

LOCKHEED MARTIN 

May 19, 1995

Ms. Joan Kessner  
Bechtel Hanford, Inc.  
345 Hills  
P.O. Box 969  
Richland, WA 99352



RE: Log-in No.: L4243/L4271  
Quotation No.: Q400000-B  
SAF: B95-040  
Document File No.: 0411596/0414596  
WHC Document File No.: 208  
SDG No.: LK4243

L4243- The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on 11 April 1995. 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.

L4271- The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on 14 April 1995. The temperature of the cooler upon receipt was 6°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.

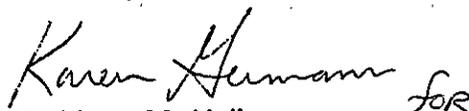
If you have any questions concerning the analysis or the data please call Kathleen Hall at (509) 943-4423.

The EDD is being sent on the Hanford Bulletin Board System.

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

" 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 *for*  
Client Services Representative

cc: Client Services  
Document Control

**CASE NARRATIVE  
INORGANIC NON METALS ANALYSES**

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

**Preparation and Analysis Requirements**

- One water sample was received for LK4243 and prepared as batch 411bh and analyzed for selected analytes as requested on the chain of custody. Quality control analysis was performed on the following sample:

Client ID	LAL #		Method
BOF8W8	L4243-4	MS, DUP	300.0 Sulfate
	L4243-4	MS, DUP	300.0 Fluoride
	L4243-4	DUP	9040 pH
	L4243-5	DUP	9050 Conductivity

**Holding Time Requirements**

- All samples were analyzed within the specified holding time.

**Method Blanks**

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

**Internal Quality Control**

- All Internal Quality Control were within acceptance limits.

Kay McCann

April 24, 1995

Prepared By

Date

**CASE NARRATIVE  
INORGANIC NON METALS ANALYSES**

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

**Preparation and Analysis Requirements**

- One water sample was received for LK4243 and prepared as batch 414bh and analyzed for selected analytes as requested on the chain of custody. Quality control analysis was performed on the following sample:

Client ID	LAL #		Method
BOF8X0	L4271-4	MS, DUP	300.0 Sulfate
	L4271-4	MS, DUP	300.0 Fluoride
	L4271-4	DUP	9040 pH
	L4271-5	DUP	9050 Conductivity

**Holding Time Requirements**

- All samples were analyzed within the specified holding time.

**Method Blanks**

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

**Internal Quality Control**

- All Internal Quality Control were within acceptance limits.

Shellee McGrath

April 27, 1995

Prepared By

Date

**CASE NARRATIVE  
INORGANIC METALS ANALYSES  
WATER**

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

**Preparation and Analysis Requirements**

- Two water samples total metals analysis. The samples were prepared as LAS Batch 411BHT and analyzed for selected analytes as requested on the chain of custody. Samples BOF8W8 (L4243-2 for metals and L4243-3 for mercury) were used for matrix spike and duplicate, post-digestion spike and serial dilution analyses. All data flags due to the performance of the above-mentioned QC samples are also associated with every sample digested with this batch.

**Holding Time Requirements**

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

**Method Blanks**

- The level of analytes in the method blanks were less than the reporting detection limits with the following exception:
- For mercury, the absolute value of the prep blank is slightly higher than the reporting detection limit at -0.201 a carry-over affect from the preceding high mercury concentration sample. However, all samples showed mercury content within +/- CRDL therefore, no corrective action was taken.

**Internal Quality Control**

- All internal quality control were within acceptance limits.

**Sample Results**

- The following qualifiers are reported on the basis of the techniques employed to perform the analyses:  
"P" Trace ICP-AES  
"P" ICP-AES  
"AV" Cold Vapor AA

**Nalini Prabhakar**

**05/08/95**

\_\_\_\_\_  
**Prepared By**

\_\_\_\_\_  
**Date**

**CASE NARRATIVE  
INORGANIC METALS ANALYSES  
FILTERED WATER**

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

**Preparation and Analysis Requirements**

- Two filtered water samples for dissolved metals analysis. As the measured turbidity of the samples was less than 1 NTU, they were batched as 411BHD for selected dissolved analytes as requested on the chain of custody. For this sample batch sample B0F8W9 (L4243-16 for metals and L4243-17 for mercury) were used for matrix spike and duplicate, post-digestion spike and serial dilution analyses. All data flags due to the performance of the above-mentioned QC samples are also associated with every sample analyzed with this batch.

**Holding Time Requirements**

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

**Method Blanks**

- The level of analytes in the method blanks were less than the reporting detection limits.

**Internal Quality Control**

All internal quality control were within acceptance limits.

**Sample Results**

- The following qualifiers are reported on the basis of the techniques employed to perform the analyses:  
"P" ICP-AES  
"AV" Cold Vapor AA  
"P" Trace ICP

Nalini Prabhakar

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05/08/95

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## **CASE NARRATIVE RADIOCHEMICAL ANALYSES**

The routine calibration and quality control 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.

### **Holding Time Requirements**

All holding time requirements were met.

### **Analytical Method**

#### **Carbon-14**

The carbon-14 analysis was performed using LAL-91-SOP-0209. The matrix spike recovery was low; however, because the LCS recovery was within limits, and the matrix spike sample was below the RDL, the data is considered acceptable. All other QC criteria were met.

#### **Gross Alpha Beta**

The gross alpha beta analysis was performed using LAL-91-SOP-0060. The matrix spike recovery was high due to suspected matrix effect; however, because the LCS recovery was within limits, the data is considered acceptable. All other QC criteria were met.

#### **Strontium-90**

The strontium-90 analysis was performed using LAL-91-SOP-0196. No problems were encountered during analysis, and all QC criteria were met. A matrix spike analysis was not performed for Sr-90.

#### **Technetium-99**

The technetium-99 analysis was performed using LAL-91-SOP-0169. No problems were encountered during analysis, and all QC criteria were met, except as noted below:

Batch 21858 was reanalyzed as batch 22778 due to out of limits QC. The matrix

spike analysis was not done on this batch.

Batch 22778 - The tracer chemical yield elevated the LCS activity, resulting in a high LCS recovery. The actual chemical yield is 100%. There was insufficient sample on the repeat analysis for a matrix spike analysis.

**Tritium**

The tritium analysis was performed using LAL-91-SOP-0066. No problems were encountered during analysis, and all QC criteria were met.

Yvonne M. Jacoby  
Prepared by

May 19, 1995  
Date

**Lockheed Analytical Services**  
**DATA QUALIFIERS FOR INORGANIC ANALYSES**

[Revised 08/28/92]

<b>For Use on the Analytical Data Reporting Forms</b>	
<b>B</b>	<i>For CLP Analyses Only</i> – Reported value is less than the contract required detection limit (CRDL) but greater than or equal to the instrument detection limit (IDL).
<b>C</b>	<i>For Routine, Non-CLP Analyses Only</i> – Any constituent that was also detected in the associated blank whose concentration was greater than the reporting detection limit (RDL).
<b>D</b>	Presence of high levels of interfering constituents required dilution of sample which increased the RDL by the dilution factor.
<b>E</b>	Estimated value due to presence of interference.
<b>H</b>	Sample analysis performed outside of method-or client-specified maximum holding time requirement.
<b>M</b>	<i>For CLP Analyses Only</i> – Duplicate injection precision criterion was not met.
<b>N</b>	Matrix spike recovery exceeded acceptance limits.
<b>S</b>	Reported value was determined from the method of standard addition.
<b>U</b>	<i>For CLP Reporting Only</i> – Constituent was analyzed for but not detected (sample quantitation must be corrected for dilution and percent moisture).
<b>W</b>	<i>For AAS Only</i> – Post-digestion spike for Furnace AAS did not meet acceptance criteria and sample absorbance is less than 50% of spike absorbance.
<b>X, Y, or Z</b>	Analyst-defined qualifier.
<b>*</b>	Relative percent difference (RPD) for duplicate analysis exceeded acceptance limits.
<b>+</b>	Correlation coefficient (r) for the MSA is less than 0.995.
<b>For Use on the QC Data Reporting Forms</b>	
<b>a<sup>1</sup></b>	The spike recovery and/or RPD for matrix spike and matrix spike duplicates cannot be evaluated due to insufficient spiking level compared to the elevated sample analyte concentration.
<b>b<sup>1</sup></b>	The RPD cannot be computed because the sample and/or duplicate concentration was below the RDL.

<sup>1</sup> Used as footnote designations on the QC summary form.

**Lockheed Analytical Services**  
**DATA QUALIFIERS FOR RADIOCHEMICAL ANALYSES**

[Revised 08/28/92]

<b>For Use on the Analytical Data Reporting Forms</b>	
<b>B</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).
<b>C</b>	Presence of high TDS in sample required reduction of sample size which increased the MDA.
<b>D</b>	Constituent detected in the diluted sample.
<b>E</b>	Constituent concentration exceeded the calibration or attenuation curve range.
<b>F</b>	<i>For Alpha Spectrometry Only</i> -- FWHM exceeded acceptance limits.
<b>H</b>	Sample analysis performed outside of method-specified maximum holding time requirement.
<b>Y</b>	Chemical yield exceeded acceptance limits.
<b>For Use on the QC Data Reporting Forms</b>	
<b>*</b>	QC data (i.e., percent recovery data for laboratory control standard and matrix spike; and RPD for replicate analyses) exceeded acceptance limits.
<b>a<sup>1</sup></b>	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>b<sup>1</sup></b>	The RPD cannot be computed because the sample and/or duplicate concentration was below the MDA.

<sup>1</sup> Used as foot note designations on the QC summary form.

LOGIN CHAIN OF CUSTODY REPORT (ln01)  
 Apr 11 1995, 03:05 pm

Login Number: L4243  
 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
L4243-1 temp 5; SAF# B95-040 Location: RFG01-43B Water 1 S SCREENING	BOF8W8	07-APR-95	11-APR-95	16-MAY-95
		Hold:04-OCT-95		
L4243-2 temp 5; SAF# B95-040 Location: RFG01-07A Water 1 S CLP FURNACE Water 1 S CLP ICP	BOF8W8	07-APR-95	11-APR-95	16-MAY-95
		Hold:04-OCT-95		
		Hold:04-OCT-95		
L4243-3 temp 5; SAF# B95-040 Location: RFG01-07A Water 1 S CLP MERCURY	BOF8W8	07-APR-95	11-APR-95	16-MAY-95
		Hold:05-MAY-95		
L4243-4 temp 5; SAF# B95-040 Location: RFG01-07A Water 1 S 300.0 FLUORIDE Water 1 S 300.0 SULFATE Water 1 S 9040 PH	BOF8W8	07-APR-95	11-APR-95	16-MAY-95
		Hold:05-MAY-95		
		Hold:05-MAY-95		
		Hold:14-APR-95		
L4243-5 temp 5; SAF# B95-040 Location: RFG01-07A Water 1 S 9050 CONDUCTIVITY	BOF8W8	07-APR-95	11-APR-95	16-MAY-95
		Hold:05-MAY-95		
L4243-6 temp 5; SAF# B95-040 Location: 157 Water 1 S GR ALP/BETA LAL-0060 Water 1 S SR-90 LAL-0196	BOF8W8	07-APR-95	11-APR-95	16-MAY-95
		Hold:04-OCT-95		
		Hold:04-OCT-95		
L4243-7 temp 5; SAF# B95-040 Location: 157	BOF8W8	07-APR-95	11-APR-95	16-MAY-95
L4243-8 temp 5; SAF# B95-040 Location: 157	BOF8W8	07-APR-95	11-APR-95	16-MAY-95

0411546

LOGIN CHAIN OF CUSTODY REPORT (ln01)  
 Apr 11 1995, 03:05 pm

Login Number: L4243  
 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
L4243-9 temp 5; SAF# B95-040 Location: 157	BOF8W8	07-APR-95	11-APR-95	16-MAY-95
L4243-10 temp 5; SAF# B95-040 Location: 157	BOF8W8	07-APR-95	11-APR-95	16-MAY-95
L4243-11 temp 5; SAF# B95-040 Location: 157	BOF8W8	07-APR-95	11-APR-95	16-MAY-95
Water 1 S TC-99 LAL-0169		Hold:04-OCT-95		
L4243-12 temp 5; SAF# B95-040 Location: 157	BOF8W8	07-APR-95	11-APR-95	16-MAY-95
L4243-13 temp 5; SAF# B95-040 Location: 157	BOF8W8	07-APR-95	11-APR-95	16-MAY-95
L4243-14 temp 5; SAF# B95-040 Location: 157	BOF8W8	07-APR-95	11-APR-95	16-MAY-95
L4243-15 temp 5; SAF# B95-040 Location: 157	BOF8W8	07-APR-95	11-APR-95	16-MAY-95
Water 1 S C-14 LAL-0209		Hold:04-OCT-95		
Water 1 S TRITIUM(H3) LAL-0066		Hold:04-OCT-95		
L4243-16 temp 5; SAF# B95-040 Location: RFG01-07A	BOF8W9	07-APR-95	11-APR-95	16-MAY-95
Filt H20 15 S CLP FURNACE		Hold:04-OCT-95		
Filt H20 15 S CLP ICP		Hold:04-OCT-95		
L4243-17 temp 5; SAF# B95-040 Location: RFG01-07A	BOF8W9	07-APR-95	11-APR-95	16-MAY-95
Filt H20 15 S CLP MERCURY		Hold:05-MAY-95		

C411596

LOGIN CHAIN OF CUSTODY REPORT (ln01)  
Apr 11 1995, 03:05 pm

Login Number: L4243  
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
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L4243-18	REPORT TYPE	11-APR-95	11-APR-95	16-MAY-95
SAF# B95-040				
Location:				
Water	1 S EDD - DISK DEL.			
Water	1 S INORG TYPE 4A RPT			
Water	1 S RAD RPT TYPE 4F			

Page 3

Signature: MMH  
Date: 4-11-95 020

0411596

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

**LY243**

Data Turnaround  
 Priority  
 Normal

Collector <i>K. D. Lee</i>	Company Contact R.F. Raidl	Telephone (509) 372-9641
Project Designation 100-BC-5 Groundwater Sampling Round 8	Sampling Location 100 B and 100 C	SAF No. B95-040
Ice Chest No. <i>ER-40</i>	Field Logbook No. <i>EFL-1036</i>	Method of Shipment Federal Express
Shipped To Lockheed	Offsite Property No. <i>4-10-95 N/A W95-0-0204-24</i>	Bill of Lading/Air Bill No. <i>2904624995</i>

Possible Sample Hazards/Remarks	Preservation	HNO3	HNO3	Cool 4C	Cool 4C	HNO3	HCl	Cool 4C	Cool 4C	HNO3	HNO3
	Type of Container	G	G	P	P	G	P	G	P	G	G
	No. of Container(s)	1	1	1	1	5	4	1	1	1	1

Special Handling and/or Storage Maintain samples between 2C and 6C.	Volume	1L	500mL	500mL	250mL	1L	1L	1L	20mL	1L	500mL
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SAMPLE ANALYSIS	ICP Metals, AA Metels. Unfiltered	Mercury Unfiltered	Anions-F, SO4. pH	Conductivity	Gross Alpha, Gross Beta, Sr-90	Tc-99	Tritium, C-14	Activity Scan	ICP Metals, AA Metels. Filtered	Mercury Filtered
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Sample No.	Matrix*	Date Sampled	Time Sampled									
BOF8W8	W	<i>4/7/95</i>	<i>0922</i>	<input checked="" type="checkbox"/>								
BOF8W9	W	<i>4/7/95</i>	<i>0922</i>								<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS	Matrix*
Relinquished By <i>K. D. Lee</i>	Date/Time <i>4/7/95 1245</i>	Received By <i>EFL</i>	Date/Time <i>1245</i>
Relinquished By <i>EFL</i>	Date/Time <i>4-7-95</i>	Received By <i>B. Whit</i>	Date/Time <i>4-7-95</i>
Relinquished By <i>Bill Burt</i>	Date/Time <i>4-7-95 -0900</i>	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

Data Deliverable "Standalone".  
The Activity Scan is for all samples list on this chain of custody.

