START

9713531.2176

LK7418-LAS

5/

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

0046719

LOCKHEED MARTIN

July 23, 1996

FEB 1997 RECEIVED EDMC

AUG 1996 RECEIVED Data Log In

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

RE:	Log-in No.:	L7418
	Quotation No.:	Q400000-B
	SAF:	B96-147
	Document File No.:	0713596A
	WHC Document Control No.:	386
	SDG No.:	LK7418

The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on July 13, 1996. The temperature of the cooler upon receipt was 5°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,

Karen Herman for

Kathleen M. Hall
Client Services Representative

cc: Client Services
Document Control

Lockheed Analytical Services

Log-in No.: L7418
Quotation No.: Q400000-B
SAF: B96-147
Document File No.: 0713596A
WHC Document Control No.: 386
SDG No.: LK7418
Page No.: 1

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 Strontium-90

The strontium-90 analysis was performed using standard operating procedure, LAL-91-SOP-0065. The samples were analyzed in workgroup 38962. 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. The minimum detectable activity for sample BOHXQ8 (L7418-2) was greater than the reporting detection limit; since all QC criteria were met data quality is not believed to be adversely affected. No re-analyses were performed.

Andrea Tippett
Prepared By

June 23, 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.

9713531.2179

LOCKHEED ANALYTICAL SERVICES
LOGIN CHAIN OF CUSTODY REPORT (ln01)
Jul 15 1996, 08:46 am

Login Number: L7418
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
L7418-1	B0HXQ8	10-JUL-96	13-JUL-96		28-JUL-96
TEMP 5					
Location: 157					
Water 1 S SCREENING		Hold:06-JAN-97			
* L7418-2	B0HXQ8	10-JUL-96	13-JUL-96		28-JUL-96
TEMP 5					
Location: 157					
Water 1 S SR-TOTAL LAL-0065					
L7418-3	B0HXQ8	10-JUL-96	13-JUL-96		28-JUL-96
TEMP 5					
Location: 157					
L7418-4	B0HXQ8	10-JUL-96	13-JUL-96		28-JUL-96
TEMP 5					
Location: 157					
L7418-5	B0HXQ8	10-JUL-96	13-JUL-96		28-JUL-96
TEMP 5					
Location: 157					
* L7418-6	REPORT TYPE	13-JUL-96	13-JUL-96		28-JUL-96
Location:					
Water 1 S EDD - DISK DEL.					
Water 1 S RAD RPT TYPE 2					

~~000007~~

* analysis and report type changed

Signature: [illegible]

Date: 7-15-96

0713596

Bechtel Hanford Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

L7418

B96-147-19 | Page 1 of 1

Data Turnaround
☐ Priority
☐ Normal

Collector A. Rizzo	**Company Contact** J. V. Borghese	**Telephone No.** (509) 373-4790
Project Designation 100-NR-2 Pump and Treat Treatability Study	**Sampling Location** 100 N	**SAF No.** B96-147
Ice Chest No. GWS-025	**Field Logbook No.** EFR-1258	**Method of Shipment** Federal Express
Shipped To Lockheed	**Offsite Property No.** W96-0-0314-2	**Bill of Lading/Air Bill No.** 2904659773

POSSIBLE SAMPLE HAZARDS/REMARKS

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

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

Sample No.	Matrix *	Sample Date	Sample Time										
B0HXQ8	Water	7-10-96	0930	X	X								

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By A. G. Rizzo (EFR)	Date/Time 1430 7-10-96	Relinquished By Eric White (EC) Eric White	Date/Time 1830 7-10-96
Relinquished By Eric White (EC) Eric White	Date/Time 0900 7-12-96	Relinquished By	Date/Time
Relinquished By	Date/Time	Relinquished By	Date/Time
Relinquished By	Date/Time	Relinquished By	Date/Time

SPECIAL INSTRUCTIONS

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 Davis	Title Sample Custodian	Date/Time 7-13-96 1530
FINAL SAMPLE DISPOSAL SECTION	Disposal Method	Disposed By	Date/Time

