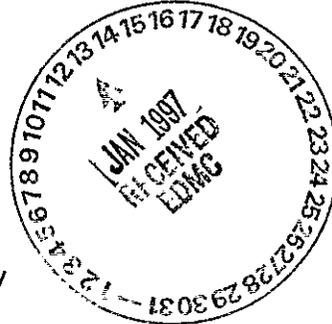


Lockheed Environmental Systems & Technologies Co.
Lockheed Analytical Services
975 Kelly Johnson Drive Las Vegas, Nevada 89119-3705
Telephone 702-361-0220 800-582-7605 Facsimile 702-361-8146

0046377

LOCKHEED MARTIN



July 9, 1996

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

RE:	Log-in No.:	L7304
	Quotation No.:	Q400000-B
	SAF:	B96-124
	Document File No.:	0622596C
	BHI Document Control No.:	381
	SDG No.:	LK7304



The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on June 22, 1996. 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 M. Hall at (509) 375-4741.

"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,

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, and duplicate samples.

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

Holding Time Requirements

All holding time requirements were met.

Analytical Method Gross Alpha/Beta

The gross alpha/beta analysis was performed using standard operating procedure, LAL-91-SOP-0060. The samples were analyzed in workgroup 38485. The instrument calibration verification met criteria. The method blank was within QC criteria. The laboratory control sample recoveries were within QC criteria. The duplicate recoveries were within QC criteria. No re-analyses were performed.

Yvonne M. Jacoby
Prepared By

July 5, 1996
Date

LOCKHEED ANALYTICAL SERVICES
 LOGIN CHAIN OF CUSTODY REPORT (ln01)
 Jun 24 1996, 04:42 pm

Login Number: L7304
 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
L7304-1 TEMP 2; SAF# B96-124 Location: 157 Liq. Waste 7 S SCREENING	BOHGK3	18-JUN-96	22-JUN-96	07-JUL-96
L7304-2 TEMP 2; SAF# B96-124 Location: 157 Liq. Waste 7 S GR ALP/BETA LAL-0060	BOHGK3	18-JUN-96	22-JUN-96	07-JUL-96
L7304-3 SAF# B96-124 Location: Water 1 S EDD - DISK DEL. Water 1 S RAD RPT TYPE 2	REPORT TYPE	22-JUN-96	22-JUN-96	07-JUL-96

Signature: *[Handwritten Signature]*

Date: 6-24-96

0622596C

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

L7304

Page ____ of ____

Data Turnaround

-
- Priority
-
-
- Normal

Collector D.Bowers	Company Contact P.K.Huff	Telephone 373-4566
Project Designation 109N Oil Sampling - 1000 Steam Cleaner Liquid	Sampling Location 100N 90 Day Pad	SAF No. B96-124
Ice Chest No. Billy	Field Logbook No. EFL-1133-1	Method of Shipment Hand Delivered
Shipped To Lockheed	Offsite Property No. NA 8W-2-96 W96-0-0640-50	Bill of Lading/Air Bill No. NA 8W-2-96 2904658732 2904658565 ^{8W} ₂₋₉₆

Possible Sample Hazards/Remarks	Preservation	None	None										
	Type of Container	G/P	G/P										
	No. of Container(s)	1	1										
	Special Handling and/or Storage	Volume	1L	20mL									
SAMPLE ANALYSIS				Gross Alpha									
				Gross Beta									
				Activity Scan									

Sample No.	Matrix*	Date Sampled	Time Sampled										
BOHGK3	DL	6/18/96	1236	x	x								

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS	Matrix*
Relinquished By <i>D. Bowers</i>	Date/Time 6-18-96/1435	Received By <i>Eric</i>	Date/Time 6-18-96
Relinquished By <i>Eric</i>	Date/Time 6-18-96/0930	Received By <i>B. Whitte</i>	Date/Time 6-18-96
Relinquished By <i>Eric</i>	Date/Time 6-18-96/0930	Received By	Date/Time
Relinquished By <i>Eric</i>	Date/Time	Received By	Date/Time

LABORATORY SECTION	Received By <i>Admiller</i>	Title Sample Custodian	Date/Time 6-22-96/0930
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Matrix*

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

LOCKHEED MARTIN



Sample Login Login Review Checklist

Lot Number L7304

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?	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

	<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?	X	—	—	_____
2. Have all appropriate comments been indicated in the comment section?	—	—	X	_____