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 <i>Amoralle</i>	Title <i>Sample Custodian</i>	Date/Time <i>4-11-95 / 0830</i>
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

04/11/95

# Sample Login

## Login Review Checklist

Lot Number L4243

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 an effective login review, as a minimum, five reports from the login process are required. These are the chain of custody (or equivalent), the login chain of custody report, the sample summary report, the sample receiving checklist, and the login quotation. Before beginning a review, ensure that these five components are available. For jobs with single component samples, the sample summary report may be omitted.

### Sample Summary Report

Yes No

N/A

- |    |  |          |   |   |
|----|--|----------|---|---|
| 1. | Are all sample IDs correct?  | <u>X</u> | — | — |
| 2. | Are all samples present?   | <u>X</u> | — | — |
| 3. | Are all matrices correct?<br>(e.g., TCLP analyses should be on a TCLP leachate, field blanks should be water)  | <u>X</u> | — | — |
| 4. | Are all analyses on the chain of custody/login quotation included?   | <u>X</u> | — | — |
| 5. | Are analyses logged in for the correct container?<br>(e.g., analyses requiring preservation logged in for a preserved container and vice versa)  | <u>X</u> | — | — |
| 6. | Are samples logged in according to laboratory batching procedures?<br>(e.g., TCLP regular leaching and associated metals/semivolatile organics should be logged in on the same bottle) | <u>X</u> | — | — |

### Login Chain of Custody Report

- |    |   |          |   |   |
|----|---|----------|---|---|
| 1. | Are the Collect, Receive, and Due dates correct for every sample?   | <u>X</u> | — | — |
| 2. | Have appropriate sample comments been included?<br>(e.g., MS/MSD designation, comments from the client concerning method modifications) | <u>X</u> | — | — |

### Sample Receiving Checklist

- |    |   |
|----|---|
| 1. | Are any discrepancies between the chain of custody and the login noted? <u>—</u> <u>—</u> <u>✓</u><br>(e.g., client IDs different on chains of custody and bottle labels, samples not seen, samples lost from breakage) |
|----|---|

Murphy

4-11-95

Paula Daily

4-11-95

Primary review signature

Date

Secondary review signature

Date

L4243

WHC/BHI SAMPLE CHECK-IN LIST

Date/Time Received: 4-11-95/0830 SDG #: N/A

Work Order Number: N/A SAF #: B95-040

Shipping Container ID: FR-40 Chain of Custody # N/A

1. Custody Seals on shipping container intact? Yes  No

2. Custody Seals dated and signed? Yes  No

3. Chain-of-Custody record present? Yes  No

4. Cooler temperature 5°C

5. Vermiculite/packing materials is Wet  Dry

6. Number of samples in shipping container: 17

7. Sample holding times exceeded: Yes  No

8. Samples have: X tape X hazard labels  
X custody seals X appropriate sample labels

9. Samples are: X in good condition        leaking  
       broken        have air bubbles

10. Were any anomalies identified in sample receipt? Yes  No

11. Description of anomalies (include sample numbers):       

Sample Custodian: Anthony Miller On: 4-11-95/0830

Telephoned To: Kathleen Hull On 4-11-95 BY Anthony Miller

041159

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

Client	LAL	SDG		
Sample Number	Sample Number	Number	Matrix	Method
BOF8W8 ~	L4243-1		Water	. SCREENING ~
	L4243-2		Water	. CLP FURNACE ~
	L4243-2		Water	. CLP ICP ~
	L4243-3		Water	. CLP MERCURY ~
	L4243-4		Water	. 300.0 FLUORIDE ~
	L4243-4		Water	. 300.0 SULFATE ~
	L4243-4		Water	. 9040 PH ~
	L4243-5		Water	. 9050 CONDUCTIVIT
	L4243-6		Water	. GR ALP/BETA LAL-
	L4243-6		Water	. SR-90 LAL-0196
	L4243-11		Water	. TC-99 LAL-0169
L4243-15		Water	. C-14 LAL-0209	
L4243-15		Water	. TRITIUM(H3) LAL-	
BOF8W9 ~	L4243-16		Filt H2O	. CLP FURNACE ~
	L4243-16		Filt H2O	. CLP ICP ~
	L4243-17		Filt H2O	. CLP MERCURY ~
REPORT TYPE ~	L4243-18		Water	. EDD - DISK DEL ~
	L4243-18		Water	. INORG TYPE 4A RP
	L4243-18		Water	. RAD RPT TYPE 4F ~

LOGIN CHAIN OF CUSTODY REPORT (ln01)  
 Apr 14 1995, 03:48 pm

Login Number: L4271  
 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
L4271-1 temp 6; SAF# B95-040 Location: RFG01-43E Water 1 S SCREENING	BOF8X0	12-APR-95	14-APR-95	19-MAY-95
		Hold:09-OCT-95		
L4271-2 temp 6; SAF# B95-040 Location: RFG01-07A Water 1 S CLP FURNACE Water 1 S CLP ICP	BOF8X0	12-APR-95	14-APR-95	19-MAY-95
		Hold:09-OCT-95		
		Hold:09-OCT-95		
L4271-3 temp 6; SAF# B95-040 Location: RFG01-07A Water 1 S CLP MERCURY	BOF8X0	12-APR-95	14-APR-95	19-MAY-95
		Hold:10-MAY-95		
L4271-4 temp 6; SAF# B95-040 Location: RFG01-07A Water 1 S 300.0 FLUORIDE Water 1 S 300.0 SULFATE Water 1 S 9040 PH	BOF8X0	12-APR-95	14-APR-95	19-MAY-95
		Hold:10-MAY-95		
		Hold:10-MAY-95		
		Hold:19-APR-95		
L4271-5 temp 6; SAF# B95-040 Location: RFG01-07A Water 1 S 9050 CONDUCTIVITY	BOF8X0	12-APR-95	14-APR-95	19-MAY-95
		Hold:10-MAY-95		
L4271-6 temp 6; SAF# B95-040 Location: 157 Water 1 S GR ALP/BETA LAL-0060 Water 1 S SR-90 LAL-0196	BOF8X0	12-APR-95	14-APR-95	19-MAY-95
		Hold:09-OCT-95		
		Hold:09-OCT-95		
L4271-7 temp 6; SAF# B95-040 Location: 157	BOF8X0	12-APR-95	14-APR-95	19-MAY-95
L4271-8 temp 6; SAF# B95-040 Location: 157	BOF8X0	12-APR-95	14-APR-95	19-MAY-95

LOGIN CHAIN OF CUSTODY REPORT (ln01)

Apr 14 1995, 03:48 pm

Login Number: L4271

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
L4271-9 temp 6; SAF# B95-040 Location: 157	BOF8X0	12-APR-95	14-APR-95	19-MAY-95
L4271-10 temp 6; SAF# B95-040 Location: 157	BOF8X0	12-APR-95	14-APR-95	19-MAY-95
L4271-11 temp 6; SAF# B95-040 Location: 157	BOF8X0	12-APR-95	14-APR-95	19-MAY-95
Water 1 S TC-99	LAL-0169	Hold:09-OCT-95		
L4271-12 temp 6; SAF# B95-040 Location: 157	BOF8X0	12-APR-95	14-APR-95	19-MAY-95
L4271-13 temp 6; SAF# B95-040 Location: 157	BOF8X0	12-APR-95	14-APR-95	19-MAY-95
L4271-14 temp 6; SAF# B95-040 Location: 157	BOF8X0	12-APR-95	14-APR-95	19-MAY-95
L4271-15 temp 6; SAF# B95-040 Location: 157	BOF8X0	12-APR-95	14-APR-95	19-MAY-95
Water 1 S C-14	LAL-0209	Hold:09-OCT-95		
Water 1 S TRITIUM(H3)	LAL-0066	Hold:09-OCT-95		
L4271-16 temp 6; SAF# B95-040 Location: RFG01-07A	BOF8X1	12-APR-95	14-APR-95	19-MAY-95
Filt H20 15 S CLP	FURNACE	Hold:09-OCT-95		
Filt H20 15 S CLP	ICP	Hold:09-OCT-95		
L4271-17 temp 6; SAF# B95-040 Location: RFG01-07A	BOF8X1	12-APR-95	14-APR-95	19-MAY-95
Filt H20 15 S CLP	MERCURY	Hold:10-MAY-95		

LOGIN CHAIN OF CUSTODY REPORT (ln01)  
Apr 14 1995, 03:48 pm

Login Number: L4271  
Account: 596 Bechtel Hanford, Inc. \* Richland, WA  
Project: BECHTEL-HANFORD Bechtel Hanford Project

Laboratory	Client	Collect	Receive	Due
Sample Number	Sample Number	Date	Date	PR Date
L4271-18	REPORT TYPE	14-APR-95	14-APR-95	19-MAY-95
SAF# B95-040				
Location:				
Water	1 S EDD - DISK DEL.			
Water	1 S INORG TYPE 4A RPT			
Water	1 S RAD RPT TYPE 4F			

Signature: *Mill*  
Date: 4-14-95 032

0414596

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

**L4271**

Data Turnaround  
 Priority  
 Normal

Collector <i>K. Lee</i>	Company Contact R.F. Raidl	Telephone (509) 372-9641
Project Designation 100-BC-5 Groundwater Sampling Round 8	Sampling Location 100 B and 100 C	SAF No. B95-040
Ice Chest No. <i>OWS-145</i>	Field Logbook No. <i>EFL-1036</i>	Method of Shipment Federal Express
Shipped To Lockheed	Offsite Property No. <i>W95-0-0204-20</i>	Bill of Lading/Air Bill No. <i>2904625315</i>

Possible Sample Hazards/Remarks	Preservation	HNO3	HNO3	Cool 4C	Cool 4C	HNO3	HCl	Cool 4C	Cool 4C	HNO3	HNO3
	Type of Container	G	G	P	P	G	P	G	P	G	G
	No. of Container(s)	1	1	1	1	5	4	1	1	1	1
Special Handling and/or Storage Maintain samples between 2C and 6C.	Volume	1L	500mL	500mL	250mL	1L	1L	1L	20mL	1L	500mL
SAMPLE ANALYSIS	ICP Metals, AA Metals, Unfiltered	Mercury Unfiltered	Anions-F, SO4, pH	Conductivity	Gross Alpha, Gross Beta, Sr-90	Tc-99	Tritium, C-14	Activity Scan	ICP Metals, AA Metals, Filtered	Mercury Filtered	

Sample No.	Matrix*	Date Sampled	Time Sampled	ICP	Mercury	Anions-F	Conductivity	Gross Alpha	Tc-99	Tritium	Activity Scan	ICP	Mercury
BOF8X0	W	4-12-95	1049	X	X	X	X	X	X	X	X		
BOF8X1	W	4-12-95	1049									X	X

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS	Matrix*
Relinquished By <i>K. Lee</i> Date/Time <i>4/12/95 1255</i>	Received By <i>ERC</i> Date/Time <i>1255</i>	Data Deliverable "Standalone".	S = Soil
Relinquished By <i>ERC</i> Date/Time <i>0900</i>	Received By <i>Michelle B. Walker</i> Date/Time <i>4-12-95</i>	The Activity Scan is for all samples list on this chain of custody.	SE = Sediment
Relinquished By <i>Michelle B. Walker</i> Date/Time <i>4-13-95</i>	Received By		SO = Solid
Relinquished By	Received By		SL = Sludge
Relinquished By	Received By		W = Water
Relinquished By	Received By		O = Oil
Relinquished By	Received By		A = Air
Relinquished By	Received By		DS = Drum Solids
Relinquished By	Received By		DL = Drum Liquids
Relinquished By	Received By		T = Tissue
Relinquished By	Received By		WI = Wipe
Relinquished By	Received By		L = Liquid
Relinquished By	Received By		V = Vegetation
Relinquished By	Received By		X = Other

LABORATORY SECTION	Received By <i>M. M. All</i>	Title <i>Sample Custodian</i>	Date/Time <i>4-14-95/0900</i>
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

# Sample Login

## Login Review Checklist

Lot Number L4271

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 an effective login-review, at a minimum, five reports from the login process are required. These are the chain of custody (or equivalent), the login chain of custody report, the sample summary report, the sample receiving checklist, and the login quotation. Before beginning a review, ensure that these five components are available. For jobs with single component samples, the sample summary report may be omitted.