0013546A

0012531190

SAMPLE CHECK-IN LIST

Date/Time Received: 7-13-96 / 9:30am SDG#: n.a

Work Order Number: n.a SAF #: B96-147

Shipping Container ID: GWS-025 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 5°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 [ ] No [x]

7. Samples have:
   - ____ tape
   - x custody seals
   - ____ hazard labels
   - ____ 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: [illegible] / LAS Date: 7-13-96

~~Telephoned~~ Faxed To: KATHLEEN HALL On 7-13-96 By [illegible]

ACD 7-13-96

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LOCKHEED MARTIN

Sample Login
Login Review Checklist

Lot Number L7418

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 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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Paula Dawson — primary review signature — 7-12-96 — date

Paula Dawson — secondary review signature — 7-12-96 — date

0713596

Lockheed Analytical Services
Sample Receiving Checklist

Client Name: Bechtel - Hanford Job No. 67418 Cooler ID: 1142

COOLER CONDITION UPON RECEIPT			
Temperature of cooler upon receipt: 5°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		N/A	
are samples bi-phasic (if so, indicate sample ID'S):		N/A	

MISCELLANEOUS ITEMS			
	Yes	No	* Comments/Discrepancies
samples with short holding times		X	
samples to subcontract		N/A	

ADDITIONAL COMMENTS/DISCREPANCIES

Completed by / date: Paula Wilcox 2-13-96

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*

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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: B0HXQ8
Date Collected: 10-JUL-96
Matrix: Water

Login Number: L7418
Date Received: 13-JUL-96

Constituent	Method	Batch	Activity	Error	MDA	Qualifier	Units	Analyzed	Lab ID
Sr-89,90	LAL-0065	38962	0.28	0.68	1.2		pCi/L	19-JUL-96	L7418-2

LOCKHEED ANALYTICAL LABORATORY

SAMPLE PREPARATION LOG FOR STRONTIUM ANALYSIS
TOTAL RADIOSTRONTIUM - LAL-91-SOP-0065

Date Prep Started : 7/18/96 Matrix : Water
WorkGroup : SR-TOTAL LAL-0065 38962 Prep Due Date : 07/24/96

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
L7418-2	38962DUP1	1	DUP1	38962-01	.5	2	7/19/96	15:45	8.7257				
Lab Ctrl Sample	38962LCS1	2	LCS1	38962-02	↓	↓	↓	↓	8.7026				
Method Blank	38962MBB	3	MBB1	38962-03	↓	↓	↓	↓	8.6709				
B0HXQ8	L7418-2	4	SMP1	38962-04	↓	↓	↓	↓	8.6812				
		5											
		6											
		7											
		8											
		9											
		10											
		11											
		12											
		13											
		14											
		15											
		16											
		17											
		18											
		19											
		20											
		21											
		22											
		23											
		24											

Conc&Vol of Carrier	2mL; 10mg/mL	val: 0425	Act & Vol of LCS	1mL 40 pCi/mL	Prep Anlst	M. YOUNG
Carrier Exp Date	4/29/97		LCS Ref Date	8/1/96	Start Date	7/18/96
Carrier ID#	94-0658-35		LCS ID#	95-721-33-1	Count Anlst	

Balance Number : ( ) Pipette Number : 115387 (✓) Carrier and LCS added by: MY
( ) ( ) Witnessed by : 7/18/96

Comments :

Analyst : 7/19/96 Checked by : Cnt Rm Custody\Date : 8V 7-22-96

V96024

0000018

LOCKHEED ANALYTICAL LABORATORY

SAMPLE PREPARATION LOG FOR STRONTIUM ANALYSIS
TOTAL RADIOSTRONTIUM - LAL-91-SOP-0065

Date Prep Started : 7/18/96 Matrix : Water
WorkGroup : SR-TOTAL LAL-0065 38962 Prep Due Date : 07/24/96

