Certificate I.D. # of Parent Standard:	<u>EPA 94003 - 1</u>
Diluted Source Logbook I.D. #:	<u>93-474 -82-1</u>
Balance Verification?:	<u>Yes</u>
Diluent Used:	<u>0.1 M HCl</u>

Dilution	
*Diluent:	<u>0.1 M HCl</u>
*Density of diluent (g/ml):	<u>N/A</u>
a: Parent Specific Activity:	<u>536.44 pCi/ml</u>
b: Amount of Source Transferred:	<u>5.0018 g</u>
c: Total amount of Dilution:	<u>100.20 g</u>
d: Total Volume of Dilution:	<u>N/A</u>
e: Activity of Dilution (a * b / c):	<u>N/A</u>
f: Activity of Dilution (a * b / d):	<u>26.78 pCi/ml</u>
Dilution Logbook I.D. #:	<u>94-677-44-1</u>
Prepared By: <u>Dynes Wong</u>	Preparation Date: <u>3-2-95</u>
Reviewed By: <u>Joe Hill</u>	Review Date: <u>3/3/95</u>

*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 Dynes Wong 3-3-95 Date _____

Strontium Carrier Standardization

Strontium Carrier (10 mg/mL):

Use commercially available 10,000 μg Sr/mL ICP Standard or equivalent. Alternately, Dissolve 24.16 g of $\text{Sr}(\text{NO}_3)_2$ 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 6520
Net wt. of carrier added (mg)	12.27	12.17	12.30

AVERAGE $\text{Sr}(\text{NO}_3)_2 \pm \text{STD DEV.} = \underline{12.25 \pm 0.0681}$ $\left(0.01225\text{g} \pm 0.00061\text{g}\right)$
per 0.5mL

Expected mg of $\text{Sr}(\text{NO}_3)_2 = \text{cert. value} (=10\text{mg of Sr/mL}) * 0.5 \text{ mL} * 2.41$

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

Initial and Date: WJ 10-5-95

Walter L. L. 10-11-95

Continued on Page _____

Read and Understood By _____

WJ
Signed

10-4-95
Date

Signed

Date