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)?	—	—	X	_____

0008

Tom Miller
primary review signature

6-24-96
date

Tom Miller
secondary review signature

6-24-96
date

Class 5960

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

Client Sample Number	LAL Sample Number	SDG Number	Matrix	Method
BOHGK3 -	L7304-1 L7304-2		Liq. Waste Liq. Waste	SCREENING- GR ALP/BETA LAL
REPORT TYPE -	L7304-3 L7304-3		Water Water	EDD - DISK DEL. RAD RPT TYPE 2

0010

0622596

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: BOHGK3
Date Collected: 18-JUN-96
Matrix: Liq. Waste

Login Number: L7304
Date Received: 22-JUN-96

Constituent	Method	Batch	Activity	Error	MDA	Qualifier	Units	Analyzed	Lab ID
Gross Alpha	LAL-0060	38485	0.14	0.63	1.2		pCi/g	03-JUL-96	L7304-2
Gross Beta	LAL-0060	38485	33.5	2.5	1.1		pCi/g	03-JUL-96	L7304-2

12 ✓
7-19-96

Quidi Turn

LOCKHEED ANALYTICAL LABORATORY

SAMPLE PREPARATION LOG FOR GROSS ALPHA/BETA ANALYSIS

LAL-91-SOP-0060

Date Prep Started : 7/3/96
 Workgroup Number : GR ALP/BETA LAL-0060 38485

Matrix : Liq. Waste
 Prep Due Date : 07/01/96

CLIENT SAMPLE ID	LAL ID	QC	CHILD LAL ID	pH <2	ALQT VOL (g/L/smp)	PLANCHET TARE WT (grams)	PLANCHET GROSS WT (grams)	SAMPLE WEIGHT (grams)	COMMENTS
L7304-2	38485DUP1	1 DUP1	38485-01	N	.0005	8.7397	8.8116	0.5g	
Lab Ctrl Sample	38485LCS1	2 LCS1	38485-02		.250	8.5858	8.6640	100g	
Method Blank	38485MBB	3 MBB1	38485-03		.250	8.6261	8.6262	100g	
BOHGY0	L7301-17	4	38485-04		.015	8.7143	8.7458	15.0	
BOHGK3	L7304-2	5 SMP1	38485-05		.0005	8.7206	8.7992	0.5	
		6							
		7							
		8							
		9							
		10							
		11							
		12							
		13							
		14							
		15							
		16							
		17							
		18							
		19							
		20							
		21							
		22							
		23							
		24							
LCS Volume & RefDate	1.0ml		8/1/90		MS Volume & RefDate				
LCS Nuclide	Am-241		Sr-90		MS Nuclide				
LCS Activity	9.81 pCi/ml		12.0 pCi/ml		MS Activity				
LCS ID #	95-721-13-				MS ID #				

Balance Number : 40020046 ()

Pipette Number : 71008 ()

LCS added by : CD

Comments : _____

Witnessed by : DA

Analyst : [Signature]

Checked by : [Signature]

Cnt Rm Custody/Date : [Signature] 7-3-96 V96106

001

PROJECT Preparation of Am-241 Std.

Continued From Page _____

Cert #	Calib	Exp.	Ref #	Vendor	Prep	Withdraw
Print Ref.	Certs. Date	Date			In	In
388-100-1	Nov 1, 1991	5/6/92	91-0225-641	IPL	JH	JH

Item #	Preparation Date	Final Conc.	Initial Conc.	Bar Code
1	5/6/92	9,800 pCi/g	0.997 uCi/g	AA0030

The entire standard was transferred to a 100-ml volumetric. V.F. and the ²⁴¹Am sample was diluted to 100ml with 0.5N HCl.

68.4902	164.01 g std + dilution
43.5665 g wt. V.F.	63.57 g V.F.
<u>4.9237 g std</u>	<u>100.44 g diluted std</u>

Activity Std = $\frac{0.1994 \mu\text{Ci/g} \times 4.9237 \text{ g std}}{100.44 \text{ g dilution}}$

Density 0.5N HCl = 1.003598 g/ml $\Rightarrow 0.0097748 \mu\text{Ci/g} \times 1.003598 \text{ g/ml}$
 $= 0.00980 \mu\text{Ci/g}$ $= 0.009810 \mu\text{Ci/g}^m$
 $\text{or} = 9,800 \text{ pCi/g}$ $= 9810 \text{ pCi/ml}$