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
L7418-2	38962DUP1	1	DUP1	38962-01	~~1~~ .5	2	7/19/96	15:45	8.7257	8.7637		0.038	
Lab Ctrl Sample	38962LCS1	2	LCS1	38962-02	1	2	7/19/96	15:45	8.7026	8.7385		0.0359	
Method Blank	38962MBB	3	MBB1	38962-03	1	2	7/19/96	15:45	8.6709	8.708		0.0371	
B0HXQ8	L7418-2	4	SMP1	38962-04	3L PEAK	2	7/19/96	15:45	8.6812	8.7099		0.0287	
		5											
		6											
		7											
		8											
		9											
		10											
		11											
		12											
		13											
		14											
		15											
		16											
		17											
		18											
		19											
		20											
		21											
		22											
		23											
		24											

Conc&Vol of Carrier	21.25 mg/mL; 2.0 mL	Act & Vol of LCS	40.00 pCi/mL; 1.0 mL	Prep Anlst	my
Carrier Exp Date	29-Apr-97	LCS Ref Date	01-Aug-90	Start Date	7/18/96
Carrier ID#	94-658-35	LCS ID#	95-721-33	Count Anlst	lv

Balance Number : ( ) Pipette Number : 115387 ( ) Carrier and LCS added by: my
( ) ( ) Witnessed by : nn

Comments :

Analyst : 7/19/96 Checked by :

V96024

0000019

LOCKHEED ANALYTICAL LABORATORY

COUNT DATA AND CALCULATIONS FOR STRONTIUM ANALYSIS
TOTAL RADIOSTRONTIUM - LAL-91-SOP-0065

WorkGroup : SR-TOTAL LAL-0065 38962

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-A1	38962-01	DUP1	0.894	200	237	217	0.386	07/19/96	17:37	1.038	0.25	0.53	0.53	0.86	0.90
LB1-A2	38962-02	LCS1	0.845	200	5528	195	0.387	07/19/96	17:37	1.038	70.75	1.97	4.05	0.86	0.90
LB1-A3	38962-03	MBB1	0.873	200	189	201	0.397	07/19/96	17:37	1.038	-0.15	0.48	0.48	0.82	0.86
LB1-A4	38962-04	SMP1	0.675	200	233	216	0.394	07/19/96	17:37	1.038	0.28	0.68	0.68	1.12	1.16

COMMENTS : 38962LCS1 LCS Recovery = 70.75/69.40 = 101.9 %.
L7418-2, 38962DUP1 RPD = 9.7 %, RER = 0.02

MBB = -0.150 pCi/L => less than RDL(HAMDC).

V96024

Date Completed : 7-22-96

Analyst's Signature : SV

Checked by : [illegible]

000020

PROJECT Strontium Carrier Chemistry NOTEBOOK NO. 6K

6/12/96: Procedure: Refined to LAL-96-106-0688-36
ID: LAL-93-106-0509-86.
CHEMICALS: FISHER, Sr(NO3)2, LOT#953609, CERTIFIED ACS.

	CAL #1	CAL #2	CAL #3	CAL #4	CAL #5	CAL #6
CARRIER PLUS PLANCHET WT.	8.7535(g)	8.7828(g)	8.7734(g)	8.8082(g)	8.7719(g)	8.8427(g)
TARE WT. OF PLANCHET	8.6527(g)	8.6853(g)	8.6645(g)	8.6965(g)	8.6542(g)	8.7422(g)
NET WT. OF CARRIER ADDED (mg)	0.1008	0.0975	0.1089	0.1117	0.1177	0.1005

AV = 0.1062

NUBLAGE = (0.1008 + 0.0975 + 0.1089 + 0.1117 + 0.1177 + 0.1005) / 5 ml (for CAL.) × 2 ml (used in Fro. method)

= 0.0425 (g)

6/12/96

Continued on Page

Read and Understood By

000022

Signed	Date	Signed	Date
	6/12/96		7/9/96

97135531.2189

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

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	4.514×10^3 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 ± 0.2 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
[illegible]uary, 1991

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

*Notes on back

NOTES

(1) Approximately five milliliters of solution. Ampoule specifications:

body diameter	16.5 ± 0.5 mm
wall thickness	0.60 ± 0.04 mm
barium content	less than 2.5 percent
lead oxide content	less than 0.02 percent
other heavy elements	trace quantities

(2) Solution density is 1.014 ± 0.002 g/mL at 21.5 °C.