### Sample Summary Report

Yes No

N/A

- |    |   |          |   |   |
|----|---|----------|---|---|
| 1. | Are all sample IDs correct?   | <u>X</u> | — | — |
| 2. | Are all samples present?  | <u>X</u> | — | — |
| 3. | Are all matrices correct?<br><small>(e.g., TCLP analyses should be on a TCLP leachate, field blanks should be water)</small>  | <u>X</u> | — | — |
| 4. | Are all analyses on the chain of custody/login quotation included?  | <u>X</u> | — | — |
| 5. | Are analyses logged in for the correct container?<br><small>(e.g., analyses requiring preservation logged in for a preserved container and vice versa)</small>  | <u>X</u> | — | — |
| 6. | Are samples logged in according to laboratory batching procedures?<br><small>(e.g., TCLP regular leaching and associated metals/semivolatile organics should be logged in on the same bottle)</small> | <u>X</u> | — | — |

### Login Chain of Custody Report

- |    |  |          |   |   |
|----|--|----------|---|---|
| 1. | Are the Collect, Receive, and Due dates correct for every sample?  | <u>X</u> | — | — |
| 2. | Have appropriate sample comments been included?<br><small>(e.g., MS/MSD designation, comments from the client concerning method modifications)</small> | <u>X</u> | — | — |

### Sample Receiving Checklist

- |    |  |  |  |  |
|----|--|--|--|--|
| 1. | Are any discrepancies between the chain of custody and the login noted? <u>Y/N</u><br><small>(e.g., client IDs different on chains of custody and bottle labels, samples not sent, samples lost from breakage)</small> |  |  |  |
|----|--|--|--|--|

M. M. Miller

4-14-95

Paula J. Jones

4-14-95

Primary review signature

Date

Secondary review signature

Date



**Lockheed Analytical Services  
Sample Receiving Checklist**

Client Name: Westinghouse

Job No. L4271

Cooler ID:

COOLER CONDITION UPON RECEIPT			
Temperature of cooler upon receipt:	<u>6°C</u>		
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>N/A</u>
are samples bi-phasic (if so, indicate sample ID'S):			<u>N/A</u>
MISCELLANEOUS ITEMS			
	Yes	No	* Comments/Discrepancies
samples with short holding times		X	
samples to subcontract		X	
ADDITIONAL COMMENTS/DISCREPANCIES			
Completed by / date:	<u>mm/ll 4-14 95</u>		
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			

C414546

N38

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

Client Sample Number	LAL Sample Number	SDG Number	Matrix	Method
BOF8X0 -	L4271-1		Water	SCREENING -
	L4271-2		Water	CLP FURNACE -
	L4271-2		Water	CLP ICP -
	L4271-3		Water	CLP MERCURY -
	L4271-4		Water	300.0 FLUORIDE -
	L4271-4		Water	300.0 SULFATE -
	L4271-4		Water	9040 PH -
	L4271-5		Water	9050 CONDUCTIVIT
	L4271-6		Water	GR ALP/BETA LAL-
	L4271-6		Water	SR-90 LAL-0196-
	L4271-11		Water	TC-99 LAL-0169 -
BOF8X1 -	L4271-15		Water	C-14 LAL-0209 -
	L4271-15		Water	TRITIUM(H3) LAL-
	L4271-16		Filt H2O	CLP FURNACE -
REPORT TYPE -	L4271-16		Filt H2O	CLP ICP -
	L4271-17		Filt H2O	CLP MERCURY -
	L4271-18		Water	EDD - DISK DEL.
	L4271-18		Water	INORG TYPE 4A RP
	L4271-18		Water	RAD RPT TYPE 4F -

LOCKHEED ANALYTICAL SERVICES  
COMMON IONS AND ADDITIONAL ANALYTES

Sample Results

Client Sample ID: B0F8W8	Date Collected: 07-APR-95
Matrix: Water	Date Received: 11-APR-95

Constituent	Units	Method	Result	Reporting Det Limit	Data Qualifier(s)	Date Analyzed	LAS Batch ID	LAS Sample ID
Fluoride	mg/L	300.0	0.22	0.1		12-APR-95	21605	L4243-4
Sulfate	mg/L	300.0	41.	0.1		12-APR-95	21606	L4243-4
pH	pH Units	9040	8.0	0.1		14-APR-95	21671	L4243-4
Conductivity	uS/cm	9050	310	1		20-APR-95	21607	L4243-5

LOCKHEED ANALYTICAL SERVICES

COMMON IONS AND ADDITIONAL ANALYTES

Sample Results

Client Sample ID: B0F8X0	Date Collected: 12-APR-95
Matrix: Water	Date Received: 14-APR-95

Constituent	Units	Method	Result	Reporting Det Limit	Data Qualifier(s)	Date Analyzed	LAS Batch ID	LAS Sample ID
Fluoride	mg/L	300.0	0.29	0.1		26-APR-95	21773	L4271-4
Sulfate	mg/L	300.0	26.	0.1		21-APR-95	21772	L4271-4
pH	pH Units	9040	7.9	0.1		17-APR-95	21755	L4271-4
Conductivity	uS/cm	9050	320	1		20-APR-95	21774	L4271-5

LOCKHEED ANALYTICAL SERVICES

COMMON IONS AND ADDITIONAL ANALYTES

QC Data Summary For Reagent Blank Analysis

Constituent	Units	Reporting Detection Limit	LAS Batch ID	Date Analyzed	Reagent Blank Result	Data Qualifier
Fluoride	mg/L	.1	21605	04/12/95	< .1	
Sulfate	mg/L	.1	21606	04/12/95	< .1	

CLP

1  
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

B0F8W8

Lab Name: LOCKHEED\_ANALYTICAL\_SVC Contract: HANFORD

Lab Code: LOCK Case No.: SAF#B9 SAS No.: SDG No.: LK4243

Matrix (soil/water): WATER Lab Sample ID: L4243-2

Level (low/med): LOW Date Received: 04/11/95

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	33.0	U		P
7440-36-0	Antimony	2.0	U		P
7440-38-2	Arsenic	7.9	B		P
7440-39-3	Barium	10.2	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	3.0	U		P
7440-70-2	Calcium	44800			P
7440-47-3	Chromium	20.5			P
7440-48-4	Cobalt	6.0	U		P
7440-50-8	Copper	2.0	U		P
7439-89-6	Iron	38.1	B		P
7439-92-1	Lead	2.0	U		P
7439-95-4	Magnesium	9830			P
7439-96-5	Manganese	2.0	U		P
7439-97-6	Mercury				NR
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	6750			P
7782-49-2	Selenium	3.0	U		P
7440-22-4	Silver	3.0	B		P
7440-23-5	Sodium	13400			P
7440-28-0	Thallium	4.0	U		P
7440-62-2	Vanadium	12.3	B		P
7440-66-6	Zinc	10.6	B		P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

\_\_\_\_\_  
\_\_\_\_\_  
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1  
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

B0F8W8

Lab Name: LOCKHEED\_ANALYTICAL\_SVC Contract: HANFORD

Lab Code: LOCK Case No.: SAF#B9 SAS No.: SDG No.: LK4243

Matrix (soil/water): WATER Lab Sample ID: L4243-3

Level (low/med): LOW Date Received: 04/11/95

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_

Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_

Comments:

1  
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

B0F8X0

Lab Name: LOCKHEED\_ANALYTICAL\_SVC Contract: HANFORD

Lab Code: LOCK Case No.: SAF#B9 SAS No.: SDG No.: LK4243

Matrix (soil/water): WATER

Lab Sample ID: L4271-2

Level (low/med): LOW

Date Received: 04/14/95

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	33.0	U		P
7440-36-0	Antimony	2.0	U		P
7440-38-2	Arsenic	8.9	B		P
7440-39-3	Barium	21.2	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	3.0	U		P
7440-70-2	Calcium	36500			P
7440-47-3	Chromium	3.0	U		P
7440-48-4	Cobalt	6.0	U		P
7440-50-8	Copper	2.0	U		P
7439-89-6	Iron	104			P
7439-92-1	Lead	2.0	U		P
7439-95-4	Magnesium	9700			P
7439-96-5	Manganese	2.0	U		P
7439-97-6	Mercury				NR
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	5000	B		P
7782-49-2	Selenium	3.0	U		P
7440-22-4	Silver	3.0	U		P
7440-23-5	Sodium	15200			P
7440-28-0	Thallium	4.0	U		P
7440-62-2	Vanadium	11.2	B		P
7440-66-6	Zinc	9.0	B		P

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_

Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_

Comments:

1  
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

B0F8X0

Lab Name: LOCKHEED\_ANALYTICAL\_SVC Contract: HANFORD

Lab Code: LOCK Case No.: SAF#B9 SAS No.: SDG No.: LK4243

Matrix (soil/water): WATER

Lab Sample ID: L4271-3

Level (low/med): LOW

Date Received: 04/14/95

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_

Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_

Comments:

1  
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

B0F8W9

Lab Name: LOCKHEED\_ANALYTICAL\_SVC Contract: HANFORD

Lab Code: LOCK Case No.: SAF#B9 SAS No.: SDG No.: LK4243

Matrix (soil/water): WATER Lab Sample ID: L4243-16

Level (low/med): LOW Date Received: 04/11/95

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	33.0	U		P
7440-36-0	Antimony	54.0	U		P
7440-38-2	Arsenic	10.2			P
7440-39-3	Barium	10.0	U		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	3.0	U		P
7440-70-2	Calcium	44800			P
7440-47-3	Chromium	17.9			P
7440-48-4	Cobalt	6.0	U		P
7440-50-8	Copper	2.0	U		P
7439-89-6	Iron	12.0	U		P
7439-92-1	Lead	2.0	U		P
7439-95-4	Magnesium	9770			P
7439-96-5	Manganese	2.0	U		P
7439-97-6	Mercury				NR
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	6130			P
7782-49-2	Selenium	4.1	B		P
7440-22-4	Silver	3.0	U		P
7440-23-5	Sodium	13200			P
7440-28-0	Thallium	4.3	B		P
7440-62-2	Vanadium	11.6	B		P
7440-66-6	Zinc	3.0	U		P

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

1  
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

B0F8W9

Lab Name: LOCKHEED\_ANALYTICAL\_SVC Contract: HANFORD

Lab Code: LOCK Case No.: SAF#B9 SAS No.: SDG No.: LK4243

Matrix (soil/water): WATER Lab Sample ID: L4243-17

Level (low/med): LOW Date Received: 04/11/95

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_

Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_

Comments:

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1  
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

BOF8X1

Lab Name: LOCKHEED\_ANALYTICAL\_SVC Contract: HANFORD

Lab Code: LOCK Case No.: SAF#B9 SAS No.: SDG No.: LK4243

Matrix (soil/water): WATER Lab Sample ID: L4271-16

Level (low/med): LOW Date Received: 04/14/95

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	33.0	U		P
7440-36-0	Antimony	54.0	U		P
7440-38-2	Arsenic	5.2	B		P
7440-39-3	Barium	20.2	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	3.0	U		P
7440-70-2	Calcium	35600			P
7440-47-3	Chromium	3.0	U		P
7440-48-4	Cobalt	6.0	U		P
7440-50-8	Copper	2.0	U		P
7439-89-6	Iron	12.0	U		P
7439-92-1	Lead	2.0	U		P
7439-95-4	Magnesium	9420			P
7439-96-5	Manganese	2.0	U		P
7439-97-6	Mercury				NR
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	5340			P
7782-49-2	Selenium	5.1			P
7440-22-4	Silver	3.0	U		P
7440-23-5	Sodium	14900			P
7440-28-0	Thallium	4.0	U		P
7440-62-2	Vanadium	12.1	B		P
7440-66-6	Zinc	3.0	U		P

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

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1  
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

B0F8X1

Lab Name: LOCKHEED\_ANALYTICAL\_SVC Contract: HANFORD

Lab Code: LOCK Case No.: SAF#B9 SAS No.: SDG No.: LK4243

Matrix (soil/water): WATER Lab Sample ID: L4271-17

Level (low/med): LOW Date Received: 04/14/95

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_

Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_

Comments:

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RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. \* Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0F8W8

LAL Sample ID: L4243-6

Date Collected: 07-APR-95

Date Received: 11-APR-95

Matrix: Water

Login Number: L4243

SDG: LK4243

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
Gross Alpha	02-MAY-95	GR ALP/BETA LAL-0060_21843	0.6	1.3	2.4	C	pCi/L
Gross Beta	02-MAY-95	GR ALP/BETA LAL-0060_21843	27.1	2.9	2.2		pCi/L
Total radio-strontium	12-MAY-95	SR-90 LAL-0196_21857	0.95	0.23	0.32		pCi/L

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. \* Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0F8W8

LAL Sample ID: L4243-11

Date Collected: 07-APR-95

Date Received: 11-APR-95

Matrix: Water

Login Number: L4243

SDG: LK4243

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
Tc-99	16-MAY-95	TC-99 LAL-0169_22778	39.2	7.7	4.6		pCi/L

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. \* Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0F8W8

LAL Sample ID: L4243-15

Date Collected: 07-APR-95

Date Received: 11-APR-95

Matrix: Water

Login Number: L4243

SDG: LK4243

Constituent	Analyzed	Batch	Activity	Error	MQA	Background	Units
C-14	02-MAY-95	C-14 LAL-0209_21835	17.0	9.4	10.		pCi/L
H-3	05-MAY-95	TRITIUM(H3) LAL-0066_21862	1920	310	220		pCi/L

661

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. \* Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: 80F8X0

LAL Sample ID: L4271-6

Date Collected: 12-APR-95

Date Received: 14-APR-95

Matrix: Water

Login Number: L4271

SDG: LK4243

Constituent	Analyzed	Batch	Activity	Error	MDA	Background	Units
Gross Alpha	02-MAY-95	GR ALP/BETA LAL-0060_21843	2.5	1.6	2.0		pCi/L
Gross Beta	02-MAY-95	GR ALP/BETA LAL-0060_21843	48.6	4.0	2.2		pCi/L
Total radio-strontium	12-MAY-95	SR-90 LAL-0196_21857	0.02	0.21	0.36		pCi/L

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. \* Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0F8X0

LAL Sample ID: L4271-11

Date Collected: 12-APR-95

Date Received: 14-APR-95

Matrix: Water

Login Number: L4271

SDG: LK4243

Constituent	Analyzed	Batch	Activity	Error	MBA	DataQual	Units
Tc-99	16-MAY-95	TC-99	LAL-0169_22778	100	13.	5.0	pCi/L

663

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. \* Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0F8X0

LAL Sample ID: L4271-15

Date Collected: 12-APR-95

Date Received: 14-APR-95

Matrix: Water

Login Number: L4271

SDG: LK4243

Constituent	Analyzed	Batch	Activity	Error	MDA	Dataqual	Units
C-14	02-MAY-95	C-14 LAL-0209_21835	3.6	8.3	10.		pCi/L
H-3	05-MAY-95	TRITIUM(H3) LAL-0066_21862	1370	270	220		pCi/L

# COPY



Date: June 28, 1995  
To: Bechtel Hanford, Inc. (technical representative)  
From: A.T. Kearney, Inc.  
Project: 100-BC-5 Groundwater Sampling - Round 8  
Subject: Wet Chemistry - Data Package No. LK4243-LAS (SDG LK4243)

## INTRODUCTION

This memo presents the results of data validation on Data Package No. LK4243-LAS prepared by Lockheed Analytical Services (LAS). A list of the samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analysis
BOF8W8	04/07/95	Water	D	See Note 1
BOF8X0	04/12/95	Water	D	See Note 1

Note 1. Requested Method: Fluoride, Sulfate, pH, and Specific Conductance.

Data validation was conducted in accordance with the WHC statement of work (WHC 1994) and validation procedures (WHC 1993). Appendices 1 through 5 provide the following information as indicated below:

- Appendix 1. Glossary of Data Reporting Qualifiers
- Appendix 2. Summary of Data Qualifications
- 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**

Analytical holding times for fluoride, sulfate, pH and specific conductance were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: 28 days for fluoride, sulfate and specific conductance; and immediate for pH.

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If holding times are exceeded, but not by greater than twice the limit, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If holding times are exceeded by greater than twice the limit, all associated detectable sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

All pH sample results were qualified as estimates and flagged "J" due to holding times exceeding QC limits.

Holding times for all other analytes reviewed met QC requirements.