Continued on Page _____

Read and Understood By

0024

Joe Hutchison
Signed

5/1/92
Date

JH
Signed

7/13/92
Date

PROJECT

SR-90 Radioisotope Standard Preparation Continued From Page

CERT #	Calibration	Expiration	Reference	VENDOR	PREP	WITNESSES
Parent Ref #	Cert Date	Date	#		INITIALS	INITIALS
SRM #	1000	10-2-93	SRM # 4919-6A	NIST		
4919-6	Aug 11, 1990		91-0199-63			
I.F.M.	Preparation	Final	INITIAL			
#	Date	Concentration	Concentration			
✓	1000 EST #1189 Aug 11, 1990	600.685 600.685	4.514 x 10³ Bq/g 4.514 x 10 ³ Bq/g			

9/10/91

Radioisotope = SR-90

SOURCE # 4919-6

SOURCE description: Solution in NIST Borosilicate glass ampule

Composition: # SR-90 + Y-90 plus approximately 95 mg of non radioactive SR and yttrium per gram of 1 molar HCL.

mass approximately 5.0 grams

Radioactivity conc. 4.514 x 10³ Bq/g

Reference time = 1200 EST Aug. 1, 1990

T_{1/2} = 28.5 to 2 years

10/2/91 Preparation

// weighing

100.0 ml V.F. + standard of SR-90 in ampule

= 65.2000

100.0 ml V.F. (empty) (g) = 60.2814

Difference of mass (g) + v.e. = 4.9186

2/ Calculations:

$$4.514 \times 10^3 \text{ Bq/g} \times 4.9186 \text{ g} = 22,202.5604 \text{ Bq}$$

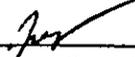
$$22,202.5604 \text{ Bq} \times 0.7027 \text{ Pci/Bq} = 600.685999 \text{ Pci}$$

(STD date Aug 1, 1990) Continued on Page

Transferred 11-19-91 Paul Fabrett

(Repeared from LAL 60 0199 pg 63)
Read and Understood By

0026


Signed

 11/19/91
Date


Signed

 12/1/91
Date

SECONDARY/WORKING LEVEL STANDARD DILUTION RECORD

Dilution Source Information

Isotope: Am-241 and Sr-90

Parent Barcode Number: AA0030 AA0046
Am-241 IPI 388-700-1

Vendor or Certificate I.D. # of Parent Standard: Sr-90 NIST SRM 4219G
Am-241 91-0225-60-1

Diluted Source Logbook I.D. #: Sr-90 91-0225-30-2

Balance Verification?: Yes

Diluent Used: 0.1 N HNO₃

Dilution

* Diluent: 0.1 N HNO₃ + 42mg Sr(NO₃)₂/mL

* Density of diluent (g/ml): NA

a: Parent Specific Activity: Am-241 9810 pCi/mL
Sr-90 6000 pCi/mL m 8/1/90

b: Amount of Source Transferred: Am-241 0.5 mL
Sr-90 0.5 mL

c: Total amount of Dilution: 500 mL

d: Total Volume of Dilution: 500 mL

e: Activity of Dilution (a * b / c): NA
Am-241 9.81 pCi/mL

f: Activity of Dilution (a * b / d): Sr-90 12 pCi/mL m 8/1/90

Dilution Logbook I.D. #: 95-721-13-1

Prepared By: Joe Hutchins

Preparation Date: 8/23/95

Reviewed By: Joe Marshall

Review Date: 8/24/95

*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

0022

Signed

Date

Signed

Date

CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

Radionuclide	Am-241	Customer:	LOCKHEED ENGINEERING & SCIENCES Co
Half Life:	432.7 ± 0.5 years	P.O.No.:	06LAB1245
Catalog No.:	7241	Reference Date:	November 1 1991 12:00 PST.
Source No.:	388-100-1	Contained Radioactivity:	0.997 μ Cl.

Description of Solution

a. Mass of solution:	5.0007	grams.
b. Chemical form:	AmCl ₃ in 0.5N HCl	
c. Carrier content:	None added	
d. Density:	1.0077	gram/ml @ 20°C.

Radioimpurities

None detected

Radioactive Daughters

None detected

Radionuclide Concentration

0.1994 μ Cl/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:	±2.0%
b. Random uncertainty in assay:	±0.7%
c. Random uncertainty in weighing(s):	±0.0%
d. Total uncertainty at the 99% confidence level:	±2.7%

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)



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

Ray A. Moore
 QUALITY CONTROL

0023

Cert #	Calib	Exp.	Ref #	Vendor	Prep	Withdraw
Parent Ref.	Certs. Date	Date			In	In
388-100-1	Nov 1, 1991	5/6/92	91-0225-601	IPL	JH	JH
Item #	Preparation Date	Final Conc.	Initial Conc.	Bar Code		
1	5/6/92	9,800 $\mu\text{Ci/g}$	0.997 $\mu\text{Ci/g}$	AA0030		
		$\frac{1}{g}$	$\frac{1}{g}$			
			in 50 μl			
			0.1994 $\mu\text{Ci/g}$			

The entire standard was transferred to a 100-ml volumetric V.F. and the ²⁴¹Am sample was diluted to 100ml with 0.5N HCl.