(3) The overall uncertainty was formed by taking three times the quadratic combination of standard deviations of the mean, or approximations thereof, for the following:

a) liquid-scintillation measurements	0.01 percent
b) gravimetric measurements	0.05 percent
c) dead time	0.10 percent
d) background	0.01 percent
e) detection efficiency	0.30 percent
f) decay-scheme data	0.10 percent
g) half life	0.01 percent
h) radionuclidic impurities	0.10 percent

(4) The limit of detection for photon-emitting impurities is:

$$0.01\ \gamma\ s^{-1}g^{-1} \text{ between 50 and 1900 keV.}$$

(5) The limit of detection for alpha-particle-emitting impurities is:

$$0.05\ \alpha\ s^{-1}g^{-1}.$$

(6) NCRP Report No. 58, 2nd Edition, February 1985, p. 365.

For further information please contact Dr. Larry Lucas at (301) 975-5546.

4919-G

NOTES ON THE USE OF STANDARD REFERENCE MATERIAL 4919G, STRONTIUM-90

The activity of the strontium-90 in the ampoule is given per gram of solution. If transfers are ma by volume, the density given on the certificate can be used to compute the activity per unit volun The activity given is the strontium-90 activity only. Because the strontium-90 is in equilibrium wi its yttrium-90 daughter, which is also a beta-particle emitter, the activity given should be doubled get the corresponding total beta-particle-emission rate.

If the solution is to be used for making quantitative sources, it should be kept tightly sealed so th evaporation, and the consequent change in the radioactivity concentration, is minimized. Glass containers are best for storage.

Dilute solutions of strontium-90 are often assayed by liquid-scintillation counting. We recommer that carrier solution containing approximately 1 mg of non-radioactive strontium be added first t the liquid-scintillation cocktail. We typically use a carrier solution containing 4 mg of strontium mL of 0.5- molar hydrochloric acid. When 0.25 mL of this solution is added to 10 mL of emulsi type liquid-scintillation cocktail, the resulting 1 mg of strontium per vial is generally sufficient to prevent the radioactive strontium-90 from plating out on the vial walls. A set of liquid-scintillati vials that cover a range of sample-solution masses should be prepared and monitored over sever days to ensure that the efficiency is constant.

The beta-particle counting efficiency will be somewhat less than unity. A correction for the loss low-energy beta particles can be computed using the integral-discriminator-extrapolation technic (G. Goldstein, Nucleonics 23 (1965) 67) or using the liquid-scintillation efficiency-tracing technic with tritium (B.M. Coursey et al, Int. J. Radiat. Isotopes 37 (1986) 403).

The activity concentration given on the certificate is as of 1200 hours Eastern Standard Time, August 9, 1990. To convert from EST to your local time, the table given below can be used.

TO CONVERT FROM EST TO:

EDT	Add	1 hour
CDT	Same as EST	
CST	Subtract	1 hour
MDT	Subtract	1 hour
MST	Subtract	2 hours
PDT	Subtract	2 hours
PST	Subtract	3 hours
UTC	Add	5 hours

PROJECT Sr-90 LCS

Notebook No. [redacted]

Continued From Page _____

SECONDARY/WORKING LEVEL STANDARD DILUTION RECORD

Dilution Source Information

Isotope:	Sr-90
Parent Barcode Number	AA0046
Vendor or Certificate I.D. # of Parent Standard:	-
Diluted Source Logbook I.D. #:	91-0225-30-2
Balance Verification?:	Y
Diluent Used:	1.0 M HCl