- **Blanks**

One laboratory preparation blank is analyzed with each sample batch. At least one initial calibration blank is analyzed for every 20 samples. As per WHC guidelines, no qualification of data was necessary.

- **Accuracy**

Matrix Spike

Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must fall within a range of 75% to 125%. Samples with a spike recovery <30% and a sample value below the IDL are rejected and flagged "UR". Samples with a spike recovery between 30% to 74% and a sample value below the IDL are qualified as estimates and flagged "UJ". Samples with a spike recovery of <75% or >125% and a sample value >IDL are qualified as "J". Finally, samples with a spike recovery >125% and a sample value <IDL are acceptable and do not require qualification.

All matrix spike results were acceptable.

Laboratory Control Sample Recovery

The LCS monitors the overall performance of the analysis, including the sample preparation. An LCS should be prepared (e.g., digested or distilled) and analyzed with every group of samples which have been prepared together. The performance criteria for aqueous LCS percent recovery is 80% to 120%. The performance criteria for solid LCS samples are established through interlaboratory studies coordinated by a certifying agency (e.g., EPA or an independent commercial supplier).

000002

All LCS results were acceptable.

- **Precision**

Laboratory Duplicates

Laboratory duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Samples whose precision results fell outside the quality control limits were qualified as estimates and flagged "J".

All duplicate analyses results were acceptable.

Field Split Samples

Two split samples were submitted to LAS as shown below:

<u>Sample No.</u>	<u>Split Sample No.</u>	<u>Well Location</u>
BOF8T0	BOF8W8	199-B9-1
BOF8V6	BOF8X0	699-72

The split pair results were compared using the sample guidelines for determining the RPD between a sample and its duplicate. All results fell within the required control limits.

- **Sample Result Verification and Detection Limits**

Sample results and reported detection limits were recalculated to ensure that the reported results were accurate. Raw data were examined for anomalies, transcription errors, and reduction errors. The reviewer verified that the results and detection limits fell within the linear range of the instrument.

All sample results and reported detection limits were acceptable.

- **Completeness**

Data Package No. LK4243-LAS (SDG No. LK4243) was submitted for validation and verified for completeness. The completion percentage was 100%.

000003

## MAJOR DEFICIENCIES

None found.

## MINOR DEFICIENCIES

All pH sample results were qualified as estimates and flagged "J" due to holding times exceeding QC limits. Data flagged "J" indicate the associated concentration is an estimate, but the data are usable for decision making purposes.

## REFERENCES

EPA, 1987, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, Third Edition, 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.

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

**Appendix 1**  
**Glossary of Data Reporting Qualifiers**

000005

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 in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- J - Indicates the compound or analyte was analyzed for and detected. 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.
- NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).
- N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications usable for decision-making purposes).

000006

**Appendix 2**  
**Summary of Data Qualification**

000007



**Appendix 3**

**Qualified Data Summary and Annotated Laboratory Reports**



LOCKHEED ANALYTICAL SERVICES  
COMMON IONS AND ADDITIONAL ANALYTES

Sample Results

Client Sample ID: B0F8W8	Date Collected: 07-APR-95
Matrix: Water	Date Received: 11-APR-95

Constituent	Units	Method	Result	Reporting Det Limit	Data Qualifier(s)	Date Analyzed	LAS Batch ID	LAS Sample ID
Fluoride	mg/L	300.0	0.22	0.1		12-APR-95	21605	L4243-4
Sulfate	mg/L	300.0	41.	0.1		12-APR-95	21606	L4243-4
pH	pH Units	9040	8.0	0.1	J	14-APR-95	21671	L4243-4
Conductivity	uS/cm	9050	310	1		20-APR-95	21607	L4243-5

*RBC*  
*4/28/95*  
*041/MSK*

000011

LOCKHEED ANALYTICAL SERVICES

COMMON IONS AND ADDITIONAL ANALYTES

Sample Results

Client Sample ID: B0F8X0	Date Collected: 12-APR-95
Matrix: Water	Date Received: 14-APR-95

Constituent	Units	Method	Result	Reporting Det/Limit	Data Qualifier(s)	Date Analyzed	LAS Batch ID	LAS Sample ID
Fluoride	mg/L	300.0	0.29	0.1		26-APR-95	21773	L4271-4
Sulfate	mg/L	300.0	26.	0.1		21-APR-95	21772	L4271-4
pH	pH Units	9040	7.9	0.1	J	17-APR-95	21755	L4271-4
Conductivity	us/cm	9050	320	1		20-APR-95	21774	L4271-5

RBC  
4/28/95

*[Handwritten signature]*

**Appendix 4**

**Laboratory Narrative and Chain-of-Custody Documentation**

May 19, 1995

Ms. Joan Kessner  
Bechtel Hanford, Inc.  
345 Hills  
P.O. Box 969  
Richland, WA 99352



RE: Log-in No.: L4243/L4271  
Quotation No.: Q400000-B  
SAF: B95-040  
Document File No.: 0411596/0414596  
WHC Document File No.: 208  
SDG No.: LK4243

- L4243- The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on 11 April 1995. 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.
- L4271- The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on 14 April 1995. The temperature of the cooler upon receipt was 6°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) 943-4423.

000014

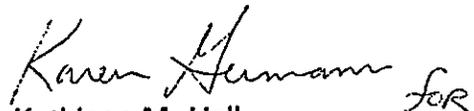
*005 RAC*

The EDD is being sent on the Hanford Bulletin Board System.

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

" 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

000015



**CASE NARRATIVE  
 INORGANIC NON METALS ANALYSES**

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

**Preparation and Analysis Requirements**

- One water sample was received for LK4243 and prepared as batch 411bh and analyzed for selected analytes as requested on the chain of custody. Quality control analysis was performed on the following sample:

Client ID	LAL #		Method
BOF8W8	L4243-4	MS, DUP	300.0 Sulfate
	L4243-4	MS, DUP	300.0 Fluoride
	L4243-4	DUP	9040 pH
	L4243-5	DUP	9050 Conductivity

**Holding Time Requirements**

- All samples were analyzed within the specified holding time.

**Method Blanks**

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

**Internal Quality Control**

- All Internal Quality Control were within acceptance limits.

Kay McCann

April 24, 1995

Prepared By

Date

000016

*Handwritten signature*

**CASE NARRATIVE  
 INORGANIC NON METALS ANALYSES**

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

**Preparation and Analysis Requirements**

- One water sample was received for LK4243 and prepared as batch 414bh and analyzed for selected analytes as requested on the chain of custody. Quality control analysis was performed on the following sample:

Client ID	LAL #		Method
BOF8X0	L4271-4	MS, DUP	300.0 Sulfate
	L4271-4	MS, DUP	300.0 Fluoride
	L4271-4	DUP	9040 pH
	L4271-5	DUP	9050 Conductivity

**Holding Time Requirements**

- All samples were analyzed within the specified holding time.

**Method Blanks**

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

**Internal Quality Control**

- All Internal Quality Control were within acceptance limits.

Shellee McGrath

April 27, 1995

Prepared By

Date

000017

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

**L4271**

Data Turnaround  
 Priority  
 Normal

Collector <i>K. Lee</i>	Company Contact R.F. Raidl	Telephone (509) 372-9641
Project Designation 100-BC-5 Groundwater Sampling Round 8	Sampling Location 100 B and 100 C	SAF No. B95-040
Ice Chest No. <i>GW5-145</i>	Field Logbook No. <i>EFL-1036</i>	Method of Shipment Federal Express
Shipped To Lockheed	Offsite Property No. <i>W95-0-0304-20</i>	Bill of Lading/Air Bill No. <i>2904625315</i>

Possible Sample Hazards/Remarks	Preservation	HNO3	HNO3	Cool 4C	Cool 4C	HNO3	HCl	Cool 4C	Cool 4C	HNO3	HNO3
	Type of Container	G	G	P	P	G	P	G	P	G	G
	No. of Container(s)	1	1	1	1	5	4	1	1	1	1
Special Handling and/or Storage Maintain samples between 2C and 6C.	Volume	1L	500mL	500mL	250mL	1L	1L	1L	20mL	1L	500mL

SAMPLE ANALYSIS	ICP Metals, AA Metels. Unfiltered	Mercury Unfiltered	Anions-F, SO4. pH	Conductivity	Gross Alpha, Gross Beta, Sr-90	To-99	Tritium, C-14	Activity Scan	ICP Metals, AA Metels. Filtered	Mercury Filtered
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Sample No.	Matrix*	Date Sampled	Time Sampled									
BOF8X0	W	4.12.95	1049	X	X	X	X	X	X	X		
BOF8X1	W	4.12.95	1049								X	X

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS	Matrix*
Relinquished By <i>K. Lee</i> Date/Time <i>4/12/95 1255</i>	Received By <i>ERC</i> Date/Time <i>1255</i>	Data Deliverable "Standalone".  The Activity Scan is for all samples list on this chain of custody.	<ul style="list-style-type: none"> <li>S = Soil</li> <li>SE = Sediment</li> <li>SO = Solid</li> <li>SL = Sludge</li> <li>W = Water</li> <li>O = Oil</li> <li>A = Air</li> <li>DS = Drum Solids</li> <li>DL = Drum Liquids</li> <li>T = Tissue</li> <li>WI = Wipe</li> <li>L = Liquid</li> <li>V = Vegetation</li> <li>X = Other</li> </ul>
Relinquished By <i>ERC</i> Date/Time <i>0900</i>	Received By <i>Bill Hunter</i> Date/Time <i>4-12-95</i>		
Relinquished By <i>Bill Hunter</i> Date/Time <i>4-13-95</i>	Received By _____ Date/Time _____		
Relinquished By _____ Date/Time _____	Received By _____ Date/Time _____		

LABORATORY SECTION	Received By <i>Murd</i>	Title <i>Sample Custodian</i>	Date/Time <i>4-14-95/0900</i>
FINAL SAMPLE DISPOSITION	Disposal Method <i>15</i>	Disposed By	Date/Time

000015

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

**L4243**

Data Turnaround

- Priority
- Normal

Collector <i>K.D. Lee</i>	Company Contact R.F. Raidl	Telephone (509) 372-9641
Project Designation 100-BC-5 Groundwater Sampling Round 8	Sampling Location 100 B and 100 C	SAF No. B95-040
Ice Chest No. <i>ER-40</i>	Field Logbook No. <i>E.F.L-1036</i>	Method of Shipment Federal Express
Shipped To Lockheed	Offsite Property No. <i>4-10-95 X/A W95-0-0204-24</i>	Bill of Lading/Air Bill No. <i>2904624995</i>

Possible Sample Hazards/Remarks	Preservation	HNO3	HNO3	Cool 4C	Cool 4C	HNO3	HCl	Cool 4C	Cool 4C	HNO3	HNO3
	Type of Container	G	G	P	P	G	P	G	P	G	G
No. of Container(s)	1	1	1	1	5	4	1	1	1	1	1

Special Handling and/or Storage Maintain samples between 2C and 6C.	Volume	1L	500mL	500mL	250mL	1L	1L	1L	20mL	1L	500mL
--	--------	----	-------	-------	-------	----	----	----	------	----	-------

SAMPLE ANALYSIS				ICP Metals, AA Metals, Unfiltered	Mercury Unfiltered	Anions-F, SO4, pH	Conductivity	Gross Alpha, Gross Beta, Sr-90	Tc-99	Tritium, C-14	Activity Scan	ICP Metals, AA Metals, Filtered	Mercury Filtered
Sample No.	Matrix*	Date Sampled	Time Sampled										
BOF8W8	W	4/7/95	0922	X	X	X	X	X	X	X			
BOF8W9	W	4/7/95	0922									X	X

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS	Matrix*
Relinquished By <i>K.D. Lee</i>	Date/Time 4/7/95 - 1245	Received By <i>R.F. Raidl</i>	Date/Time 4-7-95
Relinquished By <i>Eric</i>	Date/Time 4-7-95 - 0900	Received By <i>Bub Hen</i>	Date/Time 4-7-95
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

Data Deliverable "Standalone".

The Activity Scan is for all samples list on this chain of custody.

- 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 <i>Anderson</i>	Title Sample Custodian	Date/Time 4-11-95 / 0830
FINAL SAMPLE DISPOSITION	Disposal Method <i> </i>	Disposed By <i> </i>	Date/Time <i> </i>

65-000000

65-000000

ERC LABORATORY MANAGEMENT  
SAMPLING AUTHORIZATION FORM

3/21/95

SAF Number B95-040

Revision 0

PROGRAM TYPE CERCLA

PROJECT ID 100-BC-5 LFI

PROJECT TYPE Limited Field Investigation

OPERABLE UNIT 100-BC-5

TASK ID 6

ROUND NUMBER 8

SAMPLING EVENT TITLE 100-BC-5 GROUNDWATER SAMPLING — ROUND 8

TASK MANAGER	ORG. CODE	MSIN	TELEPHONE	FAX
<u>R. L. Biggerstaff</u>	<u>BF001</u>	<u>H4-91</u>	<u>372-9572</u>	<u>972-9655</u>

CHARGE CODES —	ANALYTICAL SERVICES <u>PB5AA</u>	SAMPLE MANAGEMENT	<u>PB5AA</u>
	SAMPLING SERVICES <u>PB5AA</u>	TECHNICAL OVERSIGHT	<u>PB5AA</u>

SAMPLE MANAGEMENT FUNCTION PROJECT COORDINATOR R. C. Smith

TELEPHONE 372-2537

ESTIMATED START DATE 04/10/95 ESTIMATED COMPLETION DATE 04/29/95

SAMPLING LOCATION 100-BC-5/100 Area ESTIMATED NUMBER OF SAMPLES 60

DATA TURNAROUND REQUIREMENTS \_\_\_ PRIORITY \_\_\_  REGULAR

DATA DELIVERABLE REQUIREMENTS  STANDALONE \_\_\_ SUMMARY

SAMPLE MATRIX \_\_\_ SOIL  WATER \_\_\_ OTHER (See Comments)

ANALYTICAL PROTOCOL(S) CLP, SW-846, RADCHEM, and Field Screening

LABORATORY QUANTERRA (Main) LOCKHEED (Split)

COMMENTS:

▶▶ The Person in Charge is Bob Raidl 3050C/63; 372-9641.

▶▶ Take the split and duplicate at the sample sampling point (well). Twenty-four wells are to be sampled. Filtered and unfiltered samples are needed from each well.