68.4902	164.01 g std + dilute
43.5665 g wt. V.F.	63.57 g V.F.
<u>4.9237 g std</u>	<u>100.44 g diluted std</u>

$$\text{Activity Std} = \frac{0.1994 \mu\text{Ci/g} \times 4.9237 \text{ g std}}{100.44 \text{ g dilution}}$$

$$\begin{aligned} \text{Density } 0.5\text{N HCl} &= 1.003598 \text{ g/ml} & \Rightarrow & 0.0097748 \mu\text{Ci/g} \times 1003598 \text{ g/ml} \\ &= 0.0098 \mu\text{Ci/g} & & = 0.009810 \mu\text{Ci/g} \\ \text{or} &= 9,800 \text{ pCi/g} & & = 9810 \text{ pCi/ml} \end{aligned}$$

Continued on Page

Read and Understood By

0024

Joe Hutchinson
Signed

5/11/92
Date

JH
Signed

2/13/92
Date



THIS IS A PHOTOCOPY OF THE CERTIFICATE
WHICH IS BEING MAILED TO YOU UNDER
SEPARATE COVER.

AA004 ✓

National Institute of Standards & Technology

Certificate

Standard Reference Material 4919-G Radioactivity Standard

Radionuclide	Strontium-90
Source identification	4919-G
Source description	Solution in NIST borosilicate-glass ampoule ⁽¹⁾ *
Solution composition	Strontium-90 plus yttrium-90 plus approximately 95 μg each of non-radioactive strontium and yttrium per gram of 1-molar hydrochloric acid ⁽²⁾
Mass	Approximately 5.0 grams
Radioactivity concentration	$4.514 \times 10^5 \text{ Bq g}^{-1}$
Reference time	1200 EST August 1, 1990
Overall uncertainty	1.05 percent ⁽³⁾
Photon-emitting impurities	None observed ⁽⁴⁾
Alpha-particle-emitting impurities	None observed ⁽⁵⁾
Half life	$28.5 \pm 0.2 \text{ years}$ ⁽⁶⁾
Measuring instrument	4 $\pi\beta$ liquid-scintillation counter

This standard reference material was prepared in the Center for Radiation Research, Ionizing Radiation Division, Radioactivity Group, Dale D. Hoppes, Group Leader.

Gaithersburg, MD 20899
January, 1991

William P. Reed, Acting Chief
Office of Standard Reference Materials

*Notes on back

0025

PROJECT

SR-90 Radioisotope Standard Preparation Continued From Page

CERT #	Calibration	Expiration	Reference	VENDOR	PREP	WITNES
Parent Cert #	Cert Date	Date	#		INITIALS	INITIALS
SRM #	1000	10-2-93	SRM #4919-6-A	NIST		
4919-6	Aug 1, 1990		91-0199-63			
I.F.M.	Preparation	Final	INITIAL			
#	DATE	Concentration	Concentration			
✓	10-2-91 10-2-91 Aug 1, 1990	600.685 Bq/g 600.685 Bq/g	4.514 x 10 ³ Bq/g			

9/10/91

Radioisotope = SR-90

SOURCE # 4919-6

Source description: Solution in NIST Borosilicate glass ampule
Composition: # SR-90 + Y-90 plus approximately95% of non radioactive SR and
yttrium per gram of 1 molar HCl.

mass

approximately 5.0 grams

Radioactivity conc.

4.514 x 10³ Bq/g

Reference time =

1000 EST Aug 1, 1990

T_{1/2} =

28.5 to 2 years

10/2/91 Preparation

1/ weighing

100.0 ml V.F. + standard of SR-90 in ampule

= 65.2000

100.0 ml V.F. (empty) (g) = 60.2814

Difference of mass (g) = 4.9186

2/ Calculations =

$$4.514 \times 10^3 \text{ Bq/g} \times 4.9186 \text{ g} = 22,202.5604 \text{ Bq}$$

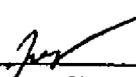
$$22,202.5604 \text{ Bq} \times 0.7027 \text{ Pci/Bq} = 600.685999 \text{ Pci}$$

(570 date Aug 1, 1990) Continued on Page

Transferred 11-19-91 Paul Fabbitt

(Referred from LAL 605 0199 pg 63)
Read and Understood By

0026


Signed

 11/19/91
Date


Signed

 12/4/91
Date