Dilution

*Diluent:	1 M HCl	
*Density of diluent (g/ml):	1.0121	g/ml
a: Parent Specific Activity:	6000.69 pCi/ml ~~pCi/g~~ @ 8/1/90	
b: Amount of Source Transferred:	~~2.00~~ 2.01	g
c: Total amount of Dilution:	303.63	g
d: Total Volume of Dilution:	300.0	ml
e: Activity of Dilution (a * b / c):	40.49	pCi/g @ 8/1/90
f: Activity of Dilution (a * b / d):	40.00	pCi/ml
Dilution Logbook I.D. #:	95-0721-33-1	

Prepared By: [signature] Preparation Date: 7/9/96

Reviewed By: [signature] Review Date: 7/9/96

*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

Signed _____ Date _____ Signed [signature] Date 7/9/96

000026

Notebook No. LAL-91-LC-0199

PROJECT SR-90 Radionuclide Standard Preparation

Continued From Page

CERT # / Parent Ref #	Calibration Cert Date	Expiration Date	Reference #	VENDOR	PREP INITIALS	WITNESS INITIALS
SRM # 4919-G	1200 Aug 1, 1990	10-2-93	SRM #4919-G-A 91-0199-63	NIST		

ITEM #	Preparation Date	Final Concentration	INITIAL Concentration
1	~~1200 EST~~ 10-2-91 ~~Aug 1, 1990~~	~~600,068.5999~~ 12-7-91 600,685 Bi/g	4.514×10^3 Bq-1

9/10/91

Radionuclide : SR-90

SOURCE # 4919-G

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 4.514×10^3 Bq-1

Reference Time : 1200 EST Aug. 1, 1990

T1/2 = 28.5 ±0.2 years

10/2/91 Preparation

1/ weighing 100.0 ml V.F + Standard of SR-90 in ample = 65.2000

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

Difference of mass (g) t.w. = 4.9186

2/ Calculations :

4.514×10^3 Bq/g X 4.9186 = 22,202.5604 Bq

22,202.5604 Bq X 27.027 Pci/Bq = 600,068.5999 Pci

(STD date Aug 1, 1990)

Continued on Page

Transferred 11-19-91 Paul [illegible]

(Referred from LAL LC 0199 pg 63)

Read and Understood By

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[illegible] Signed 11/19/91 Date [illegible] Signed 12/4/91 Date

9713531.2194

Kearney/Centaur Division
A.T. Kearney, Inc.
2952 George Washington Way
Richland, Washington 99352
509 375 5667
Facsimile 509 375 5151

Management
Consultants

AUG 1996
RECEIVED
Validation
Log In

AT KEARNEY

28 August 1996

Ms. Joan Kessner
Bechtel Hanford Incorporated
3350 George Washington Way MSIN BI-35
Richland, Washington 99352

Dear Ms. Kessner:

Enclosed is the radiochemistry data validation report for sample data group LK7418-LAS.

Sincerely,

R. Bruce Christian, CIH
Associate

cc: J. Duncan - CH2
J. Goode - ATK

Date: 28 August 1996
To: Bechtel Hanford, Inc. (technical representative)
From: A.T. Kearney, Inc.
Project: 100-NR-2 Performance Monitoring Round 0 - July Samples
Subject: Radiochemistry - Data Package No. LK7418-LAS (SDG No. LK7418)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. LK7418-LAS which was prepared by Lockheed Analytical Services (LAS). A list of samples validated along with the analyses reported and the requested analyte is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analysis
B0HXQ8	07/10/96	Water	C	Strontium-89,90

Data validation was conducted in accordance with the WHC statement of work (WHC 1994) and validation procedures (WHC 1992b). Appendices 1 through 5 provide the following information as indicated below:

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

DATA QUALITY OBJECTIVES

- **Holding Times**

  Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for radiochemical analyses is six months.

  All holding times were acceptable.

- **Instrument Calibration and Performance**

  Instrument calibration is performed to establish that the counters used to determine radionuclide activities are capable of producing acceptable and reliable analytical data. Each counting system must be factory calibrated at installation and after any maintenance or repair. Calibration consists of an instrument

efficiency determination for each applicable radionuclide. Continuing calibration checks are performed to verify that instrument performance is stable and reproducible.