Date 03/21/95

BHI-EE-002 (12/94)

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**Appendix 5**

**Data Validation Supporting Documentation**

GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	<u>D</u>	E
PROJECT:	100-BC-5 8rd gw		DATA PACKAGE: LK4243-LAS		
VALIDATOR:	RBC	LAB: Lockleed	DATE: 19 June 95		
CASE:			SDG: LK4243		
ANALYSES PERFORMED					
<input checked="" type="checkbox"/> Anions/IC	<input type="checkbox"/> TOC	<input type="checkbox"/> TOX	<input type="checkbox"/> TPH-418.1	Oil and Grease	Alkalinity
<input type="checkbox"/> Ammonia	<input type="checkbox"/> BOD/COD	<input type="checkbox"/> Chloride	<input type="checkbox"/> Chromium-VI	<input checked="" type="checkbox"/> pH	<input type="checkbox"/> NO <sub>2</sub> /NO <sub>3</sub>
<input type="checkbox"/> Sulfate	<input type="checkbox"/> TDS	<input type="checkbox"/> TKN	<input type="checkbox"/> Phosphate	<input checked="" type="checkbox"/> S. Conduct.	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SAMPLES/MATRIX : H <sub>2</sub> O					
BOF8X0 + BOF8W8					

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . Yes No N/A  
 Is a case narrative present? . . . . . Yes No N/A

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

2. HOLDING TIMES

Are sample holding times acceptable? . . . . . Yes No N/A  
 Comments: pH - J all

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

3. INSTRUMENT CALIBRATION

- Was initial calibration performed for all applicable analyses?  Yes No N/A
- Are initial calibration results acceptable? . . . . .  Yes No N/A
- Was a calibration check performed for all applicable analyses?  Yes No N/A
- Are calibration check results acceptable? . . . . .  Yes No N/A

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

4. BLANKS

- Were laboratory blanks analyzed? . . . . .  Yes No N/A
- Are laboratory blank results acceptable? . . . . .  Yes No N/A
- Were field/trip blanks analyzed? . . . . . Yes  No N/A
- Are field/trip blank results acceptable? . . . . . Yes No  N/A

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

5. ACCURACY

- Were spike samples analyzed at the required frequency? . . . .  Yes No N/A
- Are spike recoveries acceptable? . . . . .  Yes No N/A
- Were LCS analyses performed at the required frequency? . . . .  Yes No N/A
- Are LCS recoveries acceptable? . . . . .  Yes No N/A

Comments: \_\_\_\_\_

\_\_\_\_\_

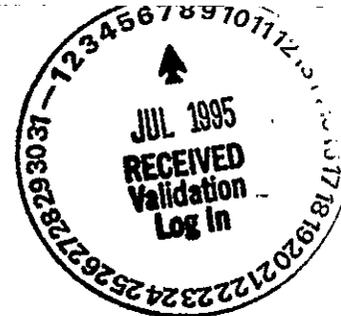
\_\_\_\_\_

6. PRECISION

- Were laboratory duplicate samples analyzed at the required frequency? . . . . .  Yes No N/A
- Are laboratory duplicate sample RPD values acceptable? . . . .  Yes No N/A
- Are field duplicate RPD values acceptable? . . . . . Yes No  N/A
- Are field split RPD values acceptable? . . . . .  Yes No N/A



# COPY



Date: June 28, 1995  
To: Bechtel Hanford, Inc. (technical representative)  
From: A.T. Kearney, Inc.  
Project: 100-BC-5 Round 8 Groundwater Sampling  
Subject: Inorganics - Data Package No. LK4243-LAS (SDG No. LK4243)

## INTRODUCTION

This memo presents the results of data validation on Data Package No. LK4243-LAS prepared by Lockheed Analytical Services (LAS). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analysis
BOF8W8	04/07/95	Water	D	See Note 1
BOF8W9	04/07/95	Water	D	See Note 1
BOF8X0	04/12/95	Water	D	See Note 1
BOF8X1	04/12/95	Water	D	See Note 1

Note 1. Requested Method: CLP-ICP Metals and Hg

Data validation was conducted in accordance with the WHC statement of work (WHC 1994) and validation procedures (WHC 1993). Appendices 1 through 5 provide the following information as indicated below:

- Appendix 1. Glossary of Data Reporting Qualifiers
- Appendix 2. Summary of Data Qualifications
- 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**

Analytical holding times for ICP metals and CVAA mercury analyses were assessed to ascertain whether the holding time requirements were met by the

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laboratory. The holding time requirements are as follows: Samples must be analyzed within six months for all metals and within 28 days for mercury.

Holding time requirements for all analytes were met.

- **Blanks**

- Calibration Blanks

- A calibration blank must be analyzed immediately after every initial and continuing calibration verification. The blank must be analyzed at the beginning of the run and after the last analytical sample. In the case of positive blank results, samples with digestate concentrations (in ug/L) of  $< 5x$  the highest amount found in any of the associated blanks have had their associated values qualified as non-detected and flagged "U". Samples with concentrations  $> 5x$  the highest blank value do not require qualification.

- In the case of negative calibration blank results, if the absolute value of any calibration blank exceeds the Instrument Detection Limit (IDL), all non-detects are qualified as estimates and flagged "UJ", and all positive results within two times (2x) the absolute value of the blank result are qualified as estimates and flagged "J". The qualification is applied only to results generated between the calibration blank IDL and the nearest acceptable blank.

- Due to the presence of positive blank results, sample numbers BOF8W8 and BOF8X0 were flagged "U" for arsenic.

- Due to the presence of positive blank results, sample number BOF8W8 was flagged "U" for iron.

- Due to the presence of positive blank results, sample number BOF8W8 was flagged "U" for vanadium.

- All other calibration blank results were acceptable.

- Preparation Blanks

- At least one preparation blank, consisting of deionized distilled water processed through each sample preparation and analysis procedure must be prepared and analyzed with every sample delivery group. In the case of positive blank results, samples with digestate concentrations (in ug/L) of  $< 5x$  the preparation blank value have had their associated values qualified as non-detects and flagged "U". Samples with concentrations  $> 5x$  the highest blank concentration do not require qualification.

In the case of negative blank results, if the absolute value exceeds the Contract Required Detection Limit (CRDL), all non-detects are rejected and flagged "UR" and all detects that are  $< 10x$  the absolute value of the associated preparation blank result are qualified as estimates and flagged "J". If the absolute value of the negative preparation blank is  $> IDL$  and  $\leq CRDL$ , all non-detects are qualified as estimates and flagged "UJ" and all detects  $< 10x$  the absolute value of the blank are qualified as estimates and flagged "J". If the sample results are  $> 10x$  the absolute value of the preparation blank, no qualification is necessary.

Due to the presence of positive preparation blank results, sample number B0F8W8 was flagged "U" for iron.

Due to the presence of positive preparation blank results, sample number B0F8W8 was flagged "U" for silver.

Due to the presence of positive preparation blank results, sample number B0F8W9 was flagged "U" for thallium.

Due to the presence of positive preparation blank results, sample numbers B0F8W8 and B0F8X0 were flagged "U" for zinc.

Due to the presence of negative preparation blank results, sample numbers B0F8W9 and B0F8X1 were flagged "UJ" for copper.

Due to the presence of negative preparation blank results, sample numbers B0F8W8 and B0F8X0 were flagged "UJ" for mercury.

All other preparation blanks results were acceptable.

- **Accuracy**

- Matrix Spike

- Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must fall within the range of 75% to 125%. Samples with a spike recovery of  $< 30\%$  and a sample value below the IDL were rejected and flagged "UR". Samples with a spike recovery of 30% to 74% and a sample result  $< IDL$  are qualified "UJ". Samples with a spike recovery of  $> 125\%$  or  $< 75\%$  and a sample result  $> IDL$  are qualified "J". Finally, all samples with a spike recovery  $> 125\%$  and a sample result  $< IDL$ , no qualification is required.

- All matrix spike recovery results were acceptable.

### Laboratory Control Sample Recovery

The LCS monitors the overall performance of the analysis, including the sample preparation. An LCS should be digested or distilled and analyzed with every group of samples which have been prepared together. The performance criteria for solid LCS samples are established through interlaboratory studies coordinated by a certifying agency (e.g., EPA or an independent commercial supplier).

One liquid LCS was digested and analyzed for each sample batch in this report.

All LCS results were found to be acceptable.

- **Precision**

#### Laboratory Duplicate Samples

The laboratory duplicate result measures the precision of the method by measuring a second aliquot of the sample that is treated the same way as the original. Samples whose precision fell outside the quality control requirements were qualified as estimates and flagged "J".

All laboratory duplicate recovery results were acceptable.

#### ICP Serial Dilution

The ICP serial dilution is used to determine whether significant physical or chemical interferences exist due to the sample matrix. If the sample concentration is  $\geq 50x$  IDL for an analyte and the %D is outside the control limits  $> 10\%$ , the associated data must be qualified as estimated "J".

All ICP serial dilution results were acceptable.

#### Field Split Samples

Four sets of field split samples were submitted to LAS as shown below.

<u>Sample No.</u>	<u>Split Sample No.</u>	<u>Well Location</u>
BOF8T0	BOF8W8	199-B9-1
BOF8T1	BOF8W9	199-B9-1
BOF8V6	BOF8X0	699-72-73
BOF8V7	BOF8X1	699-72-73

The split sample results were compared using the sample guidelines for determining the RPD between a sample and its duplicate. All results fell within the required control limits with the exception of copper (difference > CRDL) in sample pair BOF8T0/BOF8W8, iron (difference > CRDL) in sample pair BOF8T1/BOF8W9, and iron (difference > CRDL) in sample pair BOF8V6/BOF8X0. No judgement was made on the split samples, since under WHC validation guidelines, sample data are not qualified based on split sample results.

- **Sample Result Verification and Detection Limits**

Sample results and reported detection limits were recalculated to ensure that the reported results were accurate. Raw data were examined for anomalies, transcription errors, and reduction errors.

The reviewer verified that the results and detection limits fell within the linear range of the instrument. All sample results and reported detection limits were acceptable.

- **Completeness**

Data Package No. LK4243-LAS (SDG No. LK4243) was submitted for validation and verified for completeness. The completion percentage was 100%.

### **MAJOR DEFICIENCIES**

None found.

### **MINOR DEFICIENCIES**

Positive and negative blank contamination were noted in several samples. Associated sample results were qualified accordingly. The contamination, however, was not sufficiently high to affect the usability of the data. Data flagged "J" indicate the associated concentration is an estimate, but the data are usable for decision making purposes. All other validated results are considered accurate within the standard error associated with the methods.

## **REFERENCES**

EPA, 1987, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846*, Third Edition, 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.

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

**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 in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- 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.
- BJ - Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.
- 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.
- NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).
- N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (usable for decision-making purposes).

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**Appendix 2**  
**Summary of Data Qualification**

**000009**



**Appendix 3**

**Qualified Data Summary and Annotated Laboratory Reports**

**000011**

Project: WESTINGHOUSE-HANFORD																				
Laboratory: Lockheed																				
Case		SDG: LK4243																		
Sample Number	B0F8W8		B0F8W9		B0F8X0		B0F8X1													
Location	199-B9-1		199-B9-1		699-72-73		699-72-73													
Remarks	UG/L		SPLIT		FIL-SPLIT		SPLIT 2		FIL-SPLIT 2											
Sample Date	04/07/95		04/07/95		04/12/95		04/12/95													
Inorganic Analytes	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	
Aluminum	200	33.0	U	33.0	U	33.0	U	33.0	U											
Antimony	60	2.0	U	54.0	U	2.0	U	54.0	U											
Arsenic	10	7.9	U	10.2		8.9	U	5.2												
Barium	200	10.2		10.0	U	21.2		20.2												
Beryllium	5	1.0	U	1.0	U	1.0	U	1.0	U											
Cadmium	5	3.0	U	3.0	U	3.0	U	3.0	U											
Calcium	5000	44800		44800		36500		35600												
Chromium	10	20.5		17.9		3.0	U	3.0	U											
Cobalt	50	6.0	U	6.0	U	6.0	U	6.0	U											
Copper	25	2.0	U	2.0	UJ	2.0	U	2.0	UJ											
Iron	100	38.1	U	12.0	U	104		12.0	U											
Lead	3	2.0	U	2.0	U	2.0	U	2.0	U											
Magnesium	5000	9830		9770		9700		9420												
Manganese	15	2.0	U	2.0	U	2.0	U	2.0	U											
Mercury	0.2	0.20	UJ	0.20	U	0.20	UJ	0.20	U											
Nickel	40	12.0	U	12.0	U	12.0	U	12.0	U											
Potassium	5000	6750		6130		5000		5340												
Selenium	5	3.0	U	4.1		3.0	U	5.1												
Silver	10	3.0	U	3.0	U	3.0	U	3.0	U											
Sodium	5000	13400		13200		15200		14900												
Thallium	10	4.0	U	4.3	U	4.0	U	4.0	U											
Vanadium	50	12.3	U	11.6		11.2		12.1												
Zinc	20	10.6	U	3.0	U	9.0	U	3.0	U											

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*RJS 6/16/95*

FIL = Filtered, NA = Not Analyzed, N/A = Not Applicable

CLP

1  
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

BOF8W9

Lab Name: LOCKHEED\_ANALYTICAL\_SVC Contract: HANFORD

Lab Code: LOCK Case No.: SAF#B9 SAS No.: SDG No.: LK4243

Matrix (soil/water): WATER Lab Sample ID: L4243-16

Level (low/med): LOW Date Received: 04/11/95

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	33.0	U		P
7440-36-0	Antimony	54.0	U		P
7440-38-2	Arsenic	10.2			P
7440-39-3	Barium	10.0	U		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	3.0	U		P
7440-70-2	Calcium	44800			P
7440-47-3	Chromium	17.9			P
7440-48-4	Cobalt	6.0	U		P
7440-50-8	Copper	2.0	X		P
7439-89-6	Iron	12.0	U		P
7439-92-1	Lead	2.0	U		P
7439-95-4	Magnesium	9770			P
7439-96-5	Manganese	2.0	U		P
7439-97-6	Mercury				NR
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	6130			P
7782-49-2	Selenium	4.1	B		P
7440-22-4	Silver	3.0	U		P
7440-23-5	Sodium	13200			P
7440-28-0	Thallium	4.3	X		P
7440-62-2	Vanadium	11.6	B		P
7440-66-6	Zinc	3.0	U		P

UJ

U

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Color After: Clarity After: Artifacts:

Comments:

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1  
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

BOF8W9

Lab Name: LOCKHEED\_ANALYTICAL\_SVC Contract: HANFORD

Lab Code: LOCK Case No.: SAF#B9 SAS No.: SDG No.: LK4243

Matrix (soil/water): WATER Lab Sample ID: L4243-17

Level (low/med): LOW Date Received: 04/11/95

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_

Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_

Comments:

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\_\_\_\_\_ RJS 6/11/95

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CLP

1  
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO:

BOF8X0

Lab Name: LOCKHEED\_ANALYTICAL\_SVC Contract: HANFORD

Lab Code: LOCK Case No.: SAF#B9 SAS No.: SDG No.: LK4243

Matrix (soil/water): WATER Lab Sample ID: L4271-2

Level (low/med): LOW Date Received: 04/14/95

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	33.0	U		P
7440-36-0	Antimony	2.0	U		P
7440-38-2	Arsenic	8.9	B		P
7440-39-3	Barium	21.2	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	3.0	U		P
7440-70-2	Calcium	36500			P
7440-47-3	Chromium	3.0	U		P
7440-48-4	Cobalt	6.0	U		P
7440-50-8	Copper	2.0	U		P
7439-89-6	Iron	104			P
7439-92-1	Lead	2.0	U		P
7439-95-4	Magnesium	9700			P
7439-96-5	Manganese	2.0	U		P
7439-97-6	Mercury				NR
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	5000	B		P
7782-49-2	Selenium	3.0	U		P
7440-22-4	Silver	3.0	U		P
7440-23-5	Sodium	15200			P
7440-28-0	Thallium	4.0	U		P
7440-62-2	Vanadium	11.2	B		P
7440-66-6	Zinc	9.0	B		P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

*RF 6/14/95*

*22/1/95*

CLP

1  
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

B0F8X0

Lab Name: LOCKHEED\_ANALYTICAL\_SVC Contract: HANFORD

Lab Code: LOCK Case No.: SAF#B9 SAS No.: SDG No.: LK4243

Matrix (soil/water): WATER Lab Sample ID: L4271-3

Level (low/med): LOW Date Received: 04/14/95

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.20	✓		AV UJ
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_

Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_

Comments:

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\_\_\_\_\_  
RJS 10/16/95

CLP

1  
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

B0F8W8

Lab Name: LOCKHEED\_ANALYTICAL\_SVC Contract: HANFORD

Lab Code: LOCK Case No.: SAF#B9 SAS No.: SDG No.: LK4243

Matrix (soil/water): WATER Lab Sample ID: L4243-2

Level (low/med): LOW Date Received: 04/11/95

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	33.0	U		P
7440-36-0	Antimony	2.0	U		P
7440-38-2	Arsenic	7.9	B		P u
7440-39-3	Barium	10.2	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	3.0	U		P
7440-70-2	Calcium	44800			P
7440-47-3	Chromium	20.5			P
7440-48-4	Cobalt	6.0	U		P
7440-50-8	Copper	2.0	U		P
7439-89-6	Iron	38.1	B		P u
7439-92-1	Lead	2.0	U		P
7439-95-4	Magnesium	9830			P
7439-96-5	Manganese	2.0	U		P
7439-97-6	Mercury				NR
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	6750			P
7782-49-2	Selenium	3.0	U		P
7440-22-4	Silver	3.0	B		P u
7440-23-5	Sodium	13400			P
7440-28-0	Thallium	4.0	U		P
7440-62-2	Vanadium	12.3	B		P u
7440-66-6	Zinc	10.6	B		P u

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_

Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_

Comments:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ RJS 6/11/95

221 RJC

CLP

1  
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

BOF8W8

Lab Name: LOCKHEED\_ANALYTICAL\_SVC Contract: HANFORD

Lab Code: LOCK Case No.: SAF#B9 SAS No.: SDG No.: LK4243

Matrix (soil/water): WATER Lab Sample ID: L4243-3

Level (low/med): LOW Date Received: 04/11/95

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.20	✓		AV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_

Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_

Comments:

*Rjs 6/14/95*

FORM I - IN

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000018

*228 Pbc*

CLP

1  
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

B0F8X1

Lab Name: LOCKHEED\_ANALYTICAL\_SVC Contract: HANFORD

Lab Code: LOCK Case No.: SAF#B9 SAS No.: SDG No.: LK4243

Matrix (soil/water): WATER Lab Sample ID: L4271-16

Level (low/med): LOW Date Received: 04/14/95

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	33.0	U		P
7440-36-0	Antimony	54.0	U		P
7440-38-2	Arsenic	5.2	B		P
7440-39-3	Barium	20.2	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	3.0	U		P
7440-70-2	Calcium	35600			P
7440-47-3	Chromium	3.0	U		P
7440-48-4	Cobalt	6.0	U		P
7440-50-8	Copper	2.0	U		P
7439-89-6	Iron	12.0	U		P
7439-92-1	Lead	2.0	U		P
7439-95-4	Magnesium	9420			P
7439-96-5	Manganese	2.0	U		P
7439-97-6	Mercury				NR
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	5340			P
7782-49-2	Selenium	5.1			P
7440-22-4	Silver	3.0	U		P
7440-23-5	Sodium	14900			P
7440-28-0	Thallium	4.0	U		P
7440-62-2	Vanadium	12.1	B		P
7440-66-6	Zinc	3.0	U		P

UJ

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

\_\_\_\_\_

DJS 04/16/95

268/92

CLP

1  
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

B0F8X1

Lab Name: LOCKHEED\_ANALYTICAL\_SVC Contract: HANFORD

Lab Code: LOCK Case No.: SAF#B9 SAS No.: SDG No.: LK4243

Matrix (soil/water): WATER Lab Sample ID: L4271-17

Level (low/med): LOW Date Received: 04/14/95

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_

Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_

Comments:

*RJS 6/16/95*

*28 Rbe*

**Appendix 4**

**Laboratory Narrative and Chain-of-Custody Documentation**

000021

**CASE NARRATIVE  
INORGANIC METALS ANALYSES  
WATER**

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

**Preparation and Analysis Requirements**

- Two water samples total metals analysis. The samples were prepared as LAS Batch 411BHT and analyzed for selected analytes as requested on the chain of custody. Samples B0F8W8 (L4243-2 for metals and L4243-3 for mercury) were used for matrix spike and duplicate, post-digestion spike and serial dilution analyses. All data flags due to the performance of the above-mentioned QC samples are also associated with every sample digested with this batch.

**Holding Time Requirements**

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

**Method Blanks**

- The level of analytes in the method blanks were less than the reporting detection limits with the following exception:
- For mercury, the absolute value of the prep blank is slightly higher than the reporting detection limit at -0.201 a carry-over affect from the preceding high mercury concentration sample. However, all samples showed mercury content within +/- CRDL therefore, no corrective action was taken.

**Internal Quality Control**

- All internal quality control were within acceptance limits.

**Sample Results**

- The following qualifiers are reported on the basis of the techniques employed to perform the analyses:  
"P" Trace ICP-AES  
"P" ICP-AES  
"AV" Cold Vapor AA

**Nalini Prabhakar**

**05/08/95**

\_\_\_\_\_  
**Prepared By**

\_\_\_\_\_  
**Date**

**CASE NARRATIVE  
INORGANIC METALS ANALYSES  
FILTERED WATER**

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

**Preparation and Analysis Requirements**

- Two filtered water samples for dissolved metals analysis. As the measured turbidity of the samples was less than 1 NTU, they were batched as 411BHD for selected dissolved analytes as requested on the chain of custody. For this sample batch sample B0F8W9 (L4243-16 for metals and L4243-17 for mercury) were used for matrix spike and duplicate, post-digestion spike and serial dilution analyses. All data flags due to the performance of the above-mentioned QC samples are also associated with every sample analyzed with this batch.

**Holding Time Requirements**

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

**Method Blanks**

- The level of analytes in the method blanks were less than the reporting detection limits.

**Internal Quality Control**

All internal quality control were within acceptance limits.

**Sample Results**

- The following qualifiers are reported on the basis of the techniques employed to perform the analyses:

"P" ICP-AES  
"AV" Cold Vapor AA  
"P" Trace ICP

Nalini Prabhakar

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05/08/95

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ERC LABORATORY MANAGEMENT  
SAMPLING AUTHORIZATION FORM

3/21/95

SAF Number B95-040

Revision 0

PROGRAM TYPE CERCLA PROJECT ID 100-BC-5 LFI  
PROJECT TYPE Limited Field Investigation OPERABLE UNIT 100-BC-5  
TASK ID 6 ROUND NUMBER 8  
SAMPLING EVENT TITLE 100-BC-5 GROUNDWATER SAMPLING — ROUND 8

TASK MANAGER R. L. Biggerstaff ORG. CODE BF001 MSIN H4-91 TELEPHONE 372-9572 FAX 972-9655

CHARGE CODES — ANALYTICAL SERVICES PB5AA SAMPLE MANAGEMENT PB5AA  
SAMPLING SERVICES PB5AA TECHNICAL OVERSIGHT PB5AA

SAMPLE MANAGEMENT FUNCTION PROJECT COORDINATOR R. C. Smith

TELEPHONE 372-2537

ESTIMATED START DATE 04/10/95 ESTIMATED COMPLETION DATE 04/29/95

SAMPLING LOCATION 100-BC-5/100 Area ESTIMATED NUMBER OF SAMPLES 60

DATA TURNAROUND REQUIREMENTS \_\_\_ PRIORITY ✓ REGULAR

DATA DELIVERABLE REQUIREMENTS ✓ STANDALONE \_\_\_ SUMMARY

SAMPLE MATRIX \_\_\_ SOIL ✓ WATER \_\_\_ OTHER (See Comments)

ANALYTICAL PROTOCOL(S) CLP, SW-846, RADCHEM, and Field Screening

LABORATORY QUANTERRA (Main) LOCKHEED (Split)

COMMENTS:

▶▶ The Person in Charge is Bob Raidl 3050C/63; 372-9641.

▶▶ Take the split and duplicate at the sample sampling point (well). Twenty-four wells are to be sampled. Filtered and unfiltered samples are needed from each well.

Date 03/21/95

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

**LY243**

Data Turnaround

- Priority
- Normal

Collector <i>K.D. Lee</i>	Company Contact R.F. Raidl	Telephone (509) 372-9641
Project Designation 100-BC-5 Groundwater Sampling Round 8	Sampling Location 100 B and 100 C	SAF No. B95-040
Ice Chest No. <i>ER-40</i>	Field Logbook No. <i>EFL-1036</i>	Method of Shipment Federal Express
Shipped To Lockheed	Offsite Property No. <i>41055 XIA W95-0-0004-24</i>	Bill of Lading/Air Bill No. <i>3904624995</i>

Possible Sample Hazards/Remarks	Preservation	HNO3	HNO3	Cool 4C	Cool 4C	HNO3	HCl	Cool 4C	Cool 4C	HNO3	HNO3
	Type of Container	G	G	P	P	G	P	G	P	G	G
No. of Container(s)	1	1	1	1	1	5	4	1	1	1	1

Special Handling and/or Storage Maintain samples between 2C and 6C.	Volume	1L	500mL	500mL	250mL	1L	1L	1L	20mL	1L	500mL
SAMPLE ANALYSIS	ICP Metals, AA	Mercury	Anions-F, SO4.	Conductivity	Gross Alpha, Gross Beta, Sr-90	Tc-99	Tritium, C-14	Activity Scan	ICP Metals, AA	Mercury	Filtered
	Unfiltered	Unfiltered	pH						Metals, Filtered		

Sample No.	Matrix *	Date Sampled	Time Sampled									
BOF8W8	W	4/7/95	0922	X	X	X	X	X	X	X		
BOF8W9	W	4/7/95	0922								X	X
000027												

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS
Relinquished By <i>K.D. Lee</i>	Date/Time 4/7/95 1245	Data Deliverable "Standalone".  The Activity Scan is for all samples list on this chain of custody.
Received By <i>R.F. Raidl</i>	Date/Time 4-7-95	
Relinquished By <i>R.F. Raidl</i>	Date/Time 4-10-95 -0900	
Received By	Date/Time	
Relinquished By	Date/Time	
Received 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
  - WI = Wipe
  - L = Liquid
  - V = Vegetation
  - X = Other

LABORATORY SECTION	Received By <i>Anderson</i>	Title Sample Custodian	Date/Time 4-11-95 / 0830
FINAL SAMPLE DISPOSITION	Disposal Method <i>10</i>	Disposed By	Date/Time



**Appendix 5**

**Data Validation Supporting Documentation**

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	<b>D</b>	E
PROJECT: WHC/BHI			DATA PACKAGE: LK4243-LAS		
VALIDATOR: RJS		LAB: Lockheed		DATE: 6/16/95	
CASE: 100-BI-S Round 8			SDG: LK4243		
ANALYSES PERFORMED					
<input checked="" type="checkbox"/> CLP/ICP	<input type="checkbox"/> CLP/GFAA	<input type="checkbox"/> CLP/Hg	<input type="checkbox"/> CLP/Cyanide	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> SW-846/ICP	<input type="checkbox"/> SW-846/GFAA	<input type="checkbox"/> SW-846/Hg	<input type="checkbox"/> SW-846 Cyanide	<input type="checkbox"/>	<input type="checkbox"/>
SAMPLES/MATRIX	BOF8W8				
	BOF8X0 (4 water samples)				
	BOF8W9				
	BOF8X1				

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . **Yes** No N/A

Is a case narrative present? . . . . . **Yes** No N/A

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

2. HOLDING TIMES

Are sample holding times acceptable? . . . . . **Yes** No N/A

Comments: metals ← 6 months ✓  
Hg ← 28 days ✓  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

Were initial calibrations performed on all instruments? . . . .  Yes No N/A

Are initial calibrations acceptable? . . . . .  Yes No N/A

Are ICP interference checks acceptable? . . . . .  Yes No N/A

Were ICV and CCV checks performed on all instruments? . . . .  Yes No N/A

Are ICV and CCV checks acceptable? . . . . .  Yes No N/A

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

4. BLANKS

Were ICB and CCB checks performed for all applicable analyses?  Yes No N/A

Are ICB and CCB results acceptable? . . . . . Yes  No N/A

Were preparation blanks analyzed? . . . . .  Yes No N/A

Are preparation blank results acceptable? . . . . . Yes  No N/A

Were field/trip blanks analyzed? . . . . . Yes No  N/A

Are field/trip blank results acceptable? . . . . . Yes No  N/A

Comments: qualified calibration blank detectors / qualified prep blank detectors

<u>(As, Fe, V) "U"</u>	<u>Cu - "U S"</u>
	<u>Hg - "U S"</u>
	<u>Fe, Ag, Tl, Zn "U"</u>

5. ACCURACY

Were spike samples analyzed? . . . . .  Yes No N/A

Are spike sample recoveries acceptable? . . . . .  Yes No N/A

Were laboratory control samples (LCS) analyzed? . . . . .  Yes No N/A

Are LCS recoveries acceptable? . . . . .  Yes No N/A

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

6. PRECISION

- Were laboratory duplicates analyzed? . . . . .  Yes No N/A
- Are laboratory duplicate samples RPD values acceptable? . . . . .  Yes No N/A
- Were ICP serial dilution samples analyzed? . . . . .  Yes No N/A
- Are ICP serial dilution %D values acceptable? . . . . .  Yes No N/A
- Are field duplicate RPD values acceptable? . . . . . Yes No  N/A
- Are field split RPD values acceptable? . . . . . Yes  No N/A

Comments: CU - BOF8TO/BOF8W8 (difference > CRDL)

Splits Fe - BOF8TI/BOF8W9 (difference > CRDL)

Fe - BOF8V6/BOF8X0 (difference > CRDL)

7. FURNACE AA QUALITY CONTROL

- Were duplicate injections performed as required? . . . . . Yes No  N/A
- Are duplicate injection %RSD values acceptable? . . . . . Yes No  N/A
- Were analytical spikes performed as required? . . . . . Yes No  N/A
- Are analytical spike recoveries acceptable? . . . . . Yes No  N/A
- Was MSA performed as required? . . . . . Yes No  N/A
- Are MSA results acceptable? . . . . . Yes No  N/A

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

8. REPORTED RESULTS AND DETECTION LIMITS

- Are results reported for all requested analyses? . . . . .  Yes No N/A
- Are all results supported in the raw data? . . . . .  Yes No N/A
- Are results calculated properly? . . . . .  Yes No N/A
- Do results meet the CRDLs? . . . . .  Yes No N/A

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

BLANK AND SAMPLE DATA SUMMARY

SDG: LK4243		VALIDATOR: RJS			DATE: 6/16/95		PAGE 1 OF 1		
COMMENTS:									
SAMPLE ID	COMPOUND	RESULT	Q	RT	UNITS	5X RESULT	10X RESULT	SAMPLES AFFECTED	QUALIFIER
CCB2	Arsenic	3.0			ug/L	15	30	BOF8W8	U
CCB3	Arsenic	4.2				21	42	BOF8X0	U
CCB1	Iron	16.3				81.5	163	BOF8W8	U
CCB1	Vanadium	3.0				15.0	30	BOF8W8	U
Prep	Copper	-2.4				-12	-24	BOF8W9	UJ
↓	↓	↓				↓	↓	BOF8X1	UJ
Prep	Iron	13.36				66.8	133.6	BOF8W8	U
Prep	Mercury	-0.201				-1.005	2.01	BOF8W8	UJ
↓	↓	↓				↓	↓	BOF8X0	UJ
Prep	Silver	3.04				15.2	30.4	BOF8W8	U
Prep	Thallium	4.19				20.95	41.9	BOF8W9	U
Prep	Zinc	6.73				33.65	67.3	BOF8W8	U
↓	↓	↓			↓	↓	↓	BOF8X0	↓

B-3

000033

000034



CLP

3  
BLANKS

Lab Name: LOCKHEED\_ANALYTICAL\_SVC

Contract: HANFORD

Lab Code: LOCK

Case No.: SAF#B9

SAS No.:

SDG No.: LK4243

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L)						Preparation Blank	C	M
			1	C	2	C	3	C			
Aluminum	33.0	U	33.0	U	33.0	U	33.0	U	33.000	U	P
Antimony	54.0	U	54.0	U	54.0	U	54.0	U	54.000	U	P
Arsenic	3.0	U	3.0	U	3.0	U	3.0	U	3.000	U	P
Barium	10.0	U	10.0	U	10.0	U	10.0	U	10.000	U	P
Beryllium	1.0	U	1.0	U	1.0	U	1.0	U	1.000	U	P
Cadmium	3.0	U	3.0	U	3.0	U	3.0	U	3.000	U	P
Calcium	25.0	U	25.0	U	25.0	U	25.0	U	25.000	U	P
Chromium	3.0	U	3.0	U	3.0	U	4.1	B	3.000	U	P
Cobalt	6.0	U	6.0	U	6.0	U	6.0	U	6.000	U	P
Copper	-2.4	B	2.0	U	2.0	U	2.0	U	<del>-2.440</del>	B	P
Iron	12.0	U	12.6	B	12.0	U	14.6	B	12.000	U	P
Lead	2.0	U	2.0	U	2.0	U	2.0	U	2.000	U	P
Magnesium	35.0	U	35.0	U	35.0	U	35.0	U	35.000	U	P
Manganese	2.0	U	3.0	B	2.7	B	3.9	B	2.000	U	P
Mercury	0.2	U	0.2	U	0.2	U	0.2	U	0.200	U	AV
Nickel	12.0	U	12.0	U	12.0	U	12.0	U	12.000	U	P
Potassium	700.0	U	700.0	U	700.0	U	700.0	U	700.000	U	P
Selenium	3.0	U	3.8	B	3.0	U	3.0	U	3.000	U	P
Silver	3.0	U	3.0	U	3.0	U	3.0	U	3.000	U	P
Sodium	42.0	U	42.0	U	42.0	U	42.0	U	42.000	U	P
Thallium	4.1	B	4.9	B	4.0	U	4.7	B	<del>4.190</del>	B	P
Vanadium	3.0	U	3.0	U	3.0	U	3.0	U	3.000	U	P
Zinc	3.0	U	3.0	U	3.0	U	3.0	U	3.000	U	P

BOF8W9  
X1

FORM III - IN

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278X

CLP  
3  
BLANKS

Lab Name: LOCKHEED\_ANALYTICAL\_SVC\_\_\_\_\_ Contract: HANFORD\_\_\_\_\_

Lab Code: LOCK\_\_\_\_\_ Case No.: SAF#B9 SAS No.: \_\_\_\_\_ SDG No.: LK4243

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L\_

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L)						Preparation Blank		C	M
			1	C	2	C	3	C				
Aluminum	33.0	U	33.0	U	33.0	U	33.0	U	33.000	U	P	
Antimony	2.0	U	2.1	B	2.0	U	2.0	U	2.000	U	P	
Arsenic	3.0	U	3.0	U	3.0	B	4.2	B	3.000	U	P	
Barium	10.0	U	10.0	U	10.0	U	10.0	U	10.000	U	P	
Beryllium	1.0	U	1.0	U	1.0	U	1.0	U	1.000	U	P	
Cadmium	3.0	U	3.0	U	3.0	U	3.0	U	3.000	U	P	
Calcium	25.0	U	25.0	U	25.0	U	25.0	U	25.000	U	P	
Chromium	3.0	U	3.3	B	3.0	U	3.0	U	3.000	U	P	
Cobalt	6.0	U	6.0	U	6.0	U	6.0	U	6.000	U	P	
Copper	2.0	U	4.1	B	2.0	U	2.0	U	2.000	U	P	
Iron	12.0	U	16.3	B	12.0	U	12.0	U	13.360	B	P	
Lead	2.0	U	2.0	U	2.0	U	2.0	U	2.000	U	P	
Magnesium	35.0	U	35.9	B	35.0	U	35.0	U	35.000	U	P	
Manganese	2.0	U	3.9	B	2.0	U	2.0	U	2.000	U	P	
Mercury	0.2	U	0.2	U	0.2	U	0.2	U	-0.201		AV	
Nickel	12.0	U	12.0	U	12.0	U	12.0	U	12.000	U	P	
Potassium	700.0	U	700.0	U	700.0	U	700.0	U	707.960	B	P	
Selenium	3.0	U	3.0	U	3.0	U	3.9	B	3.000	U	P	
Silver	3.0	U	3.0	U	3.0	U	3.0	U	3.040	B	P	
Sodium	42.0	U	43.8	B	42.0	U	42.0	U	76.010	B	P	
Thallium	4.0	U	4.0	U	4.0	U	4.0	U	4.000	U	P	
Vanadium	3.0	U	3.0	B	3.0	U	3.0	U	3.000	U	P	
Zinc	3.0	U	3.0	U	3.0	U	3.0	U	6.730	B	P	

BOF8W8 BOF8XO CR3

FORM III - IN

BOF8 W8 BOF8 X O

(As, Se, Pb, Tl)

234

ILMO3.0

# COPY



Date: June 20, 1995  
To: Bechtel Hanford, Inc. (technical representative)  
From: A.T. Kearney, Inc.  
Project: 100-BC-5 Round 8 GW  
Subject: Radiochemistry - Data Package No. LK4243-LAS (SDG No. LK4243)

## INTRODUCTION

This memo presents the results of data validation on Data Package No. LK4243-LAS prepared by Lockheed Analytical Services (LAS). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analysis
BOF8W8	04/12/95	Water	D	See Note 1
BOF8X0	04/12/95	Water	D	See Note 1

Note 1. Requested Method: Gross Alpha/Beta, Sr-90, Tc-99, Tritium and C-14

Data validation was conducted in accordance with the WHC statement of work (WHC 1994) and validation procedures (WHC 1993). Appendices 1 through 5 provide the following information as indicated below:

- Appendix 1. Glossary of Data Reporting Qualifiers
- Appendix 2. Summary of Data Qualifications
- 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 and Sample Preparation

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 tritium samples must be analyzed within 7 days of distillation.

All holding times and sample preparation measures were acceptable.

000001

- **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.

All calibration results, including efficiency checks and background counts, were acceptable.

- **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 minimum detectable activity (MDA), the following qualifiers were applied: All positive sample results less than five times the highest blank concentration were qualified as estimated; sample results below the MDA were elevated to the MDA and qualified as undetected; sample results above the MDA and greater than five times the highest blank concentration were not qualified.

All blank results were acceptable.

- **Accuracy**

Accuracy is evaluated by analyzing distilled water 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 percent, while that for a matrix spike is 60 to 140 percent. Spike sample results outside the above ranges resulted in associated sample results being qualified as estimated, rejected, or not qualified, depending on the activity of the individual sample. A chemical tracer is used to determine the efficiency of the analytical method, with tracer yield limits of 30 to 105 percent for strontium-90 and technetium-99. Sample results above the MDA with chemical yields outside the above stated limits were qualified as estimated or rejected.

Due to a LCS percent recovery of 143%, all technetium-99 results were qualified as estimates and flagged "J/UJ".

000002

Due to a matrix spike recovery of 23%, all carbon-14 results were qualified as estimates and flagged "J/UJ".

Due to lack of a matrix spike analysis, all technetium-99 results were qualified as estimates and flagged "J/UJ".

All other accuracy results were acceptable.

- **Precision**

Laboratory Duplicates

Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. When the laboratory has not performed duplicate spike analyses, precision may also be assessed using unspiked duplicate sample analyses. If both sample and replicate activities are greater than five times the contract required detection level (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  $< 5 \times \text{CRDL}$ , a control limit of  $\leq 2 \times \text{CRDL}$  is used for soil samples and  $\leq \text{CRDL}$  for water samples. If either the original or replicate value is below the CRDL, the applicable control limits are  $\leq \text{CRDL}$  for water samples and  $\leq 2 \times \text{CRDL}$  for soil samples. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

Due to the duplicate pair RPD being outside QC limits, all tritium results were qualified as estimates and flagged "J".

All other precision results were acceptable.

Field Split Samples

Two pairs of split samples were submitted to LAS as shown below:

<u>Sample No.</u>	<u>Split Sample No.</u>	<u>Well Location</u>
BOF8T0	BOF8W8	199-B9-1
BOF8V6	BOF8X0	699-72-73

The split-sample results were compared using the sample guidelines for determining the RPD between a sample and its duplicate. Tritium results in sample duplicate pair BOF8T0/BOF8W8 were outside QC limits. Tritium and gross beta results in sample duplicate pair BOF8V6/BOF8X0 were outside QC limits. All other results fell within the required control limit.

000003

- **Sample Result Verification and Detection Limits**

Sample results and reported detection limits were recalculated to ensure that the reported results were accurate. Raw data were examined for anomalies, transcription errors, and reduction errors. MDAs for each analyte were assessed to ensure that they met the CRDLs.

The reviewer verified that the results and detection limits fell within the linear range of the instrument. All sample results were acceptable.

- **Completeness**

Data Package No. LK4243-LAS (SDG No. LK4243) was submitted for validation and verified for completeness. The completion percentage was 100%.

### **MAJOR DEFICIENCIES**

None found.

### **MINOR DEFICIENCIES**

Due to a LCS percent recovery of 143% and the lack of a matrix spike analysis, all technetium-99 results were qualified as estimates and flagged "J/UJ". Due to a matrix spike recovery of 23%, all carbon-14 results were qualified as estimates and flagged "J/UJ". Due to the duplicate pair results being >CRDL, all tritium results were qualified as estimates and flagged "J/UJ". Data flagged "J" indicate the associated concentration is an estimate, but the data are usable for decision making purposes.

### **REFERENCES**

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

WHC, 1992b, *Data Validation Procedures for Radiochemical Analyses*,  
WHC-SD-EN-001, Rev. 1, Westinghouse Hanford Company, 1993.

000004

**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 in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- 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.

000006

**Appendix 2**  
**Summary of Data Qualification**

000007

DATA QUALIFICATION SUMMARY

SDG: LK4243	REVIEWER: RBC	DATE: 6/28/95	AGE <u>1</u> OF <u>1</u>
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Technetium-99	J	B0F8X0, B0F8W8	High LCS Recovery
Carbon-14	J	B0F8W8	Low Matrix Spike Recovery
Carbon-14	UJ	B0F8X0	Low Matrix Spike Recovery
Technetium-99	J	B0F8X0, B0F8W8	No Matrix Spike
Tritium	J	B0F8X0, B0F8W8	RPD Outisde QC Limits

**Appendix 3**

**Qualified Data Summary and Annotated Laboratory Reports**

000009



RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. \* Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0F8W8

LAL Sample ID: L4243-6

Date Collected: 07-APR-95

Date Received: 11-APR-95

Matrix: Water

Login Number: L4243

SDG: LK4243

Constituent	Analyzed	Batch	Activity	Error	MDA	Detected	Units
Gross Alpha	02-MAY-95	GR ALP/BETA LAL-0060_21843	0.6 U	1.3	2.4	C	pCi/L
Gross Beta	02-MAY-95	GR ALP/BETA LAL-0060_21843	27.1	2.9	2.2		pCi/L
Total radio-strontium	12-MAY-95	SR-90 LAL-0196_21857	0.95	0.23	0.32		pCi/L

RBC  
6/28/95  
659032

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. \* Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0F8W8

LAL Sample ID: L4243-11

Date Collected: 07-APR-95

Date Received: 11-APR-95

Matrix: Water

Login Number: L4243

SDG: LK4243

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
Tc-99	16-MAY-95	TC-99 LAL-0169_22778	39.2 J	7.7	4.6		pCi/L

RBC  
6/28/95  
~~B0F8W8~~

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. \* Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0F8W8

LAL Sample ID: L4243-15

Date Collected: 07-APR-95

Date Received: 11-APR-95

Matrix: Water

Login Number: L4243

SDG: LK4243

Constituent	Analyzed	Batch	Activity	Error	MDA	Detected	Units
C-14	02-MAY-95	C-14 LAL-0209_21835	17.0	9.4	10.		pCi/L
H-3	05-MAY-95	TRITIUM(H3) LAL-0066_21862	1920	310	220		pCi/L

RBC  
6/28/95

~~66113~~

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. \* Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0F8X0

LAL Sample ID: L4271-6

Date Collected: 12-APR-95

Date Received: 14-APR-95

Matrix: Water

Login Number: L4271

SDG: LK4243

Constituent	Analyzed	Batch	Activity	Er/or	MBA	Dat/Qual	Units
Gross Alpha	02-MAY-95	GR ALP/BETA LAL-0060_21843	2.5	1.6	2.0		pCi/L
Gross Beta	02-MAY-95	GR ALP/BETA LAL-0060_21843	48.6	4.0	2.2		pCi/L
Total radio-strontium	12-MAY-95	SR-90 LAL-0196_21857	0.02 ✓	0.21	0.36		pCi/L

RBC  
6/28/95  
GGC

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. \* Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0F8X0

LAL Sample ID: L4271-11

Date Collected: 12-APR-95

Date Received: 14-APR-95

Matrix: Water

Login Number: L4271

SDG: LK4243

Constituent	Analyzed	Batch	Activity	Error	MCA	DataQual	Units
Tc-99	16-MAY-95	TC-99 LAL-0169_22778	100 J	13.	5.0		pCi/L

RBC  
6/28/95  
~~GG302~~

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. \* Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0F8X0

LAL Sample ID: L4271-15

Date Collected: 12-APR-95

Date Received: 14-APR-95

Matrix: Water

Login Number: L4271

SDG: LK4243

Constituent	Analyzed	Batch	Activity	Error	MBA	DataQual	Units
C-14	02-MAY-95	C-14 LAL-0209_21835	3.6	8.3	10.		pCi/L
H-3	05-MAY-95	TRITIUM(H3) LAL-0066_21862	1370	270	220		pCi/L

*RBC*  
*6/25/95*

*BBB*

**Appendix 4**

**Laboratory Narrative and Chain-of-Custody Documentation**

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**

May 19, 1995

Ms. Joan Kessner  
Bechtel Hanford, Inc.  
345 Hills  
P.O. Box 969  
Richland, WA 99352



RE: Log-in No.: L4243/L4271  
Quotation No.: Q400000-B  
SAF: B95-040  
Document File No.: 0411596/0414596  
WHC Document File No.: 208  
SDG No.: LK4243

L4243- The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on 11 April 1995. 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.

L4271- The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on 14 April 1995. The temperature of the cooler upon receipt was 6°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) 943-4423.

000018

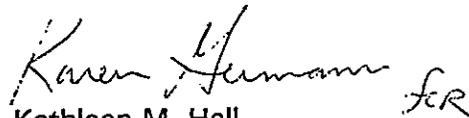
005/2

The EDD is being sent on the Hanford Bulletin Board System.

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

" 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

000019

*006*

**CASE NARRATIVE  
RADIOCHEMICAL ANALYSES**

The routine calibration and quality control 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.

**Holding Time Requirements**

All holding time requirements were met.

**Analytical Method**

**Carbon-14**

The carbon-14 analysis was performed using LAL-91-SOP-0209. The matrix spike recovery was low; however, because the LCS recovery was within limits, and the matrix spike sample was below the RDL, the data is considered acceptable. All other QC criteria were met.

**Gross Alpha Beta**

The gross alpha beta analysis was performed using LAL-91-SOP-0060. The matrix spike recovery was high due to suspected matrix effect; however, because the LCS recovery was within limits, the data is considered acceptable. All other QC criteria were met.

**Strontium-90**

The strontium-90 analysis was performed using LAL-91-SOP-0196. No problems were encountered during analysis, and all QC criteria were met. A matrix spike analysis was not performed for Sr-90.

**Technetium-99**

The technetium-99 analysis was performed using LAL-91-SOP-0169. No problems were encountered during analysis, and all QC criteria were met, except as noted below:

Batch 21858 was reanalyzed as batch 22778 due to out of limits QC. The matrix

**Lockheed Analytical Services**

Log-in No.: L4243/L4271  
Quotation No.: Q400000-B  
SAF: B95-040  
Document File No.: 0411596/0414596  
WHC Document File No.:208  
SDG No.: LK4243  
Page9

spike analysis was not done on this batch.

Batch 22778 - The tracer chemical yield elevated the LCS activity, resulting in a high LCS recovery. The actual chemical yield is 100%. There was insufficient sample on the repeat analysis for a matrix spike analysis.

**Tritium**

The tritium analysis was performed using LAL-91-SOP-0066. No problems were encountered during analysis, and all QC criteria were met.

Yvonne M. Jacoby  
Prepared by

May 19, 1995  
Date

000021

014<sup>B</sup>

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

**L4271**

Data Turnaround

- Priority
- Normal

Collector <b>K. Lee</b>	Company Contact R.F. Raidl	Telephone (509) 372-9641
Project Designation 100-BC-5 Groundwater Sampling Round 8	Sampling Location 100 B and 100 C	SAF No. B95-040
Ice Chest No. <b>6705-145</b>	Field Logbook No. <b>EFL-1036</b>	Method of Shipment Federal Express
Shipped To Lockheed	Offsite Property No. <b>W95-0-0204-20</b>	Bill of Lading/Air Bill No. <b>2904625315</b>

Possible Sample Hazards/Remarks	Preservation	HNO3	HNO3	Cool 4C	Cool 4C	HNO3	HCl	Cool 4C	Cool 4C	HNO3	HNO3
	Type of Container	G	G	P	P	G	P	G	P	G	G
	No. of Container(s)	1	1	1	1	5	4	1	1	1	1
Special Handling and/or Storage Maintain samples between 2C and 6C.	Volume	1L	500mL	500mL	250mL	1L	1L	1L	20mL	1L	500mL

SAMPLE ANALYSIS	ICP Metals, AA Metals, Unfiltered	Mercury Unfiltered	Anions-F, SO4, pH	Conductivity	Gross Alpha, Gross Beta, Sr-90	Tc-99	Tritium, C-14	Activity Scan	ICP Metals, AA Metals, Filtered	Mercury Filtered

Sample No.	Matrix*	Date Sampled	Time Sampled										
BOF8X0	W	4.12.95	1049	X	X	X	X	X	X	X			
BOF8X1	W	4.12.95	1049								X	X	

000022

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS
Relinquished By <i>K. Lee</i> Date/Time <i>4/12/95 1255</i>	Received By <i>Eric</i> Date/Time <i>1255</i>	Data Deliverable "Standalone".  The Activity Scan is for all samples list on this chain of custody.
Relinquished By <i>Eric</i> Date/Time <i>0900</i>	Received By <i>Bill Hunter</i> Date/Time <i>4-12-95</i>	
Relinquished By <i>Bill Hunter</i> Date/Time <i>4-13-95</i>	Received By _____ Date/Time _____	
Relinquished By _____ Date/Time _____	Received 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
  - WI = Wipe
  - L = Liquid
  - V = Vegetation
  - X = Other

LABORATORY SECTION	Received By <i>Murd</i>	Title <i>Sample Custodian</i>	Date/Time <i>4-14-95/0900</i>
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

**L4243**

Data Turnaround  
 Priority  
 Normal

Collector <i>K.D. Lee</i>	Company Contact R.F. Raidl	Telephone (509) 372-9641
Project Designation 100-BC-5 Groundwater Sampling Round 8	Sampling Location 100 B and 100 C	SAF No. B95-040
Ice Chest No. <i>ER-40</i>	Field Logbook No. <i>EFL-1036</i>	Method of Shipment Federal Express
Shipped To Lockheed	Offsite Property No. <i>4-1033</i> <del>W95-0-0204-34</del>	Bill of Lading/Air Bill No. <i>290462495</i>

Possible Sample Hazards/Remarks	Preservation	HNO3	HNO3	Cool 4C	Cool 4C	HNO3	HCl	Cool 4C	Cool 4C	HNO3	HNO3
	Type of Container	G	G	P	P	G	P	G	P	G	G
	No. of Container(s)	1	1	1	1	5	4	1	1	1	1
Special Handling and/or Storage Maintain samples between 2C and 6C.	Volume	1L	500mL	500mL	250mL	1L	1L	1L	20mL	1L	500mL

SAMPLE ANALYSIS	ICP Metals, AA Metels. Unfiltered	Mercury Unfiltered	Anions-F, SO4. pH	Conductivity	Gross Alpha, Gross Beta, Sr-90	Tc-99	Tritium, C-14	Activity Scan	ICP Metals, AA Metels. Filtered	Mercury Filtered
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Sample No.	Matrix*	Date Sampled	Time Sampled									
BOF8W8	W	<i>4/7/95</i>	<i>0922</i>	X	X	X	X	X	X	X		
BOF8W9	W	<i>4/7/95</i>	<i>0922</i>								X	X

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS	Matrix*
Relinquished By <i>K.D. Lee</i>	Date/Time <i>4/7/95 1245</i>	Received By <i>R.F. Raidl</i>	Date/Time <i>4-7-95</i>
Relinquished By <i>ERC</i>	Date/Time <i>4-10-95 -0900</i>	Received By <i>Bill Burton</i>	Date/Time <i>4-7-95</i>
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time
LABORATORY SECTION		Received By <i>Anderson Allen</i>	Title <i>Sample Custodian</i>
FINAL SAMPLE DISPOSITION		Disposal Method <i> </i>	Disposed By <i> </i>

SPECIAL INSTRUCTIONS

Data Deliverable "Standalone".

The Activity Scan is for all samples list on this chain of custody.

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

Date/Time  
*4-11-95 / 0830*

000023

ERC LABORATORY MANAGEMENT  
SAMPLING AUTHORIZATION FORM

3/21/95

SAF Number B95-040

Revision 0

PROGRAM TYPE CERCLA

PROJECT ID 100-BC-5 LFI

PROJECT TYPE Limited Field Investigation

OPERABLE UNIT 100-BC-5

TASK ID 6

ROUND NUMBER 8

SAMPLING EVENT TITLE 100-BC-5 GROUNDWATER SAMPLING -- ROUND 8

TASK MANAGER	ORG. CODE	MSIN	TELEPHONE	FAX
<u>R. L. Biggerstaff</u>	<u>BF001</u>	<u>H4-91</u>	<u>372-9572</u>	<u>972-9655</u>

CHARGE CODES —	ANALYTICAL SERVICES <u>PB5AA</u>	SAMPLE MANAGEMENT	<u>PB5AA</u>
	SAMPLING SERVICES <u>PB5AA</u>	TECHNICAL OVERSIGHT	<u>PB5AA</u>

SAMPLE MANAGEMENT FUNCTION PROJECT COORDINATOR R. C. Smith

TELEPHONE 372-2537

ESTIMATED START DATE 04/10/95 ESTIMATED COMPLETION DATE 04/29/95

SAMPLING LOCATION 100-BC-5/100 Area ESTIMATED NUMBER OF SAMPLES 60

DATA TURNAROUND REQUIREMENTS \_\_\_ PRIORITY \_\_\_  REGULAR

DATA DELIVERABLE REQUIREMENTS  STANDALONE \_\_\_ SUMMARY

SAMPLE MATRIX \_\_\_ SOIL  WATER \_\_\_ OTHER (See Comments)

ANALYTICAL PROTOCOL(S) CLP, SW-846, RADCHEM, and Field Screening

LABORATORY QUANTERRA (Main) LOCKHEED (Split)

COMMENTS:

- ▶▶ The Person in Charge is Bob Raidl 3050C/63; 372-9641.
- ▶▶ Take the split and duplicate at the sample sampling point (well). Twenty-four wells are to be sampled. Filtered and unfiltered samples are needed from each well.

Date 03/21/95

**Appendix 5**

**Data Validation Supporting Documentation**

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	<b>D</b>	E
PROJECT: 100BC5 8rad GW			DATA PACKAGE: LK4243-LAS		
VALIDATOR: RBC		LAB: Lockheed		DATE: 13 June	
CASE:			SDG: LK4243-LAS		
ANALYSES PERFORMED					
<input checked="" type="checkbox"/> Gross Alpha/Beta	<input checked="" type="checkbox"/> Strontium-90	<input checked="" type="checkbox"/> Technetium-99	<input type="checkbox"/> Alpha Spectroscopy	<input type="checkbox"/> Gamma Spectroscopy	
<input type="checkbox"/> Total Uranium	<input type="checkbox"/> Radium-22	<input checked="" type="checkbox"/> Tritium	<input checked="" type="checkbox"/> C-14		
SAMPLES/MATRIX H <sub>2</sub> O					
BOF8W8, BOF8X0					

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: C14-2370 J/US all  
TC-99 No MS w/batch  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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: TC-99 LCS 14370 J both

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: 3H CRDL 400 -outed QC J/W all

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: BOF8W8 - 3H diff > CRDL  
BOF8X0 grB + 3H > CRDL

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: \_\_\_\_\_

LOCKHEED ANALYTICAL SERVICES

RADIOCHEMISTRY ANALYTES

QC Data Summary For Matrix Spike Analysis

SDG: LK4243

Analyte	Batch ID	Client ID	LAL ID	Date Analyzed	Sample Result	Error 2 Sigma	MS Result	Error 2 Sigma	Spike Value	%R	Q
C-14	21835	B0F8X0	L4271-15	05/02/95	3.6	8.26	64.4	12.2	261	23	*
Gross Alpha	21843	B0F8X0	L4271-6	05/02/95	2.53	1.6	45.7	6.43	32.2	134	*
Gross Beta	21843	B0F8X0	L4271-6	05/02/95	48.6	3.98	96.1	6.48	33.4	142	*
H-3	21862	B0F8X0	L4271-15	05/05/95	1370	271	5770	510	3720	118	

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668<sup>RS</sup>

LOCKHEED ANALYTICAL SERVICES

RADIOCHEMISTRY ANALYTES

QC Data Summary For Laboratory Control Sample Analysis

SDG: LK4243

Analyte	Batch ID	Date Analyzed	LCS Result	Error 2 Sigma	True Value	(%) Recovery	Data Qualifiers
C-14	21835	05/02/95	258	21.3	261	99	
Gross Alpha	21843	05/02/95	40.4	4.78	39.2	103	
Gross Beta	21843	05/02/95	42.7	3.71	42.8	100	
Total radio-strontium	21857	05/12/95	21.9	1.27	26.1	84	
H-3	21862	05/05/95	2530	344	2930	86	
Tc-99	22778	05/16/95	160	13.9	112	143	*

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LOCKHEED ANALYTICAL SERVICES

RADIOCHEMISTRY ANALYTES

QC Data Summary For Duplicate Sample Analysis

SDG: LK4243

Analyte	Batch ID	Client ID	LAL ID	Date Analyzed	Sample Result	Error 2 Sigma	Duplicate Result	Error 2 Sigma	RER	RPD	Q
C-14	21835	B0F8W8	L4243-15	05/02/95	17	9.37	7.32	8.54	0.541	79.6	
Gross Alpha	21843	B0F8W8	L4243-6	05/02/95	0.562	1.28	0.769	1.22	0.083	31.1	
Gross Beta	21843	B0F8W8	L4243-6	05/02/95	27.1	2.85	26.8	2.84	0.048	1.11	
Total radio	21857	B0F8W8	L4243-6	05/12/95	0.949	0.231	1.07	0.279	0.237	12	
H-3	21862	B0F8W8	L4243-15	05/05/95	1920	307	1350	268	0.986	34.9	
Tc-99	22778	B0F883	L4184-13	05/16/95	397	39.8	385	35.5	1.65	3.07	
Tc-99	22778	B0F8X0	L4271-11	05/16/95	99.9	13.3	59.6	11.1	1.65	50.5	*

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