Initial and continuing calibrations are not reviewed under Level C validation.

- **Blanks**

Laboratory Blanks

Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination. If blank analysis results indicate the presence of an analyte above the MDA, the following qualifiers are applied: All positive sample results less than five times the highest blank concentration are qualified as estimates and flagged "J"; sample results below the MDA are elevated to the MDA and qualified as undetected and flagged "U"; sample results above the MDA and greater than five times the highest blank concentration are not qualified.

All blank results were acceptable.

- **Accuracy**

Accuracy is evaluated by analyzing distilled water or field samples spiked with known amounts of radionuclides. The sample activity as determined by analysis is compared to the known activity to assess accuracy. The acceptable laboratory control sample recovery range is 70% to 130%, while that for a matrix spike is 60% to 140%. In addition, samples may be spiked with a radiochemical tracer to assist in isolating the radioisotope of interest with the yield of the tracer being used in calculating sample activity. The acceptable range for tracer recovery is 20% to 105%. Spike sample results outside the above ranges result in associated sample results being qualified as estimates, rejected, or not qualified, depending on the activity of the individual sample.

All accuracy results were acceptable.

- **Precision**

Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. Precision may also be assessed using unspiked duplicate sample analyses. If both sample and replicate activities are greater than five times the CRDL and the RPD is less than 35 percent for soil samples and 20 percent for water samples, the results are acceptable. If either activities are less then five times the CRDL, a control limit of less than or equal

to two times the CRDL is used for soil samples and less than or equal to the CRDL for water samples. If either the original or replicate value is below the CRDL, the applicable control limits are less than or equal to the CRDL for water samples and less than or equal to two times the CRDL for soil samples. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

All precision results were acceptable.

Field Split Samples

One pair of field split samples were submitted to QES/LAS for analysis as shown below:

Sample No.	Split Sample No.	Well No.
B0HXP8 (QES)	B0HXQ9 (LAS)	199-N-92A

The split sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. All split sample results were within QC limits.

- **Detection Levels**

Reported laboratory detection levels are reviewed to ensure that they are at or below the CRDL. All reported MDAs were at or below the analyte specific CRDL.

- **Completeness**

Data Package No. LK7418-LAS (SDG No. LK7418) was submitted for validation and verified for completeness. The completion rate was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

REFERENCES

EPA, 1987, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, Third Edition, Environmental Protection Agency, Washington, D.C.

EPA, 1988a, *EPA Contract Laboratory Program Statement of Work for Organics Analyses, Multi-Media, Multi-Concentration*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1988b, *Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1988c, *EPA Contract Laboratory Program Statement of Work for Inorganics Analyses, Multi-Media, Multi-Concentration*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1988d, *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1990, *EPA Contract Laboratory Program Statement of Work for Inorganic Analyses, Multi-media, Multi-Concentration*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1991, *EPA Contract Laboratory Program Statement of Work for Organics Analyses, Multi-Media, Multi-Concentration*, Environmental Protection Agency, Washington, D.C.

WHC, 1992a, *Data Validation Procedures for Chemical Analyses*, WHC-SD-EN-SPP-002, Rev. 2, Westinghouse Hanford Company, October 1993.

WHC, 1992b, *Data Validation Procedure for Radiological Analyses*, WHC-SD-EN-SPP-001, Rev. 2, Westinghouse Hanford Company, 1993.

EPA, 1994, *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, U.S. Environmental Protection Agency, Washington, D.C.

WHC, 1994, *Validation Statement of Work*, Rev.1, Westinghouse Hanford Company, 1994.

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Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the procedures herein are as follows:

U - Indicates the compound or analyte was analyzed for and not detected above the minimum detectable activity (MDA) in the sample. The value reported is the sample result corrected for sample dilution and moisture content by the laboratory. The data is usable for decision making purposes.

UJ - Indicates the compound or analyte was analyzed for and not detected at concentrations above the minimum detectable activity (MDA) in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate, but is usable for decision making purposes.

J - Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

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Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: LK7418	REVIEWER: RBC	DATE: 08/28/96	PAGE 1 OF 1
COMMENTS: No qualifiers assigned.			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON

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Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

RADIOCHEMISTRY ANALYSIS, WATER MATRIX, (pCi/l)

Project: BECHTEL-HANFORD																					
Laboratory: Quanterra																					
Case	SDG: LK7418																				
Sample Number		B0HXQ8																			
Location		199-N-92A																			
Remarks		Split																			
Sample Date		07/10/96																			
Radiochemistry	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Strontium-89,90	2	0.28	U																		

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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: B0HXQ8
Date Collected: 10-JUL-96
Matrix: Water

Login Number: L7418
Date Received: 13-JUL-96

Constituent	Method	Batch	Activity	Error	MDA	Qualifier	Units	Analyzed	Lab ID
Sr-89,90	LAL-0065	38962	0.28	0.68	1.2		pCi/L	19-JUL-96	L7418-2 U

RKC
8/28/96

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Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

9713531.2207

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

July 23, 1996

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

AUG 1996
RECEIVED
Data
Log In

RE:	Log-in No.:	L7418
	Quotation No.:	Q400000-B
	SAF:	B96-147
	Document File No.:	0713596A
	WHC Document Control No.:	386
	SDG No.:	LK7418

The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on July 13, 1996. The temperature of the cooler upon receipt was 5°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,

Karen Herman for
Kathleen M. Hall
Client Services Representative

cc: Client Services
Document Control

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Lockheed Analytical Services

Log-in No.: L7418
Quotation No.: Q400000-B
SAF: B96-147
Document File No.: 0713596A
WHC Document Control No.: 386
SDG No.: LK7418
Page No.: 1

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 Strontium-90

The strontium-90 analysis was performed using standard operating procedure, LAL-91-SOP-0065. The samples were analyzed in workgroup 38962. 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. The minimum detectable activity for sample BOHXQ8 (L7418-2) was greater than the reporting detection limit; since all QC criteria were met data quality is not believed to be adversely affected. No re-analyses were performed.

Andrea Tippett
Prepared By

June 23, 1996
Date

Bechtel Hanford Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST L7418

B96-147-19 Page 1 of 1

Data Turnaround: ☐ Priority ☐ Normal

Collector: A. Rizzo	Company Contact: J. V. Borghese	Telephone No.: (509) 373-4790
Project Designation: 100-NR-2 Pump and Treat Treatability Study	Sampling Location: 100 N	SAF No.: B96-147
Ice Chest No.: GWS-025	Field Logbook No.: EFR-1258	Method of Shipment: Federal Express
Shipped To: Lockheed	Offsite Property No.: W96-0-0314-2	Bill of Lading/Air Bill No.: 2904659773

POSSIBLE SAMPLE HAZARDS/REMARKS

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

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

Sample No.	Matrix *	Sample Date	Sample Time		
B0HXQ8	Water	7-10-96	0930	X	X

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Relinquished By	Date/Time
A. G. Rizzo (EDS)	7-10-96 1430	Kim Whitt (BWHC)	7-10-96 1830
Kim Whitt (BWHC)	7-10-96 0900		

SPECIAL INSTRUCTIONS

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: Paul C. Davis — Title: Sample Custodian — Date/Time: 7-13-96 1930

Disposal Method — Disposed By — Date/Time

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Appendix 5

Data Validation Supporting Documentation

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E

PROJECT: 100NR2 July	DATA PACKAGE: LK7418	
VALIDATOR: RK	LAB: LAS	DATE: 27 Aug 96
CASE:	SDG: LK7418	

ANALYSES PERFORMED

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

SAMPLES/MATRIX Water

BOHXQ8

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:

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:_____

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:_____

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:

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:

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: Split of BOH XP8 - Both undetected

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: