

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

LK4903

0044285

LOCKHEED MARTIN 

August 17, 1995

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

RE: Log-in No.: L4903
Quotation No.: Q400000-B
SAF: B95-069
Document File No.: 0713596
WHC Document File No.: 246
SDG No.: LK4903



The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on 13 July 1995.

The temperature of the cooler upon receipt was 4°C. Sample containers received agree with the chain-of-custody documentation. Sample containers were received intact. Samples were not received in time to meet the analytical holding time requirements. Method 180.1 Turbidity and Method 300.0 Nitrate, Nitrite and Ortho Phosphate were received out of holding time.

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.



004

Lockheed Analytical Services

Log-in No.: L4903
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Document File No.: 0713596
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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,

Handwritten signature of Karen Hermann in cursive script, followed by the word "for" in a smaller, simpler font.

Kathleen M. Hall
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 LK4903 and analyzed in batch 713 bh for selected analytes as requested on the chain of custody. Quality control analysis was performed on the following sample:

Client ID	LAL #		Method
BOG864	L4903-4	DUP, MS	180.1 Turbidity
BOG864	L4903-3	DUP, MS	300.0 Chloride, Fluoride, Nitrate-Nitrogen, Nitrite-Nitrogen, Orthophosphate and Sulfate

Holding Time Requirements

- All samples were analyzed within the method-specific holding times with the exception of Method 180.1 Turbidity; Method 300.0 Nitrate-Nitrogen, Nitrite-Nitrogen and Orthophosphate which were received outside of holding time. All associated samples are flagged with an "H".

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
Prepared By

July 20, 1995
Date

**CASE NARRATIVE
INORGANIC 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 in good condition on July 13, 1995 and logged in as L4903.
- The samples were prepared as LAS Batch 713BHT and analyzed for selected analytes as requested on the chain of custody. Sample BOG864 (L4903-2) was used for matrix spike and duplicate, and serial dilution. All data flags due to the performance of the above-mentioned QC are associated with every sample digested with this batch.

Holding Time Requirements

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

Internal Quality Control

All internal quality control were within acceptance limits.

Hongsheng LI

7/25/95

Prepared By

Date

**CASE NARRATIVE
INORGANIC 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 in good condition on July 13, 1995 and logged in as L4903.
- The samples were prepared as LAS Batch 713BHD and analyzed for selected analytes as requested on the chain of custody. Sample BOG865 (L4903-12) was used for matrix spike and duplicate, and serial dilution. All data flags due to the performance of the above-mentioned QC are associated with every sample digested with this batch.

Holding Time Requirements

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

Internal Quality Control

All internal quality control were within acceptance limits with the following exceptions:

- For calcium, the Percent Difference of the serial dilution is outside the 10% control limit. This may be due to physical interferences. All calcium results are flagged with an "E".

Hongsheng LI

7/25/95

Prepared By

Date

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 times were met.

Chemical Recoveries and MDAs can be found on the preparation sheets and calculation sheets, respectively, on the attached raw data for each method.

Alpha Spectrometer 1

Analytical Method Uranium Isotopic

The uranium isotopic analysis was performed using standard operating procedure (SOP), LAL-91-SOP-0108. The samples were analyzed in workgroup 25334. No problems were encountered during analysis. All QC criteria were met, and no re-analyses were performed.

Gamma Spectrometry

Analytical Method Gamma Spectrum Analysis

The gamma spectrum analysis was performed using SOP, LAL-91-SOP-0063. The samples were analyzed in workgroup 25331. No problems were encountered during analysis. All QC criteria were met, and no re-analyses were performed.

Gas Proportional Counter

Analytical Method Gross Alpha Beta

The gross alpha beta analysis was performed using SOP, LAL-91-SOP-0060. The samples were analyzed in workgroup 25332. No problems were encountered during analysis. All QC criteria were met, and no re-analyses were performed.

Analytical Method Strontium-90

The strontium-90 analysis was performed using SOP, LAL-91-SOP-0196. The samples were analyzed in workgroup 25333. No problems were encountered during analysis. All QC criteria were met, and no re-analyses were performed.

Liquid Scintillation Counter

Analytical Method Carbon-14

The carbon-14 analysis was performed using SOP, LAL-91-SOP-0209. The samples were analyzed in workgroup 25323. No problems were encountered during analysis and all QC criteria were met, with the following exception: Sample BOG864 (L4903-11) had an activity of above 200 pCi/L. This was a direct spike C-14 screen. The workgroup was re-prepared and re-analyzed twice; however, the first workgroup (25323) contained the best results and is therefore reported.

Analytical Method Tritium

The tritium analysis was performed using SOP, LAL-91-SOP-0066. The samples were analyzed in workgroup 25330. No problems were encountered during analysis. All QC criteria were met, and no re-analyses were performed.

Yvonne M. Jacoby
Prepared By

August 17, 1995
Date

Lockheed Analytical Services
DATA QUALIFIERS FOR INORGANIC ANALYSES

[Revised 08/28/92]

For Use on the Analytical Data Reporting Forms	
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).
C	<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).
D	Presence of high levels of interfering constituents required dilution of sample which increased the RDL by the dilution factor.
E	Estimated value due to presence of interference.
H	Sample analysis performed outside of method-or client-specified maximum holding time requirement.
M	<i>For CLP Analyses Only</i> -- Duplicate injection precision criterion was not met.
N	Matrix spike recovery exceeded acceptance limits.
S	Reported value was determined from the method of standard addition.
U	<i>For CLP Reporting Only</i> -- Constituent was analyzed for but not detected (sample quantitation must be corrected for dilution and percent moisture).
W	<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.
X, Y, or Z	Analyst-defined qualifier.
*	Relative percent difference (RPD) for duplicate analysis exceeded acceptance limits.
+	Correlation coefficient (r) for the MSA is less than 0.995.
For Use on the QC Data Reporting Forms	
a¹	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.
b¹	The RPD cannot be computed because the sample and/or duplicate concentration was below the RDL.

¹ Used as footnote designations on the QC summary form.

Lockheed Analytical Services
DATA QUALIFIERS FOR RADIOCHEMICAL ANALYSES

[Revised 08/28/92]

For Use on the Analytical Data Reporting Forms	
B	Any constituent that was also detected in the associated blank whose concentration was greater than the reporting detection limit (RDL) and/or minimum detectable activity (MDA).
C	Presence of high TDS in sample required reduction of sample size which increased the MDA.
D	Constituent detected in the diluted sample.
E	Constituent concentration exceeded the calibration or attenuation curve range.
F	<i>For Alpha Spectrometry Only</i> -- FWHM exceeded acceptance limits.
H	Sample analysis performed outside of method-specified maximum holding time requirement.
Y	Chemical yield exceeded acceptance limits.
For Use on the QC Data Reporting Forms	
*	QC data (i.e., percent recovery data for laboratory control standard and matrix spike; and RPD for replicate analyses) exceeded acceptance limits.
a¹	The spike recovery and/or RPD for matrix spike and duplicates cannot be evaluated due to insufficient spiking level compared to the elevated sample analyte concentration.
b¹	The RPD cannot be computed because the sample and/or duplicate concentration was below the MDA.

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

LOCKHEED ANALYTICAL SERVICES
 LOGIN CHAIN OF CUSTODY REPORT (ln01)
 Jul 13 1995, 04:23 pm

Login Number: L4903
 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
L4903-1 TEMP 4 Location: RFG01-43G Water 1 S SCREENING	BOG864	11-JUL-95	13-JUL-95	17-AUG-95
		Hold:07-JAN-96		
L4903-2 TEMP 4 Location: RFG02-23A Water 1 S 6010 ICP METALS	BOG864	11-JUL-95	13-JUL-95	17-AUG-95
		Hold:07-JAN-96		
L4903-3 TEMP 4 Location: RFG02-23A Water 1 S 300.0 CHLORIDE Water 1 S 300.0 FLUORIDE Water 1 S 300.0 NITRATE Water 1 S 300.0 NITRITE Water 1 S 300.0 PHOSPHATE Water 1 S 300.0 SULFATE	BOG864	11-JUL-95	13-JUL-95	17-AUG-95
		Hold:08-AUG-95		
		Hold:08-AUG-95		
		Hold:13-JUL-95		
		Hold:13-JUL-95		
		Hold:13-JUL-95		
		Hold:08-AUG-95		
L4903-4 TEMP 4 Location: RFG02-23A Water 1 S 180.1 TURBIDITY	BOG864	11-JUL-95	13-JUL-95	17-AUG-95
		Hold:13-JUL-95		
L4903-5 TEMP 4 Location: 157 Water 1 S GAMMA SPEC LAL-0063 Water 1 S GR ALP/BETA LAL-0060 Water 1 S SR-90 LAL-0196 Water 1 S U-ISOTOPIIC LAL-0108	BOG864	11-JUL-95	13-JUL-95	17-AUG-95
		Hold:07-JAN-96		
L4903-6 TEMP 4 Location: 157	BOG864	11-JUL-95	13-JUL-95	17-AUG-95
L4903-7 TEMP 4 Location: 157	BOG864	11-JUL-95	13-JUL-95	17-AUG-95
L4903-8 TEMP 4 Location: 157	BOG864	11-JUL-95	13-JUL-95	17-AUG-95

LOCKHEED ANALYTICAL SERVICES
 LOGIN CHAIN OF CUSTODY REPORT (ln01)
 Jul 13 1995, 04:23 pm

Login Number: L4903
 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
L4903-9 TEMP 4 Location: 157	B0G864	11-JUL-95	13-JUL-95	17-AUG-95
L4903-10 TEMP 4 Location: 157	B0G864	11-JUL-95	13-JUL-95	17-AUG-95
L4903-11 TEMP 4 Location: 157 Water 1 S C-14 LAL-0209 Water 1 S TRITIUM(H3) LAL-0066	B0G864	11-JUL-95	13-JUL-95	17-AUG-95
L4903-12 TEMP 4 Location: RFG02-23A Filt H2O 15 S 6010 ICP METALS	B0G865	11-JUL-95	13-JUL-95	17-AUG-95
L4903-13 Location: Water 1 S EDD - DISK DEL. Water 1 S INORG TYPE 4A RPT Water 1 S RAD RPT TYPE 4F	REPORT TYPE	13-JUL-95	13-JUL-95	17-AUG-95

Signature: Paul C. Davis 015
 Date: 7-13-95

C. 713 596

Bechtel Hanford, Inc.

L4903

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Data Turnaround
 Priority
 Normal

Collector <i>K.D Lee</i>	Company Contact R. E. Peterson	Telephone (509) 372-9638
Project Designation 100-KR-4 Groundwater Sampling - Round 8	Sampling Location 100 K	SAF No. B95-069
Ice Chest No. <i>SML-574</i>	Field Logbook No. <i>EFL-1049</i>	Method of Shipment Federal Express
Shipped To Lockheed	Offsite Property No. <i>W95-0-0209-40</i>	Bill of Lading/Air Bill No. <i>2904634354</i>

Possible Sample Hazards/Remarks	Preservation	HNO ₃	Cool 4°C	Cool 4°C	HNO ₃	Cool 4°C	Cool 4°C		HNO ₃	
	Type of Container	G	G	P/G	P/G	G	P/G		G	
	No. of Container(s)	1	1	1	6	1	1		1	
Special Handling and/or Storage Maintain samples between 2°C and 6°C.	Volume	500mL	500mL	250mL	1L	1L	20mL		500mL	

SAMPLE ANALYSIS	ICP Metals - TAL (Unfiltered)	Anions (IC) - F, Cl, SO ₄ , NO ₃ , NO ₂ , PO ₄	Turbidity	Gross Alpha, Gross Beta, U-234/235 /238, Sr-90, Gamma Spec	Tritium, C-14	Activity Scan	ICP Metals - TAL (Filtered)

Sample No.	Matrix*	Date Sampled	Time Sampled									
BOG 864	W	7/11/95	0940	X	X	X	X	X	X			
BOG 865	W	7/11/95	0940								X	

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By <i>K.D Lee</i>	Date/Time 7/11/95 1400	Received By <i>GR</i>	Date/Time 1400
Relinquished By <i>Kim A. Lutton</i>	Date/Time 7-11-95 0900	Received By <i>B. Whittier</i>	Date/Time 7-11-95
Relinquished By <i>Kim A. Lutton</i>	Date/Time 7-12-95	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

Sample analysis for phosphate, nitrate, and nitrite by EPA 300.0; and turbidity by EPA 180.1 is being requested for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met.

The Activity Scan is for all sample numbers listed 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>Arviller</i>	Title <i>Sample Custodian</i>	Date/Time 7-13 95 0830
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

SAMPLE CHECK-IN LIST

FedEx
II 298 4634 354

Date/Time Received: 7-13-95

SDG#: N/A

Work Order Number: N/A

SAF #: B95-069

Shipping Container ID: SML-594

Chain of Custody # N/A

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

7. Samples have:

<input type="checkbox"/> tape	<input type="checkbox"/> hazard labels
<input checked="" type="checkbox"/> custody seals	<input type="checkbox"/> appropriate sample labels

8. Samples are:

<input checked="" type="checkbox"/> in good condition	<input type="checkbox"/> leaking
<input type="checkbox"/> broken	<input type="checkbox"/> have air bubbles

9. Is the information on the COC and Sample bottles in agreement?
 Yes No

Notes: _____

Sample Custodian/Laboratory: Paula Davis / LAS Date: 7-13-95
 Faxed
 Telephoned To: K. Hall On 7-13-95 By Paula Davis
 PCW 7-13-95



Sample Login Login Review Checklist

Lot Number L4903

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

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

SAMPLE SUMMARY REPORT

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

LOGIN CHAIN OF CUSTODY

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

SAMPLE RECEIVING CHECKLIST

	<u>YES</u>	<u>NO</u>	<u>N/A</u>	<u>Comment</u>
1. Are all discrepancies between the COC and the login noted (if applicable)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____

Paul C. Dan
primary review signature

7-13-95
date

Adm. Hte
secondary review signature

7-13-95
date

018

C71359

**Lockheed Analytical Services
Sample Receiving Checklist**

Client Name: *Westing House - Hartford*

Job No. *L4903*

Cooler ID: *11a**

COOLER CONDITION UPON RECEIPT

Temperature of cooler upon receipt: *4k*

temperature of temp. blank upon receipt:

	Yes	No	* Comments/Discrepancies
custody seals intact			
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			
are samples bi-phasic (if so, indicate sample ID'S):			<i>not app</i>

MISCELLANEOUS ITEMS

	Yes	No	* Comments/Discrepancies
samples with short holding times	X		
samples to subcontract			<i>nitrates/nitrite/turbidity were passed holding time.</i>

ADDITIONAL COMMENTS/DISCREPANCIES

Completed by / date: *Paula Jones 7-17-95*

Sent to the client (date/initials):

** Client's signature upon receipt:

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

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

71354

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

Client Sample Number	LAL Sample Number	SDE Number	Matrix	Method
BOG864 -	L4903-1		Water	SCREENING -
	L4903-2		Water	6010 ICP METALS
	L4903-3		Water	300.0 CHLORIDE
	L4903-3		Water	300.0 FLUORIDE -
	L4903-3		Water	300.0 NITRATE -
	L4903-3		Water	300.0 NITRITE -
	L4903-3		Water	300.0 PHOSPHATE
	L4903-3		Water	300.0 SULFATE -
	L4903-4		Water	180.1 TURBIDITY
	L4903-5		Water	GAMMA SPEC LAL-
	L4903-5		Water	GR ALP/BETA LAL
	L4903-5		Water	SR-90 LAL-0196 -
	L4903-5		Water	U-ISOTOPIC LAL-
L4903-11		Water	C-14 LAL-0209 -	
L4903-11		Water	TRITIUM(H3) LAL	
BOG865 -	L4903-12		Filt H2O	6010 ICP METALS
REPORT TYPE -	L4903-13		Water	EDD - DISK DEL-
	L4903-13		Water	INORG TYPE 4A R
	L4903-13		Water	RAD RPT TYPE 4F

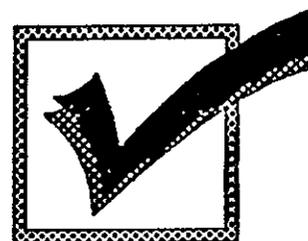
LOCKHEED ANALYTICAL SERVICES

Sample Results

Client Sample ID: B0G864	Date Collected: 11-JUL-95
Matrix: Water	Date Received: 13-JUL-95
Percent Solids: N/A	

Constituent	Units	Method	Result	Project Reporting Limit	Data Qualifier(s)	Date Analyzed	LAS Batch ID	LAS Sample ID
Turbidity	NTU	180.1	0.00	N/A	H	14-JUL-95	25270	L4903-4
Chloride	mg/L	300.0	32.	0.020		17-JUL-95	25263	L4903-3
Fluoride	mg/L	300.0	0.086	0.10	B	17-JUL-95	25264	L4903-3
Nitrate-N	mg/L	300.0	2.5	0.020	H	17-JUL-95	25265	L4903-3
Nitrite-N	mg/L	300.0	< 0.002	0.010	HU	17-JUL-95	25266	L4903-3
Ortho Phosphate	mg/L	300.0	0.081	0.10	HB	17-JUL-95	25267	L4903-3
Sulfate	mg/L	300.0	21.	0.10		17-JUL-95	25268	L4903-3

Nonmetals Analytical Data
Technical Review Checklist
(Analyst)



Analyst Name (Print): <u>P. Luch</u>	Analysis Date: <u>07/17/95</u>
Client(s) Name:	LAL Batch ID: <u>713-6h</u>
Method No: <u>300.0</u> <u>Admiss</u> <u>< 30/1/95</u>	Instrument: <u>(6-500) 92</u>

Description	Yes	No	Comments
Completeness Review			
1. Was required method/SOP followed?	✓		
2. Are <u>all</u> raw data available and labeled properly (e.g., methods used, units, sample IDs, dilution factors, reruns)?	✓		
3. Are <u>all</u> nonconformities in the raw data noted and/or explained?	✓		
4. Were <u>all</u> the client samples analyzed for all constituents and QC as specified on the LAL Bench Sheets?	✓		
Data Quality Assessment			
5. Were samples properly preserved and analyzed within the method-specified holding time?	✓	✓	SAMPLES RECEIVED OUT OF HOLDING TIME FOR NO ₂ -N, NH ₄ -N, NH ₃ -N
6. Are instrument calibration criteria met?	✓		
7. Are initial and continuing calibration verification data (bracketing the samples of interest) within criteria?	✓		
8. Are bracketing initial and continuing calibration blank data within criteria?	✓		
9. Are matrix spike and/or matrix spike duplicate (if required) recovery data within criteria?	✓		
10. Are method blank data within criteria?	✓		
11. Are duplicate precision data within criteria?	✓		
12. Are laboratory control sample data within criteria?	✓		
13. Has spike verification been performed adequately?	✓		LAL ID(s): L4903-3 SVP Initials: AD
14. Has the <i>status</i> been updated in the ACS?	✓		
Notes and comments:			

I certify, to the best of my knowledge, that the data are acceptable and in compliance with the laboratory policies and client requests, except as noted above.

P. Luch 07/18/95
Analyst's Signature/Date

YR 7/19/95 048
Secondary Reviewer's Initials/Date

**LOCKHEED ANALYTICAL LABORATORY
 CALIBRATION SUMMARY - LOW LEVEL
 DETERMINATION OF CHLORIDE BY METHOD 300.0 (IC)**

LAL BATCH: 713-BH	CALIB. DATE: 7/17/95	INTERCEPT: -4.960
CALIB. CURVE: QUADRATIC	CALIB. TIME: 9:23	LINEAR COEFF.: 1.548E-04
	R SQUARED: 0.99994	QUADRATIC COEFF.: -3.275E-13

STANDARD DATA

MANUFACTURER: EMSCIENCE		LOT NUMBER: 33210335
STANDARD ID	CONCENTRATION	RESPONSE
AUTOCAL1	0 ug/L	0
AUTOCAL2	20 ug/L	187332
AUTOCAL3	20 ug/L	120604
AUTOCAL4	50 ug/L	529372
AUTOCAL5	100 ug/L	555830
AUTOCAL6	1000 ug/L	6578974
AUTOCAL7	5000 ug/L	34908736

INITIAL CALIBRATION VERIFICATION STANDARD

SAMPLE ID	TRUE VALUE	FOUND	RECOVERY
ICVL	1000 ug/L	967 ug/L	97 %

INITIAL CALIBRATION BLANK

SAMPLE ID	FOUND	FLAG
ICB	2.6 ug/L LID	U

CONTINUING CALIBRATION VERIFICATION STANDARDS

SAMPLE ID	TRUE VALUE	FOUND	RECOVERY
CCVL	1000 ug/L	994 ug/L	99 %
CCVL	1000 ug/L	945 ug/L	95 %

CONTINUING CALIBRATION BLANKS

SAMPLE ID	FOUND	FLAG
CCB	<10.0 ug/L	U
CCB	<10 2.8 ug/L For 7/18/95	U

**LOCKHEED ANALYTICAL LABORATORY
 CALIBRATION SUMMARY - LOW LEVEL
 DETERMINATION OF NITRITE-N BY METHOD 300.0 (IC)**

LAL BATCH: 713-BH	CALIB. DATE: 7/17/95	INTERCEPT: 0.279
CALIB. CURVE: QUADRATIC	CALIB. TIME: 9:23	LINEAR COEFF.: 6.821E-05
	R SQUARED: 0.99999	QUADRATIC COEFF.: -2.093E-13

STANDARD DATA

MANUFACTURER: BAKER		LOT NUMBER: D10718
STANDARD ID	CONCENTRATION	RESPONSE
AUTOCAL1	0 ug/L	0
AUTOCAL2	6 ug/L	126426
AUTOCAL3	6 ug/L	76104
AUTOCAL4	15 ug/L	204092
AUTOCAL5	30 ug/L	406704
AUTOCAL6	300 ug/L	4457504
AUTOCAL7	1500 ug/L	23710788

INITIAL CALIBRATION VERIFICATION STANDARD

SAMPLE ID	TRUE VALUE	FOUND	RECOVERY
ICVL	300 ug/L	294 ug/L	98 %

INITIAL CALIBRATION BLANK

SAMPLE ID	FOUND	FLAG
ICB	<2.0 ug/L	U

CONTINUING CALIBRATION VERIFICATION STANDARDS

SAMPLE ID	TRUE VALUE	FOUND	RECOVERY
CCVL	300 ug/L	293 ug/L	98 %
CCVL	300 ug/L	296 ug/L	99 %

CONTINUING CALIBRATION BLANKS

SAMPLE ID	FOUND	FLAG
CCB	<i>Handwritten: <2.0</i> <2.0 ug/L	U
CCB	<i>Handwritten: <2.0</i> <2.0 ug/L	U

**LOCKHEED ANALYTICAL LABORATORY
 CALIBRATION SUMMARY - LOW LEVEL
 DETERMINATION OF NITRATE-N BY METHOD 300.0 (IC)**

LAL BATCH: 713-BH	CALIB. DATE: 7/17/95	INTERCEPT: 0.391
CALIB. CURVE: QUADRATIC	CALIB. TIME: 9:23	LINEAR COEFF.: 6.347E-05
	R SQUARED: 0.99999	QUADRATIC COEFF.: -1.500E-13

STANDARD DATA

MANUFACTURER: FISHER		LOT NUMBER: 916724	
STANDARD ID	CONCENTRATION	RESPONSE	
AUTOCAL1	0 ug/L	0	
AUTOCAL2	5 ug/L	105264	
AUTOCAL3	5 ug/L	64936	
AUTOCAL4	12.5 ug/L	200190	
AUTOCAL5	25 ug/L	344636	
AUTOCAL6	250 ug/L	3973384	
AUTOCAL7	1250 ug/L	20702312	

INITIAL CALIBRATION VERIFICATION STANDARD

SAMPLE ID	TRUE VALUE	FOUND	RECOVERY
ICVL	250 ug/L	245 ug/L	98 %

INITIAL CALIBRATION BLANK

SAMPLE ID	FOUND	FLAG
ICB	<3.0 ug/L	U

CONTINUING CALIBRATION VERIFICATION STANDARDS

SAMPLE ID	TRUE VALUE	FOUND	RECOVERY
CCVL	250 ug/L	246 ug/L	98 %
CCVL	250 ug/L	247 ug/L	99 %

CONTINUING CALIBRATION BLANKS

SAMPLE ID	FOUND	FLAG
CCB	<3.0 ug/L	U
CCB	<3.0 ug/L	U

**LOCKHEED ANALYTICAL LABORATORY
 CALIBRATION SUMMARY - HIGH LEVEL
 DETERMINATION OF CHLORIDE BY METHOD 300.0 (IC)**

LAL BATCH: 713-BH	CALIB. DATE: 7/17/95	INTERCEPT: 2.012
CALIB. CURVE: QUADRATIC	CALIB. TIME: 9:23	LINEAR COEFF.: 1.124E-07
	R SQUARED: 0.99954	QUADRATIC COEFF.: -7.564E-18

STANDARD DATA

MANUFACTURER: EMSCIENCE	LOT NUMBER: 33210335	
STANDARD ID	CONCENTRATION	RESPONSE
AUTOCAL1	5 mg/L	36132931
AUTOCAL2	10 mg/L	75759594
AUTOCAL3	25 mg/L	187458097
AUTOCAL4	75 mg/L	688410714
AUTOCAL5	150 mg/L	1458979400

INITIAL CALIBRATION VERIFICATION STANDARD

SAMPLE ID	TRUE VALUE	FOUND	RECOVERY
ICVH	50 mg/L	50.83 mg/L	102 %

INITIAL CALIBRATION BLANK (See low-level calibration summary sheet)

CONTINUING CALIBRATION VERIFICATION STANDARDS

SAMPLE ID	TRUE VALUE	FOUND	RECOVERY
CCVH	50 mg/L	50.70 mg/L	101 %
CCVH	50 mg/L	50.96 mg/L	102 %

CONTINUING CALIBRATION BLANKS (See low-level calibration summary sheet)

**LOCKHEED ANALYTICAL LABORATORY
 CALIBRATION SUMMARY - HIGH LEVEL
 DETERMINATION OF NITRITE-N BY METHOD 300.0 (IC)**

LAL BATCH: 713-BH	CALIB. DATE: 7/17/95	INTERCEPT: 0.443
CALIB. CURVE: QUADRATIC	CALIB. TIME: 9:23	LINEAR COEFF.: 5.361E-08
	R SQUARED: 0.99962	QUADRATIC COEFF.: -4.318E-19

STANDARD DATA

MANUFACTURER: BAKER		LOT NUMBER: D10718	
STANDARD ID	CONCENTRATION	RESPONSE	
AUTOCAL1	1.5 mg/L	24034137	
AUTOCAL2	3 mg/L	51196780	
AUTOCAL3	7.5 mg/L	120572455	
AUTOCAL4	22.5 mg/L	417112098	
AUTOCAL5	45 mg/L	835986174	

INITIAL CALIBRATION VERIFICATION STANDARD

SAMPLE ID	TRUE VALUE	FOUND	RECOVERY
ICVH	15 mg/L	15.31 mg/L	102 %

INITIAL CALIBRATION BLANK (See low-level calibration summary sheet)

CONTINUING CALIBRATION VERIFICATION STANDARDS

SAMPLE ID	TRUE VALUE	FOUND	RECOVERY
CCVH	15 mg/L	15.55 mg/L	104 %
CCVH	15 mg/L	15.40 mg/L	103 %

CONTINUING CALIBRATION BLANKS (See low-level calibration summary sheet)

**LOCKHEED ANALYTICAL LABORATORY
 CALIBRATION SUMMARY - HIGH LEVEL
 DETERMINATION OF NITRATE-N BY METHOD 300.0 (IC)**

LAL BATCH: 713-BH	CALIB. DATE: 7/17/95	INTERCEPT: 0.402
CALIB. CURVE: QUADRATIC	CALIB. TIME: 9:23	LINEAR COEFF.: 5.321E-08
	R SQUARED: 0.99954	QUADRATIC COEFF.: -9.497E-18

STANDARD DATA

MANUFACTURER: FISHER	LOT NUMBER: 916724	
STANDARD ID	CONCENTRATION	RESPONSE
AUTOCAL1	1.25 mg/L	20257792
AUTOCAL2	2.5 mg/L	43071456
AUTOCAL3	6.25 mg/L	101271878
AUTOCAL4	18.75 mg/L	373225638
AUTOCAL5	37.5 mg/L	815326272

INITIAL CALIBRATION VERIFICATION STANDARD

SAMPLE ID	TRUE VALUE	FOUND	RECOVERY
ICVH	12.5 mg/L	12.52 mg/L	100 %

INITIAL CALIBRATION BLANK (See low-level calibration summary sheet)

CONTINUING CALIBRATION VERIFICATION STANDARDS

SAMPLE ID	TRUE VALUE	FOUND	RECOVERY
CCVH	12.5 mg/L	12.71 mg/L	102 %
CCVH	12.5 mg/L	12.52 mg/L	100 %

CONTINUING CALIBRATION BLANKS (See low-level calibration summary sheet)

**LOCKHEED ANALYTICAL LABORATORY
 CALIBRATION SUMMARY - HIGH LEVEL
 DETERMINATION OF SULFATE BY METHOD 300.0 (IC)**

LAL BATCH: 713-BH	CALIB. DATE: 7/17/95	INTERCEPT: 3.292
CALIB. CURVE: QUADRATIC	CALIB. TIME: 9:23	LINEAR COEFF.: 1.698E-07
	R SQUARED: 0.99959	QUADRATIC COEFF.: -1.108E-17

STANDARD DATA

MANUFACTURER: FISHER	LOT NUMBER: 942865	
STANDARD ID	CONCENTRATION	RESPONSE
AUTOCAL1	10 mg/L	50600034
AUTOCAL2	20 mg/L	105738536
AUTOCAL3	50 mg/L	254546738
AUTOCAL4	150 mg/L	928638546
AUTOCAL5	300 mg/L	2008736694

INITIAL CALIBRATION VERIFICATION STANDARD

SAMPLE ID	TRUE VALUE	FOUND	RECOVERY
ICVH	50 mg/L	50.02 mg/L	100 %

INITIAL CALIBRATION BLANK (See low-level calibration summary sheet)

CONTINUING CALIBRATION VERIFICATION STANDARDS

SAMPLE ID	TRUE VALUE	FOUND	RECOVERY
CCVH	100 mg/L	102.58 mg/L	103 %
CCVH	100 mg/L	101.81 mg/L	102 %

CONTINUING CALIBRATION BLANKS (See low-level calibration summary sheet)

**LOCKHEED ANALYTICAL LABORATORY
 QUALITY CONTROL DATA SUMMARY
 LABORATORY CONTROL SAMPLE (LCS) - LOW CONCENTRATIONS**

LAL BATCH: 713-BH

LABORATORY CONTROL SAMPLE (LCS)

LCS ID	ANALYTE	TRUE	FOUND	RECOVERY
LCSL	CHLORIDE	1000 ug/L	964 ug/L	96 %
LCSL	NITRITE-N	300 ug/L	303 ug/L	101 %
LCSL	NITRATE-N	250 ug/L	244 ug/L	97 %
LCSL	SULFATE	1000 ug/L	984 ug/L	98 %

LABORATORY CONTROL SAMPLE DUPLICATE (LCS-DUP)

LCS ID	ANALYTE	TRUE	FOUND	RECOVERY
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(No low-concentration Laboratory Control Sample duplicate)

LABORATORY CONTROL SAMPLE-LABORATORY CONTROL SAMPLE DUPLICATE COMPARISON

ANALYTE	LCS	LCS-DUP	RPD	FLAG
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(No low-concentration Laboratory Control Sample duplicate)

**LOCKHEED ANALYTICAL LABORATORY
 QUALITY CONTROL DATA SUMMARY
 LABORATORY CONTROL SAMPLE (LCS) - HIGH CONCENTRATIONS**

LAL BATCH: 713-BH

LABORATORY CONTROL SAMPLE (LCS)

LCS ID	ANALYTE	TRUE	FOUND	RECOVERY
LCSH	CHLORIDE	50.00 mg/L	51.11 mg/L	102 %
LCSH	NITRITE-N	15.00 mg/L	15.13 mg/L	101 %
LCSH	NITRATE-N	12.50 mg/L	12.42 mg/L	99 %
LCSH	SULFATE	50.00 mg/L	50.12 mg/L	100 %

LABORATORY CONTROL SAMPLE DUPLICATE (LCS-DUP)

LCS ID	ANALYTE	TRUE	FOUND	RECOVERY
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(No low-concentration Laboratory Control Sample duplicate)

LABORATORY CONTROL SAMPLE-LABORATORY CONTROL SAMPLE DUPLICATE COMPARISON

ANALYTE	LCS	LCS-DUP	RPD	FLAG
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(No low-concentration Laboratory Control Sample duplicate)

LOCKHEED ANALYTICAL LABORATORY
QUALITY CONTROL DATA SUMMARY
METHOD BLANK

LAL BATCH: 713-BH

LABORATORY CONTROL SAMPLE (LCS)

LCS ID	ANALYTE	FOUND	FLAG
FILTERED BLANK	CHLORIDE	< 1.0 1.4 ug/L 1.4	U
FILTERED BLANK	NITRITE-N	< 2.0 ug/L	U
FILTERED BLANK	NITRATE-N	< 3.0 ug/L	U
FILTERED BLANK	SULFATE	< 30.0 ug/L	U

**LOCKHEED ANALYTICAL LABORATORY
 QUALITY CONTROL DATA SUMMARY
 SPIKE AND SPIKE DUPLICATE ANALYSES**

LAL BATCH: 713-BH

MATRIX SPIKE SAMPLES

LCS ID	ANALYTE	SAMPLE RESULT	SPIKE ADDED	SPIKED SAMPLE	SPIKE RECOVERY	FLAG
L4903-3	CHLORIDE	31.69 mg/L	40.00 mg/L	73.34 mg/L	104 %	
L4903-3	NITRITE-N	<2.0 ug/L (U)	12.00 mg/L	12.36 mg/L	103 %	
L4903-3	NITRATE-N	2.50 mg/L	10.00 mg/L	12.51 mg/L	100 %	
L4903-3	SULFATE	20.83 mg/L	40.00 mg/L	60.89 mg/L	100 %	

MATRIX SPIKE DUPLICATE SAMPLES

LCS ID	ANALYTE	SAMPLE RESULT	SPIKE ADDED	SPIKED SAMPLE	SPIKE RECOVERY	FLAG
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(No matrix spike duplicate)

MATRIX SPIKE - MATRIX SPIKE DUPLICATE COMPARISON

LCS ID	ANALYTE	MATRIX SPIKE	SPIKE DUPLICATE	RPD	FLAG
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(No matrix spike duplicate)

LOCKHEED ANALYTICAL LABORATORY
QUALITY CONTROL DATA SUMMARY
DUPLICATE SAMPLE ANALYSES

LAL BATCH: 713-BH

DUPLICATE SAMPLES

LCS ID	ANALYTE	SAMPLE RESULT	DUPLICATE SAMPLE	RPD	FLAG
L4903-3	CHLORIDE	31.69 mg/L	32.19 mg/L	2 %	
L4903-3	NITRITE-N	<2.0 ug/L (U)	<2.0 ug/L (U)		b
L4903-3	NITRATE-N	2.50 mg/L	2.51 mg/L	1 %	
L4903-3	SULFATE	20.83 mg/L	20.94 mg/L	1 %	

**LOCKHEED ANALYTICAL LABORATORY
 CALIBRATION SUMMARY - LOW LEVEL
 DETERMINATION OF FLUORIDE BY METHOD 300.0 (IC)**

LAL BATCH: 713-BH	CALIB. DATE: 7/17/95	INTERCEPT: -4.427
CALIB. CURVE: QUADRATIC	CALIB. TIME: 9:57	LINEAR COEFF.: 6.330E-05
	R SQUARED: 0.99995	QUADRATIC COEFF.: -9.740E-14

STANDARD DATA

STANDARD ID	CONCENTRATION	RESPONSE
AUTOCAL1	0 ug/L	0
AUTOCAL2	20 ug/L	322011
AUTOCAL3	20 ug/L	318229
AUTOCAL4	50 ug/L	1309254
AUTOCAL5	100 ug/L	1423150
AUTOCAL6	1000 ug/L	16257752
AUTOCAL7	5000 ug/L	92109900

INITIAL CALIBRATION VERIFICATION STANDARD

SAMPLE ID	TRUE VALUE	FOUND	RECOVERY
ICVL	1000 ug/L	1010 ug/L	101 %

INITIAL CALIBRATION BLANK

SAMPLE ID	FOUND	FLAG
ICB	< 10.0 ug/L	U

CONTINUING CALIBRATION VERIFICATION STANDARDS

SAMPLE ID	TRUE VALUE	FOUND	RECOVERY
CCVL	1000 ug/L	993 ug/L	99 %

CONTINUING CALIBRATION BLANKS

SAMPLE ID	FOUND	FLAG
CCB	< 10.0 ug/L < 1.0 ug/L	U

**LOCKHEED ANALYTICAL LABORATORY
 CALIBRATION SUMMARY - LOW LEVEL
 DETERMINATION OF ORTHO-PHOSPHATE BY METHOD 300.0 (IC)**

LAL BATCH: 713-BH	CALIB. DATE: 7/17/95	INTERCEPT: -6.208
CALIB. CURVE: QUADRATIC	CALIB. TIME: 9:57	LINEAR COEFF.: 2.270E-04
	R SQUARED: 0.99998	QUADRATIC COEFF.: -3.968E-13

STANDARD DATA

MANUFACTURER: EMS SCIENCE		LOT NUMBER: 32038210	
STANDARD ID	CONCENTRATION	RESPONSE	
AUTOCAL1	0 ug/L	0	
AUTOCAL2	40 ug/L	203360	
AUTOCAL3	40 ug/L	157318	
AUTOCAL4	100 ug/L	626264	
AUTOCAL5	200 ug/L	828670	
AUTOCAL6	2000 ug/L	8973380	
AUTOCAL7	10000 ug/L	48116550	

INITIAL CALIBRATION VERIFICATION STANDARD

SAMPLE ID	TRUE VALUE	FOUND	RECOVERY
ICVL	1000 ug/L	1956 ug/L	196 %

INITIAL CALIBRATION BLANK

SAMPLE ID	FOUND	FLAG
ICB	< 2.0 ug/L	U

CONTINUING CALIBRATION VERIFICATION STANDARDS

SAMPLE ID	TRUE VALUE	FOUND	RECOVERY
CCVL	2000 ug/L	1927 ug/L	96 %

CONTINUING CALIBRATION BLANKS

SAMPLE ID	FOUND	FLAG
CCB	<i>≤ 2.0 ug/L</i> <i>< 2.0 ug/L</i> <i>07/18/95</i>	U

**LOCKHEED ANALYTICAL LABORATORY
 QUALITY CONTROL DATA SUMMARY
 LABORATORY CONTROL SAMPLE (LCS) - LOW CONCENTRATIONS**

LAL BATCH: 713-BH

LABORATORY CONTROL SAMPLE (LCS)

LCS ID	ANALYTE	TRUE	FOUND	RECOVERY
LCSL	FLUORIDE	1000 ug/L	962 ug/L	96 %
LCSL	ORTHO-PHOSPHATE	1000 ug/L 2000 <i>for</i>	1963 ug/L	196% <i>98.27%</i>

LABORATORY CONTROL SAMPLE DUPLICATE (LCS-DUP)

LCS ID	ANALYTE	TRUE	FOUND	RECOVERY
LCSLDUP	FLUORIDE	1000 ug/L	1066 ug/L	107 %
LCSLDUP	ORTHO-PHOSPHATE	1000 ug/L 2000 <i>for</i>	1953 ug/L	195% <i>97.65%</i>

LABORATORY CONTROL SAMPLE-LABORATORY CONTROL SAMPLE DUPLICATE COMPARISON

ANALYTE	LCS	LCS-DUP	RPD	FLAG
FLUORIDE	962 ug/L	1066 ug/L	10 %	
ORTHO-PHOSPHATE	1963 ug/L	1953 ug/L	1 %	

for ortho-phosphate

CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

BOG865

Lab Name: L.A.S. _____ Contract: BECHTEL_HA

Lab Code: LOCK__ Case No.: 713BHD SAS No.: _____ SDG No.: LK4903

Matrix (soil/water): WATER Lab Sample ID: L4903-12__

Level (low/med): LOW__ Date Received: 07/13/95

% Solids: __0.0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	29.0	U		P
7440-36-0	Antimony	58.0	U		P
7440-38-2	Arsenic	98.0	U		P
7440-39-3	Barium	32.1	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium	67100		E	P
7440-47-3	Chromium	3.0	U		P
7440-48-4	Cobalt	6.0	U		P
7440-50-8	Copper	3.0	U		P
7439-89-6	Iron	12.0	U		P
7439-92-1	Lead	56.0	U		P
7439-95-4	Magnesium	13700			P
7439-96-5	Manganese	2.0	U		P
7440-02-0	Nickel	15.0	U		P
7440-09-7	Potassium	5400			P
7782-49-2	Selenium	94.7	B		P
7440-22-4	Silver	4.0	U		P
7440-23-5	Sodium	7770			P
7440-28-0	Thallium	82.1	B		P
7440-62-2	Vanadium	6.6	B		P
7440-66-6	Zinc	4.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

FORM I - IN

CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

BOG864

Lab Name: L.A.S. _____ Contract: BECHTEL_HA

Lab Code: LOCK__ Case No.: 713BHT SAS No.: _____ SDG No.: LK4903

Matrix (soil/water): WATER Lab Sample ID: L4903-2__

Level (low/med): LOW__ Date Received: 07/13/95

% Solids: __0.0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	29.0	U		P
7440-36-0	Antimony	58.0	U		P
7440-38-2	Arsenic	98.0	U		P
7440-39-3	Barium	28.4	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium	56700			P
7440-47-3	Chromium	3.0	U		P
7440-48-4	Cobalt	6.0	U		P
7440-50-8	Copper	3.0	U		P
7439-89-6	Iron	23.4	B		P
7439-92-1	Lead	56.0	U		P
7439-95-4	Magnesium	11800			P
7439-96-5	Manganese	2.0	U		P
7440-02-0	Nickel	15.0	U		P
7440-09-7	Potassium	4730	B		P
7782-49-2	Selenium	87.0	U		P
7440-22-4	Silver	4.0	U		P
7440-23-5	Sodium	6720			P
7440-28-0	Thallium	50.0	U		P
7440-62-2	Vanadium	8.4	B		P
7440-66-6	Zinc	4.8	B		P

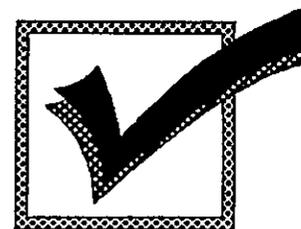
Color Before: COLORLESS Clarity Before: CLEAR__ Texture: _____

Color After: COLORLESS Clarity After: CLEAR__ Artifacts: _____

Comments:

FORM I - IN

Nonmetals Analytical Data
 Technical Review Checklist
 (Analyst)



Analyst Name (Print): Mike Nys	Analysis Date: 7/14/95
Client(s) Name: Bechtel Hanford	LAL Batch ID: 713-bh
Method No: 180.1 / Turbidity	Instrument: HF DRT 100B

Description	Yes	No	Comments
Completeness Review			
1. Was required method/SOP followed?	X		
2. Are <u>all</u> raw data available and labeled properly (e.g., methods used, units, sample IDs, dilution factors, reruns)?	X		
3. Are <u>all</u> nonconformities in the raw data noted and/or explained?	X		
4. Were <u>all</u> the client samples analyzed for all constituents and QC as specified on the LAL Bench Sheets?	X		
Data Quality Assessment			
5. Were samples properly preserved and analyzed within the method-specified holding time?	X		
6. Are instrument calibration criteria met?	X		
7. Are initial and continuing calibration verification data (bracketing the samples of interest) within criteria?	X		
8. Are bracketing initial and continuing calibration blank data within criteria?	X		
9. Are matrix spike and/or matrix spike duplicate (if required) recovery data within criteria?	X		
10. Are method blank data within criteria?	X		
11. Are duplicate precision data within criteria?	X		
12. Are laboratory control sample data within criteria?	X		
13. Has spike verification been performed adequately?	X		LAL ID(s): L4903-4 SVP Initials: TJS
14. Has the <i>status</i> been updated in the ACS?	X		
Notes and comments:			

I certify, to the best of my knowledge, that the data are acceptable and in compliance with the laboratory policies and client requests, except as noted above.

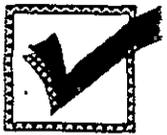
Mike Nys 7/14/95
 Analyst's Signature/Date

R. Callison 7-17-95
 Secondary Reviewer's Initials/Date

Lockheed Analytical Laboratory

Metals Analytical Data

Technical Review Checklist (Analyst)



Analyst Name (Print): <i>Jeffrey Lindner</i>		Instrument: <i>TJA ICP 61-E</i>	Method: <i>CLP/6010</i>		
Batch Number	Client Name	Code	Comments	Bench Sheet Included Y/N	ACS updated Y/N
<i>712 M1</i>	<i>[REDACTED]</i>	<i>1st run. * IZ Ag, Cd, Cu, Sb, V, Zn, 13 Ag. * Partial **</i>		<i>N</i>	<i>N</i>
<i>713 BHD</i>	<i>Bechtel Hanford</i>	<i>1st run. Partial **</i>		<i>N</i>	<i>N</i>

CODE ANOMALY

- 10 Prep Blank data was not within criteria
- 11 Laboratory Control Sample was not within criteria
- 12 Duplicate Precision was not met
- 13 Matrix Spike recovery was not within criteria
- 00 Other

Description	Yes	No	Comments
Completeness Review			
1. Were the standard operating procedures (SOP) followed?	<i>/</i>		
2. Are <u>all</u> raw data available and labeled properly (e.g., methods used, units, sample IDs, dilution factors, reruns)?	<i>/</i>		
3. Are <u>all</u> abnormalities in the raw data noted and/or explained?	<i>/</i>		
4. Were <u>all</u> the client samples analyzed for all constituents and QC as specified on the LAL Bench Sheets?	<i>/</i>		
Data Quality Assessment			
5. Was the sample properly preserved and analyzed within the method-specified holding time?	<i>/</i>		
6. Were the instrument calibration criteria met?	<i>/</i>		
7. Are the initial and continuing calibration verification samples data bracketing the samples of interest within criteria?	<i>/</i>		
8. Are the bracketing initial and continuing calibration blank data within criteria?		<i>/</i>	<i>ICB / CCBs failed for Ni. CALBLANK contaminated with Ni.</i>
9. For ICP Only: Are the interference check standard recovery data within criteria?	<i>/</i>		

Notes and comments: ** Samples analyzed neat & diluted (1:1) in anticipation of high Fe levels.*

** Due to sample heterogeneity.*

*** Reanalysis req'd for Ni due to CCB / ICB failures.*

Note! Co & Sb are affected by Ni IECs - Co & Sb values should be reported from subsequent run.

+ Zn 7-20-95 and

I certify, to the best of my knowledge, that the data are acceptable and in compliance with the laboratory policies and client requests, except as noted above.

[Signature]
Analyst Signature/Date *18 JUL 95*

[Signature] *7-20-95*
Secondary Reviewer Initials/Date

ICP RUN LOG

Date: 18 Jul 95 **Start Time:** 02:54

Analyst: Jeffrey Lindner **End Time:** 09:00

Sensitivity Check (10 ppm Mn / 10 ppm Cu): 2.45

ICP File Folder: J95198A.DBF

QC REFERENCE PAGE:	306
---------------------------	-----

BATCH #	COMMENTS
712 MI	1 st run. Partial - reanalysis req'd for Ni due to ICB/CCB failures
713 BHD	1 st run. "

ANALYST: Jeffrey Lindner **DATE:** 18 Jul 95

The sample loading lists are kept in a 3-ring binder next to the instrument and will be bound as needed.

REVIEWER: _____ **DATE:** _____

LAL-95-LOG-0733

Page 000151

LOCKHEED ANALYTICAL SERVICES

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: 80G864

LAL Sample ID: L4903-5

Date Collected: 11-JUL-95

Date Received: 13-JUL-95

Matrix: Water

Login Number: L4903

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
Ac-228(Ra-228)	24-JUL-95	GAMMA SPEC LAL-0063_25331	14.	26.	38.		pCi/L
Co-58	24-JUL-95	GAMMA SPEC LAL-0063_25331	2.0	5.5	9.3		pCi/L
Co-60	24-JUL-95	GAMMA SPEC LAL-0063_25331	3.9	4.5	10.		pCi/L
Cs-137	24-JUL-95	GAMMA SPEC LAL-0063_25331	-1.7	5.6	9.8		pCi/L
Eu-152	24-JUL-95	GAMMA SPEC LAL-0063_25331	-8.	12.	46.		pCi/L
Eu-154	24-JUL-95	GAMMA SPEC LAL-0063_25331	13.	13.	23.		pCi/L
Eu-155	24-JUL-95	GAMMA SPEC LAL-0063_25331	2.	10.	17.		pCi/L
Fe-59	24-JUL-95	GAMMA SPEC LAL-0063_25331	7.0	8.2	18.		pCi/L
Pb-212	24-JUL-95	GAMMA SPEC LAL-0063_25331	6.	11.	15.		pCi/L
Pb-214(Ra-226)	24-JUL-95	GAMMA SPEC LAL-0063_25331	4.	13.	19.		pCi/L
Ra-226(GAMMA)	24-JUL-95	GAMMA SPEC LAL-0063_25331	30	130	180		pCi/L
Ru-106	24-JUL-95	GAMMA SPEC LAL-0063_25331	-9.	43.	81.		pCi/L
U-235(GAMMA)	24-JUL-95	GAMMA SPEC LAL-0063_25331	-12.	29.	43.		pCi/L
Gross Alpha	26-JUL-95	GR ALP/BETA LAL-0060_25332	2.3	1.6	2.0	C	pCi/L
Gross Beta	26-JUL-95	GR ALP/BETA LAL-0060_25332	31.7	3.1	2.2		pCi/L
Total radio-strontium	03-AUG-95	SR-90 LAL-0196_25333	-0.29	0.42	0.77		pCi/L
U-233/4	04-AUG-95	U-ISOTOPIIC LAL-0108_25334	2.18	0.36	0.13		pCi/L
U-235	04-AUG-95	U-ISOTOPIIC LAL-0108_25334	0.131	0.087	0.079		pCi/L
U-238	04-AUG-95	U-ISOTOPIIC LAL-0108_25334	2.04	0.34	0.096		pCi/L

LOCKHEED ANALYTICAL SERVICES

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0G864

LAL Sample ID: L4903-11

Date Collected: 11-JUL-95

Date Received: 13-JUL-95

Matrix: Water

Login Number: L4903

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
C-14	26-JUL-95	C-14 LAL-0209_25323	2090	180	98.		pCi/L
H-3	29-JUL-95	TRITIUM(H3) LAL-0066_25330	101000	4200	260		pCi/L



Certificate

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

Standard Reference Material 4321B Alpha-Particle Solution Standard

Radionuclide	Natural Uranium
Source identification	SRM 4321B
Source description	Liquid in 5-mL flame-sealed glass ampoule
Source mass	Approximately 5.3 grams
Solution composition	Natural uranium in <u>1-molar nitric acid</u>
Uranium concentration	0.01998 g g ⁻¹
Reference time	1200 EST January 1, 1992
Radioactivity concentration	U-238: 246.7 Bq g ⁻¹ U-235: 11.35 Bq g ⁻¹ U-234: 237.6 Bq g ⁻¹
Overall uncertainty	U-238: 0.87 percent ⁽¹⁾ * U-235: 0.96 percent U-234: 1.86 percent
Measuring instrument	Mass spectrometer, silicon surface-barrier detector, and 4π(α+β) liquid-scintillation counter ⁽²⁾
Half life	U-238: (4.468 ± 0.005) × 10 ⁸ years ⁽³⁾ U-235: (7.037 ± 0.011) × 10 ⁸ years U-234: (2.454 ± 0.006) × 10 ⁵ years

Total U = 495.7 Bq/g

This standard reference material was prepared in the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, Dale D. Hoppes, Group Leader.

Gaithersburg, MD
February, 1992

William P. Reed, Chief
Standard Reference Materials Program

*Notes on back

NOTES

- (1) Individual uncertainties have the significance of one standard deviation of the mean, or an approximation thereof. The combined uncertainty is the individual uncertainties shown below added in quadrature. The overall uncertainty is taken to be three times the combined uncertainty.

SOURCE OF UNCERTAINTY	UNCERTAINTY (%)		
	U-238	U-235	U-234
a) uranium assay of SRM 960	0.02	0.02	0.02
b) uranium atom ratio	0.01	0.07	0.50
c) quantitative dissolution	0.25	0.25	0.25
d) gravimetric measurements	0.10	0.10	0.10
e) half life	0.11	0.16	0.24
Combined uncertainty	0.29	0.32	0.62
	x 3	x 3	x 3
Overall uncertainty	0.87	0.96	1.86

- (2) SRM 4321 was prepared by quantitatively dissolving a carefully cleaned and weighed piece of well-characterized natural uranium metal. This natural uranium metal was formerly issued by the National Bureau of Standards as SRM 960. The solution in SRM 4321B was carefully examined using thermal-ionization mass spectrometry, silicon surface-barrier alpha-particle spectrometry, and $4\pi(\alpha+\beta)$ liquid-scintillation counting. The values that we recommend for the U-234/U-238 atom ratio and alpha-particle-emission-rate ratio in SRM 4321B are $(5.29 \pm 0.02) \times 10^{-5}$ and 0.963 ± 0.003 , respectively. (See the Information for Users of SRM 4321 and SRM 4321B, Natural Uranium Solution.)
- (3) **Table of Radioactive Isotopes**, E. Browne and R.B. Firestone, John Wiley and Sons, Inc., New York (1986).

For further information please contact Dr. L.L. Lucas, (301) 975-5546; or J.M. Calhoun, (301) 975-5538.

SRM 4321B

NOTES

- (1) Individual uncertainties have the significance of one standard deviation of the mean, or an approximation thereof. The combined uncertainty is the individual uncertainties shown below added in quadrature. The overall uncertainty is taken to be three times the combined uncertainty.

<u>Source of uncertainty</u>	<u>Uncertainty (%)</u>		
	<u>U-238</u>	<u>U-235</u>	<u>U-234</u>
a) original calibration of SRM 960	0.01	0.05	0.28
b) quantitative dissolution	0.07	0.07	0.07
c) gravimetric measurements	0.07	0.07	0.07
d) half life	0.07	0.07	0.41
Combined uncertainty	<u>0.12</u>	<u>0.13</u>	<u>0.51</u>
	* 3	* 3	* 3
Overall uncertainty	0.36	0.39	1.53

- (2) SRM 4321 was prepared by quantitatively dissolving a piece of natural uranium metal (SRM 960) that had been characterized by quantitative assay and by mass spectrometry.
- (3) Radioactive Decay Data Tables, D.C. Kocher, DOE/TIC-11026 (1981).

For further information call Larry Lucas at (301) 975-5546.

SRM 4321



Dear Customer:

The Standard Reference Material(s) (SRM'(s)) for which you have requested a Material Safety Data Sheet (MSDS), 4321B, U-238 is excluded from coverage in our regular MSDS system of more than 100 sheets for one or more of the following reasons:

- 1 The SRM is an article, as that word is defined in paragraph (c) of section 1910.1200 of title 29 of the Code of Federal Regulations which does not release or otherwise result in exposure to a hazardous chemical, under normal conditions of use.
- 2 The SRM has been determined to be non-hazardous by the National Institute of Standards and Technology under paragraph (d) of section 1910.1200 of title 29 of the Code of Federal Regulations. The SRM will not release or otherwise result in exposure to a hazardous chemical under normal conditions of use.
- 3 The SRM is a pesticide or hazardous waste labeled according to regulations issued by the Environmental protection Agency.
- 4 The SRM is a food, food additive, or drug labeled according to regulations issued by the Food and Drug Administration.
- 5 The SRM is a wine labeled according to regulations issued by the Bureau of Alcohol, Tobacco, and Firearms.
- 6 The SRM is a radioactive material labeled according to regulations issued by the Nuclear Regulatory Commission. The Shipper's Declaration form included with the shipment states chemical form, physical state, and activity of SRM.
- 7 The SRM is a tobacco or tobacco product, wood, or wood product which is exempted by paragraph (b) (5) (ii) and (iii) of section 1910.1200 of title 29 of the Code of Federal Regulations from the provisions of that section.

If we can be of assistance to you in regard to this matter, or any issue related to SRMs, please do not hesitate to write to me.

Sincerely,

Stanley D. Rasberry
Chief
Office of Standard Reference Materials

AA9804

INITIAL STANDARD DILUTION RECORD

Standard Information:			
Isotope:	<u>U-238</u>	Vendor:	<u>NIST</u>
Activity of Standard Received:	<u>0.035338 uCi</u>	Vendor I.D. #	<u></u>
Weight of Standard Received (g):	<u>5.3 g</u>	LAL I.D. #:	<u>AA9804</u>
Standard Activity (pCi/g):	<u>6.67E+03 pCi/g</u>	NIST Traceable ?	<u>yes</u>
Half-life in Years or Days:	<u>4.468E+09 yrs</u>	Certificate #:	<u>SRM4321B</u>
Reference Date:	<u>1/1/92</u>	Receiver's Name:	<u>Kevin Free</u>
		Date Received:	<u>8/19/93</u>

Primary Dilution			
Balance Verification?:	<u>yes</u>		
Diluent Used:	<u>1 M HNO3</u>		
a: Decay Corrected Standard Activity (pCi/g):	<u>6.67E+03</u>	<u>pCi/g</u>	
b: Weight of the Source Transferred (g):	<u>5.23707</u>	<u>g</u>	
c: Total diluted weight (g):	<u>132.03</u>	<u>g</u>	
d: Total Diluted Volume (mL)	<u>128.28</u>	<u>mL</u>	
e: Activity of Dilution by Weight (pCi/g) [a * b / c]:	<u>2.645E+02</u>	<u>pCi/g</u>	
f: Calculated Density of Solution (g/mL) [c / d]:	<u>1.029E+00</u>	<u>g/mL</u>	
g: Activity of Dilution by Volume (pCi/mL) [e * f]:	<u>2.722E+02</u>	<u>pCi/mL</u>	
h. Dilution Logbook I.D. #:	<u>LAL-93-474-14-1</u>		
Prepared By: _____	Preparation Date: _____	<u>8/20/93</u>	
Reviewed By: _____	Review Date: _____		
Purity/Cross Check Performed By: _____	Check Date: _____		

AA9804

ISOTOPE WEIGHT DILUTION RECORD

Isotope: U-238

Vendor: NIST

Total Received Activity: ~1307 Bq

Vendor ID: 4321B

Wt. Received: ~5.3 g

NIST Traceable (Y/N) Cert. # SRM-4321B

Activity in Units/g: 246.7 Bq/g

Reference Date: JAN 1, 1992

Activity converted (dpm/g): 14,802 dpm/g

Receive Date: Aug 19, 1993

Half-life (Yrs or days) $t_{1/2}$ = 4.47×10^9 yrs *

Receiver's Name: _____

PRIMARY DILUTION:

Balance wt. check done (✓)

a: Source activity: 14,802 dpm/g * (if $t_{1/2}$ = < 100yr decay to prep. date)

b: Wt. of Source transferred: 5.23707 g

Diluent used: 1 M HNO₃

c: Total diluted weight: 132.03 g

d: Activity of dilution (a*b/c): 587.13 dpm/g $\pm 0.87\%$

e: Calculated density of solution: 1.0292 g/mL (1M HNO₃ = 1.0292 g/mL)

f: Activity by volume = (d*e): 604.3 dpm/mL (100mL weighed the prepared 1M HNO₃ solution)

Dilution Log Book ID: LAL-93-0474-14-1

Preparation Date: 8/20/93 Preparer's Name: [Signature]

SECONDARY OR WORKING LEVEL DILUTION

Balance wt. check done (✓)

Log Book ID of source being diluted: 93-0474-14-1

a: Source activity: 587.13 dpm/g * (if $t_{1/2}$ = < 100yr decay to prep. date)

b: Wt. of Source transferred: 2.60815 g

Diluent used: 1 M HNO₃

c: Total diluted weight: 125.21 g

d: Activity of dilution (a*b/c): 12.23 dpm/g $\pm 0.87\%$ U-238

e: Calculated density of solution: 1.0292 g/mL (1M HNO₃ = 1.0292 g/mL)

f: Activity by volume = (d*e): 12.59 dpm/mL $\pm .9\%$ U-238

Dilution Log Book ID: 93-0474-14-2

L = 12.6 ± 0.1

Preparer's Name: [Signature] Preparation Date: 8/20/93

Reviewed By: [Signature] Review Date: 8-24-93

Jaynes Work
8-24-93

SECONDARY/WORKING LEVEL STANDARD DILUTION RECORD

Dilution Source Information	
Isotope:	U-238
Parent Barcode Number	AA9804
Vendor or Certificate I.D. # of Parent Standard:	
Diluted Source Logbook I.D. #:	93-474-14-1
Balance Verification?:	yes
Diluent Used:	1M HNO ₃

970.M.A

Dilution	
*Diluent:	1M HNO ₃
*Density of diluent (g/ml):	N/A
a: Parent Specific Activity:	272.21 pCi/ml
b: Amount of Source Transferred:	6.0648 g
c: Total amount of Dilution:	144.57 g
d: Total Volume of Dilution:	N/A
e: Activity of Dilution (a * b / c):	N/A
f: Activity of Dilution (a * b / d):	11.42 pCi/ml
Dilution Logbook I.D. #:	94-677-71-1
Prepared By: <u>Rogues Wong</u>	Preparation Date: <u>7-11-95</u>
Reviewed By: <u>A.J.C. Muel</u>	Review Date: <u>7/12/95</u>

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

Signed

Date

Signed

Date
451

CALIBRATION OF U-232

2 mL of U-232 at 6635 dpm/mL (91-225-36-1, AA0078) was run through the AG1-X8 column in 9 M HCl for removal of daughter products. U-232 was stripped off with 0.5 M HCl at the end of the procedure. This solution was taken down to dryness. It was then brought up in 2 M HNO₃ to 500 mL. Calibration of this tracer was performed with 0.5 mL U-238 (11.42 pCi/mL, 94-677-71-1) and samples were counted for 4 hours.

CHILD ID	U-232 GROSS COUNTS per 0.5 mL	U-238 GROSS COUNTS	CALCULATED U-232 VALUE IN pCi/0.5mL
U173195	503.3	573.2	5.01
U273195	439.7	528.5	4.75
U373195	512.2	593.3	4.93
U473195	566.5	646.8	5.00
U573195	504.3	574.3	5.01
U673195	604.3	744.0	4.64
U773195	545.8	610.3	5.11
			9.85 pCi \pm 0.33 pCi/mL

The value calibrated for this tracer was 9.85 pCi/mL with a precision of \pm 3.3%

U-232 Logbook Reference # 94-677-77-1

Ref. Date 7-31-95

Exp. Date 7-31-97

Agnes Wong
Continued on Page 452

Read and Understood By

Art Reems CP 8/8/95

Signed

Date

Signed

Date

452



October 2, 1995
LATA95-192

Ms. Joan Kessner
Bechtel
1022 Lee Boulevard
Richland, WA 99352

Subject: VB403.94, SDG LK4903-LAS

Dear Ms. Kessner:

Attached is the data validation report for analytical results for 100-KR-4 Groundwater Round 8, (SDG LK4903-LAS). The package was received by Los Alamos Technical Associates on September 11, 1995.

If you have any questions, please feel free to contact me.

Sincerely,

Bunt Morris for

Marsha C. Webb
Deputy Project Manager

Attachment

cc: Jeanette Duncan, CH2M Hill
Don Smith, LATA
VB403.94
MCW/lb

In

DATA VALIDATION REPORT
for
100-KR-4 GROUNDWATER ROUND 8
Metals Analysis
SDG LK4903-LAS
LATA VB403.94

Bechtel Hanford Inc.
P.O. Box 969
Richland, Washington

October 2, 1995

Table of Contents

Data Validation Narrative	000002
INTRODUCTION	000002
ANALYSES REQUESTED	000002
DATA QUALITY OBJECTIVES	000002
REFERENCES	000004
GLOSSARY OF VALIDATION APPLIED QUALIFIERS (CHEMISTRY)	000005
GLOSSARY OF LABORATORY APPLIED QUALIFIERS	000006
 Qualification Summary Table	 000007
 Data Summary Table	 000009
 Sample Results	 000011
 Checklist	 000014
 Laboratory Case Narrative	 000033
 Chain-of-Custody Information	 000036
 END OF PACKAGE	 000038

**100-KR-4 GROUNDWATER ROUND 8
Data Validation Narrative**

INTRODUCTION

All samples in Sample Delivery Group (SDG) LK4903-LAS (VB403.94) were validated at level D as defined in the Data Validation Procedures for Chemical Analysis (WHC-SD-EN-SPP-002, Rev. 2).

The analyses were performed by Lockheed Analytical Services.

ANALYSES REQUESTED

See Table 1.

DATA QUALITY OBJECTIVES

- Precision:** Goals for precision were met with the exception of those items discussed in the "**Qualification Summary Table**".
- Accuracy:** Goals for accuracy were met with the exception of those items discussed in the "**Qualification Summary Table**".
- Sample Result Verification:** All sample results were supported in the raw data.
- Detection Limits:** Detection limit goals were met for all sample results as specified in the *Remedial Investigation/Feasibility Study Work Plan for the 100-KR-4 Operable Unit*, DOE/RL-90-21, Rev. 0.
- Completeness:** The data package was 100% complete for all requested analyses.

MAJOR DEFICIENCIES

No major deficiencies were identified during data validation which required qualification of data as unusable.

MINOR DEFICIENCIES

Minor deficiencies were identified during validation which required qualification of data as estimated. See the "**Qualification Summary Table**".

Table 1
Chain-of-Custody
Analysis Request

LATA ID #: VB403.94

SDG: LK4903-LAS

Sample Information					Analyses Requested	
SAMPLE NO.	DATE COLLECTED	MATRIX	SAF	FIELD QC INFO	1	2
B0G864	11-Jul-95	WATER	B95-069	Split of B0G814	X	
B0G865	11-Jul-95	WATER	B95-069	Split of B0G815		X

Method References:

<u>Analysis</u>	<u>Method</u>
1. ICP Metals (Unfiltered)	6010
2. ICP Metals (Filtered)	6010

REFERENCES

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

WHC 1992, *Remedial Investigation/Feasibility Study Work Plan for the 100-KR-4 Operable Unit*, DOE/RL-90-21, Rev. 0, Department of Energy-Hanford, Richland, Washington.

GLOSSARY OF VALIDATION APPLIED QUALIFIERS (CHEMISTRY)

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 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.
- 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 are unusable due to an identified QC deficiency.

GLOSSARY OF LABORATORY APPLIED QUALIFIERS

Qualifiers which may be applied by the laboratory in compliance with applicable requirements are as follows.

Commonly used laboratory metals (inorganic) qualifiers:

- U- Indicates the analyte was analyzed for but not detected in the sample.
- B- Indicates the analyte concentration is less than the CRDL but greater than the IDL.
- E- Indicates the value reported is estimated due to the presence of interference.
- N- Indicates spiked sample recovery was not within the control limits.
- *- Indicates duplicate analysis was not within control limits.

Qualification Summary Table

Qualification Summary Table

Inorganics (Metals)

ANALYTE	TYPE	QUALIFIER	SAMPLES AFFECTED	DQO	REASON
Zinc	MINOR	U	B0G864	BLANKS	Preparation blank value is positive and outside acceptance criteria.
Iron	MINOR	U	B0G864	BLANKS	Calibration blank value is positive and outside acceptance criteria.
Nickel	MINOR	UJ	B0G864 B0G865	BLANKS	Calibration blank value is negative and outside acceptance criteria.
Thallium	MINOR	UJ	B0G864	BLANKS	Calibration blank value is negative and outside acceptance criteria.
Vanadium	MINOR	U	B0G864	BLANKS	Calibration blank value is positive and outside acceptance criteria.
Copper	MINOR	UJ	B0G865	BLANKS	Preparation blank value is negative and outside acceptance criteria.
Calcium	MINOR	J	B0G864 B0G865	ACCURACY	No matrix spike performed.
Magnesium	MINOR	J	B0G864 B0G865	ACCURACY	No matrix spike performed.
Potassium	MINOR	J/BJ	B0G864 B0G865	ACCURACY	No matrix spike performed.
Sodium	MINOR	J	B0G864 B0G865	ACCURACY	No matrix spike performed.
Calcium	MINOR	J	B0G865	PRECISION	Serial dilution percent difference is outside acceptance criteria and the sample results are greater than 50 times the instrument detection limit.

Comments:

1. The following field splits were identified: B0G814/B0G864 and B0G815/B0G865. Field split results are evaluated in SDG W0623-QES (VB403.95).

Data Summary Table

**METALS
DATA SUMMARY TABLE**

LATA ID#: VB403.94		HEIS #:	B0G864	B0G865
		Date:	11-Jul-95	11-Jul-95
		Matrix:	WATER	WATER
Constituent	CAS #	Units	Results Q	Results Q
Aluminum	7429-90-5	µg/L	29.0 U	29.0 U
Antimony	7440-36-0	µg/L	58.0 U	58.0 U
Arsenic	7440-38-2	µg/L	98.0 U	98.0 U
Barium	7440-39-3	µg/L	28.4 B	32.1 B
Beryllium	7440-41-7	µg/L	1.0 U	1.0 U
Cadmium	7440-43-9	µg/L	5.0 U	5.0 U
Calcium	7440-70-2	µg/L	56700 J	67100 J
Chromium	7440-47-3	µg/L	3.0 U	3.0 U
Cobalt	7440-48-4	µg/L	6.0 U	6.0 U
Copper	7440-50-8	µg/L	3.0 U	3.0 UJ
Iron	7439-89-6	µg/L	23.4 U	12.0 U
Lead	7439-92-1	µg/L	56.0 U	56.0 U
Magnesium	7439-95-4	µg/L	11800 J	13700 J
Manganese	7439-96-5	µg/L	2.0 U	2.0 U
Nickel	7440-02-0	µg/L	15.0 UJ	15.0 UJ
Potassium	7440-09-7	µg/L	4730 BJ	5400 J
Selenium	7782-49-2	µg/L	87.0 U	94.7 B
Silver	7440-22-4	µg/L	4.0 U	4.0 U
Sodium	7440-23-5	µg/L	6720 J	7770 J
Thallium	7440-28-0	µg/L	50.0 UJ	82.1 B
Vanadium	7440-62-2	µg/L	8.4 U	6.6 B
Zinc	7440-66-6	µg/L	4.8 U	4.0 U

000010

Shaded areas indicate changes by the validator.
40394DST.XLS, METALS

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Sample Results (Form I's)

CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

BOG864

Lab Name: L.A.S. _____

Contract: BECHTEL_HA

Lab Code: LOCK__

Case No.: 713BHT

SAS No.: _____

SDG No.: LK4903

Matrix (soil/water): WATER

Lab Sample ID: L4903-2__

Level (low/med): LOW__

Date Received: 07/13/95

% Solids: __0.0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	29.0	U		P
7440-36-0	Antimony	58.0	U		P
7440-38-2	Arsenic	98.0	U		P
7440-39-3	Barium	28.4	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium	56700			P
7440-47-3	Chromium	3.0	U		P
7440-48-4	Cobalt	6.0	U		P
7440-50-8	Copper	3.0	U		P
7439-89-6	Iron	23.4	X		P
7439-92-1	Lead	56.0	U		P
7439-95-4	Magnesium	11800			P
7439-96-5	Manganese	2.0	U		P
7440-02-0	Nickel	15.0	X		P
7440-09-7	Potassium	4730	B		P
7782-49-2	Selenium	87.0	U		P
7440-22-4	Silver	4.0	U		P
7440-23-5	Sodium	6720			P
7440-28-0	Thallium	50.0	X		P
7440-62-2	Vanadium	8.4	X		P
7440-66-6	Zinc	4.8	X		P

U
U
U
U

Color Before: COLORLESS

Clarity Before: CLEAR__

Texture: _____

Color After: COLORLESS

Clarity After: CLEAR__

Artifacts: _____

Comments:

FORM I - IN

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9-20-95

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151

CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

BOG865

Lab Name: L.A.S. _____

Contract: BECHTEL_HA

Lab Code: LOCK__

Case No.: 713BHD

SAS No.: _____

SDG No.: LK4903

Matrix (soil/water): WATER

Lab Sample ID: L4903-12__

Level (low/med): LOW__

Date Received: 07/13/95

% Solids: __0.0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	29.0	U		P
7440-36-0	Antimony	58.0	U		P
7440-38-2	Arsenic	98.0	U		P
7440-39-3	Barium	32.1	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium	67100		E	P
7440-47-3	Chromium	3.0	U		P
7440-48-4	Cobalt	6.0	U		P
7440-50-8	Copper	3.0	X		P
7439-89-6	Iron	12.0	U		P
7439-92-1	Lead	56.0	U		P
7439-95-4	Magnesium	13700			P
7439-96-5	Manganese	2.0	U		P
7440-02-0	Nickel	15.0	X		P
7440-09-7	Potassium	5400			P
7782-49-2	Selenium	94.7	B		P
7440-22-4	Silver	4.0	U		P
7440-23-5	Sodium	7770			P
7440-28-0	Thallium	82.1	B		P
7440-62-2	Vanadium	6.6	B		P
7440-66-6	Zinc	4.0	U		P

J
UJ
UJ

Color Before: _____

Clarity Before: _____

Texture: _____

Color After: _____

Clarity After: _____

Artifacts: _____

Comments:

FORM I - IN

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9-20-95

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172

Checklist

**LATA INORGANIC (METALS)
DATA VALIDATION CHECKLIST**

VALIDATION LEVEL:	A	B	C	D	E
VALIDATION PROCEDURE:	<input type="checkbox"/> WHC-CM-5-3, Rev. 0		<input checked="" type="checkbox"/> WHC-SD-EN-SPP-002, Rev. 2		
PROJECT:	100-KR-4		SDG:	LK4903-LAS	
VALIDATOR:	BJ MORRIS ^{BM} 9-20-95	LATA NO:	VB403.94	DATE:	19-Sep-95
REVIEWER:	BJ SEYMOUR ^{BS} 9-26-95	LAB:	LAS	CASE:	N/A
SAF NO:	B95-069	QAPP NO:	DOE/RL-90-21 Rev. 0	SAP NO:	N/A
ANALYSES REQUESTED					
<input checked="" type="checkbox"/>	ICP Metals (Unfiltered) 6010	<input checked="" type="checkbox"/>	ICP Metals (Filtered) 6010		
SAMPLE NO.	MATRIX	SAMPLE NO.	MATRIX		
B0G864	WATER	B0G865	WATER		

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE YES NO N/A

Is technical verification documentation present?

Is a case narrative present?

2. HOLDING TIMES YES NO N/A

Are sample holding times acceptable?

See **HOLDING TIME SUMMARY** form

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS YES NO N/A

Were initial calibrations performed on all instruments?

Are initial calibrations acceptable?

Are ICP interference checks acceptable?

Were ICV and CCV checks performed on all instruments?

Are ICV and CCV checks acceptable?

Validation calculation checks were performed and are acceptable.

If NO(s) are checked, see **CALIBRATION DATA SUMMARY** form

**LATA INORGANIC (METALS)
DATA VALIDATION CHECKLIST**

4. BLANKS

	YES	NO	N/A
Were ICB and CCB checks performed for all applicable analyses?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are ICB and CCB results acceptable?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Were preparation blanks analyzed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are preparation blank results acceptable?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

If NO(s) are checked, see BLANK AND SAMPLE DATA SUMMARY form

5. ACCURACY

	YES	NO	N/A
Were spike samples analyzed at the proper frequency?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Are all spike sample recoveries acceptable?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are all elements spiked at an appropriate level?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Was a post digestion spike analyzed?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Are all post digestion spike recoveries acceptable?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Were laboratory control samples (LCS) analyzed at the proper frequency?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are all LCS recoveries acceptable?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Validation calculation checks were performed and are acceptable.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If NO(s) are checked, see ACCURACY DATA SUMMARY form

6. PRECISION

	YES	NO	N/A
Were laboratory duplicates analyzed at the proper frequency?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are all duplicate RPD values acceptable?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Were MS/MSDs analyzed?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Are all MS/MSD RPD values acceptable?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Were ICP serial dilution samples analyzed at the proper frequency?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are all ICP serial dilution %D values acceptable?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Validation calculation checks were performed and are acceptable.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If NO(s) are checked, see PRECISION DATA SUMMARY form

000016

**LATA INORGANIC (METALS)
DATA VALIDATION CHECKLIST**

7. FIELD QC SAMPLES

	YES	NO	N/A
Were field QC samples (field/trip blanks, duplicates, splits, performance audit) identified?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are field/trip blank results acceptable? (see Blank Data Summary form)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Are field duplicate RPD values acceptable? (see Field QC evaluation)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Are field split RPD values acceptable? (see Field QC evaluation)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Are performance audit sample results acceptable?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Comments: The following field splits were identified: B0G814/B0G864, B0G815/B0G865.

Field split results are evaluated in SDG W0623-QES (VB403.95).

8. FURNACE AA QUALITY CONTROL

	YES	NO	N/A
Were duplicate injections required?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Are all duplicate injection %RSD values acceptable?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Were analytical spikes required?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Are all analytical spike recoveries acceptable?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Was MSA required?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Are all MSA results acceptable?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Validation calculation checks were performed and are acceptable.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Comments:

9. REPORTED RESULTS AND DETECTION LIMITS

	YES	NO	N/A
Are results reported for all requested analyses?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are all results supported in the raw data?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are results calculated properly?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do results meet the CRDLs?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Validation calculation checks were performed and are acceptable.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

VALIDATION SUMMARY

For deficiencies (major and minor) and comments, please refer to the Qualification Summary Table.

LATA INORGANIC (METALS)
DATA VALIDATION CHECKLIST

HOLDING TIME SUMMARY

SDG: LK4903-LAS			VALIDATOR: BJ MORRIS				DATE: 19-Sep-95			
PROJECT: 100-KR-4			REVIEWER: BJ SEYMOUR				LATA NO.: VB403.94			
HEIS-SN	MATRIX CODE	ANALYSIS	DATE COLLECTED	PREP DATE	ANALYSIS DATE	PREP HT (days)	<i>Required HT (days)</i>	ANALYSIS HT (days)	<i>Required HT (days)</i>	VAL Q
BOG864	WATER	ICP Metals (Unfiltered)	11-Jul-95	N/A	18-Jul-95	N/A	N/A	7	180	NONE
BOG865	WATER	ICP Metals (Filtered)	11-Jul-95	N/A	18-Jul-95	N/A	N/A	7	180	NONE

000018

LATA INORGANIC (METALS)
DATA VALIDATION CHECKLIST

BLANK DATA SUMMARY

SDG: LK4903-LAS			VALIDATOR: BJ MORRIS						DATE: 19-Sep-95	
PROJECT: 100-KR-4			REVIEWER: BJ SEYMOUR						LATA NO.: VB403.94	
BLANK ID	ANALYTE	RESULT	LAB Q	RT	UNITS	2X RESULT	5X RESULT	10X RESULT	SAMPLES AFFECTED	VAL Q
Prep Blank B0G864	Zinc	5.71	B				28.55		B0G864	U
Cal Blank B0G864	Iron	14.1	B				70.5		B0G864	U
Cal Blank B0G864	Nickel	-17.9	B			35.8			B0G864	UJ
Cal Blank B0G864	Thallium	-53.8	B			107.6			B0G864	UJ
Cal Blank B0G864	Vanadium	5.2	B				26		B0G864	U
Prep Blank B0G865	Copper	-15.18	B					151.8	B0G865	UJ
Cal Blank B0G865	Nickel	-17.9	B			35.8			B0G865	UJ

000019

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3
BLANKS

Lab Name: L.A.S. _____

Contract: BECHTEL_HA

Lab Code: LOCK__

Case No.: 713BHD

SAS No.: _____

SDG No.: LK4903

Preparation Blank Matrix (soil/water): WATER

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

Analyte	Initial Calib. Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank		M
		C	1	C	2	C	3	C		C	
Aluminum	29.0	U	54.2	B	29.0	U	29.0	U	29.000	U	P
Antimony	58.0	U	58.0	U	58.0	U	58.0	U	58.000	U	P
Arsenic	98.0	U	98.0	U	98.0	U	98.0	U	98.000	U	P
Barium	21.0	U	21.0	U	21.0	U	21.0	U	21.000	U	P
Beryllium	1.0	U	1.0	U	1.0	U	1.0	U	1.000	U	P
Cadmium	5.0	U	5.0	U	5.0	U	5.0	U	5.000	U	P
Calcium	32.0	U	45.0	B	32.0	U	32.0	U	32.000	U	P
Chromium	3.0	U	4.1	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	-13.9	B	-10.4	B	-15.2	B	-13.9	B	-15.180	B	P
Iron	12.0	U	24.9	B	12.0	U	12.0	U	12.000	U	P
Lead	56.0	U	56.0	U	56.0	U	56.0	U	56.000	U	P
Magnesium	50.0	U	50.0	U	50.0	U	50.0	U	50.000	U	P
Manganese	2.0	U	4.2	B	2.0	U	2.0	U	2.000	U	P
Nickel	15.0	U	15.0	U	15.0	U	15.0	U	15.000	U	P
Potassium	600.0	U	600.0	U	600.0	U	600.0	U	600.000	U	P
Selenium	87.0	U	87.0	U	87.0	U	87.0	U	87.000	U	P
Silver	4.0	U	4.0	U	4.0	U	4.0	U	4.000	U	P
Sodium	70.0	U	70.0	U	70.0	U	70.0	U	70.000	U	P
Thallium	50.0	U	50.0	U	50.0	U	50.0	U	50.000	U	P
Vanadium	4.0	U	4.9	B	4.0	U	4.0	U	4.000	U	P
Zinc	4.0	U	4.0	U	4.0	U	4.0	U	4.000	U	P

FORM III - IN

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3
BLANKS

Lab Name: L.A.S. _____

Contract: BECHTEL_HA

Lab Code: LOCK__

Case No.: 713BHT

SAS No.: _____

SDG No.: LK49C

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
			1	C	2	C	3	C			
Aluminum	29.0	U	29.0	U	29.0	U	29.0	U	61.190	B	F
Antimony	58.0	U	58.0	U	58.0	U	58.0	U	58.000	U	F
Arsenic	98.0	U	98.0	U	98.0	U	98.0	U	98.000	U	F
Barium	21.0	U	21.0	U	21.0	U	21.0	U	21.000	U	F
Beryllium	1.0	U	1.0	U	1.0	U	1.0	U	1.000	U	F
Cadmium	5.0	U	5.0	U	5.0	U	5.0	U	5.000	U	F
Calcium	32.0	U	32.0	U	32.0	U	32.0	U	134.050	B	F
Chromium	3.0	U	3.0	U	3.0	U	3.0	U	3.000	U	F
Cobalt	6.0	U	6.0	U	6.0	U	6.0	U	6.000	U	F
Copper	3.0	U	3.0	U	3.0	U	3.0	U	3.000	U	F
Iron	12.0	U	12.0	U	12.0	U	12.0	U	12.000	U	F
Lead	56.0	U	56.0	U	56.0	U	56.0	U	56.000	U	F
Magnesium	50.0	U	50.0	U	50.0	U	50.0	U	50.000	U	F
Manganese	2.0	U	2.0	U	2.2	B	3.4	B	2.000	U	F
Nickel	15.0	U	15.0	U	15.0	U	15.0	U	15.000	U	F
Potassium	600.0	U	600.0	U	600.0	U	600.0	U	600.000	U	F
Selenium	87.0	U	87.0	U	87.0	U	87.0	U	87.000	U	F
Silver	4.0	U	4.0	U	4.0	U	4.0	U	4.000	U	F
Sodium	70.0	U	70.0	U	70.0	U	70.0	U	112.790	B	F
Thallium	50.0	U	50.0	U	50.0	U	50.0	U	50.000	U	F
Vanadium	4.0	U	4.0	U	4.0	U	4.0	U	4.000	U	F
Zinc	4.0	U	4.0	U	4.0	U	4.0	U	5.710	B	F

FORM III - IN

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LATA INORGANIC (METALS)
DATA VALIDATION CHECKLIST

ACCURACY DATA SUMMARY

SDG: LK4903-LAS				VALIDATOR: BJ MORRIS				DATE: 19-Sep-95				
PROJECT: 100-KR-4				REVIEWER: BJ SEYMOUR				LATA NO.: VB403.94				
HEIS-SN	ANALYTE	RESULTS	Lab Q	Actual Spiking Level	Minimum Required Spiking Level	Difference	PERCENT RECOVERY (%R)				SAMPLES AFFECTED	VAL Q
							Matrix Spike	Matrix Spike Duplicate	Post Digestion Spike	Laboratory Control Standard		
B0G865	Calcium			No matrix spike performed.							B0G864 B0G865	J
B0G865	Magnesium			No matrix spike performed.							B0G864 B0G865	J
B0G865	Potassium			No matrix spike performed.							B0G864 B0G865	J/BJ
B0G865	Sodium			No matrix spike performed.							B0G864 B0G865	J

LATA INORGANIC (METALS)
DATA VALIDATION CHECKLIST

PRECISION DATA SUMMARY

SDG: LK4903-LAS			VALIDATOR: BJ MORRIS										DATE: 19-Sep-95		
PROJECT: 100-KR-4			REVIEWER: BJ SEYMOUR										LATA NO.: VB403.94		
HEIS-SN	ANALYTE	RESULTS	LAB Q	IDL µg/L	10*IDL µg/L	50*IDL µg/L	SERIAL DIL %D	CRDL µg/L	2 CRDL µg/L	5 CRDL µg/L	DUPE RPD %	DUPE CRDL dif	MS/MSD RPD	SAMPLES AFFECTED	VAL Q
BOG865	Calcium	67058.24		32.0		1600	12.5%							BOG865	J

CLP

9

ICP SERIAL DILUTION

CLIENT ID NO.

BOG865 L

Lab Name: L.A.S.

Contract: BECHTEL_HA

Lab Code: LOCK

Case No.: 713BHD

SAS No.:

SDG No.: LK490

Matrix (soil/water): WATER

Level (low/med): LOW

Concentration Units: ug/L

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Difference	Q	M
Aluminum	29.00	U	145.00	U			P
Antimony	58.00	U	290.00	U			P
Arsenic	98.00	U	490.00	U			P
Barium	32.13	B	105.00	U	100.0		P
Beryllium	1.00	U	5.00	U			P
Cadmium	5.00	U	25.00	U			P
Calcium	67058.24	U	58682.12	U	12.5	E	P
Chromium	3.00	U	15.00	U			P
Cobalt	6.00	U	30.00	U			P
Copper	3.00	U	15.00	U			P
Iron	12.00	U	60.00	U			P
Lead	56.00	U	280.00	U			P
Magnesium	13699.08	U	12516.48	B	8.6		P
Manganese	2.00	U	10.00	U			P
Nickel	15.00	U	75.00	U			P
Potassium	5400.49	U	4749.61	B	12.1		P
Selenium	94.73	B	435.00	U	100.0		P
Silver	4.00	U	20.00	U			P
Sodium	7773.91	U	7231.77	B	7.0		P
Thallium	82.11	B	250.00	U	100.0		P
Vanadium	6.56	B	20.94	B	219.2		P
Zinc	4.00	U	20.00	U			P

FORM IX - IN

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188

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**LATA INORGANIC (METALS)
DATA VALIDATION CHECKLIST**

PERCENT RECOVERY (ICV/CCV)

SDG: LK4903-LAS
LATA No.: VB403.94

Date: 19-Sep-95
Validator: BJ MORRIS

Analyte	ICV/CCV ID	Observed Value	True Value	%R
		O	A	
<u>Aluminum</u>	<u>ICV</u>	<u>100537.3</u>	<u>100000</u>	100.5%
<u>Zinc</u>	<u>CCV</u>	<u>10175.78</u>	<u>10000.0</u>	101.8%

**LATA INORGANIC (METALS)
DATA VALIDATION CHECKLIST**

MATRIX SPIKE RECOVERY (MS)

SDG: LK4903-LAS

Date: 19-Sep-95

LATA No.: VB403.94

Validator: BJ MORRIS

Analyte	Sample ID	Spike Sample Result	Sample Result	Spike Added	%R
		SSR	SR	SA	
<u>Aluminum</u>	<u>B0G864</u>	<u>1970.73</u>	<u>0.00</u>	<u>2000.00</u>	<u>98.5%</u>

LATA INORGANIC (METALS)
DATA VALIDATION CHECKLIST

PERCENT RECOVERY (LCS)

SDG: LK4903-LAS

Date: 19-Sep-95

LATA No.: VB403.94

Validator: BJ MORRIS

Analyte	Observed value	True value
	OLCS	ALCS
<u>Vanadium</u>	<u>515.66</u>	<u>500.00</u>

%R
103.1%

LATA INORGANIC (METALS)
DATA VALIDATION CHECKLIST

PERCENT DIFFERENCE (ICP SERIAL DILUTION)

SDG: LK4903-LAS
LATA No.: VB403.94

Date: 19-Sep-95
Validator: BJ MORRIS

Analyte	Analyte Concentration before Dilution	Analyte Concentration after Serial Dilution	%D
<u>Calcium-BOG865</u>	<u>67058.24</u>	<u>58682.12</u>	12.5%

000031

LATA INORGANIC (METALS)
DATA VALIDATION CHECKLIST

INORGANICS RESULTS CALCULATION, WATER

SDG: LK4903-LAS

Date: 19-Sep-95

LATA No.: VB403.94

Validator: BJ MORRIS

Analyte	Concentration from curve		Dilution Factor	Concentration (µg/L)
	CONCW	units	DFW	
<u>Barium B0G865</u>	<u>0.0321</u>	<u>mg/L</u>	<u>1</u>	32.1

Laboratory Case Narrative

CASE NARRATIVE INORGANIC 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 in good condition on July 13, 1995 and logged in as L4903.
- The samples were prepared as LAS Batch 713BHD and analyzed for selected analytes as requested on the chain of custody. Sample BOG865 (L4903-12) was used for matrix spike and duplicate, and serial dilution. All data flags due to the performance of the above-mentioned QC are associated with every sample digested with this batch.

Holding Time Requirements

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

Internal Quality Control

All internal quality control were within acceptance limits with the following exceptions:

- For calcium, the Percent Difference of the serial dilution is outside the 10% control limit. This may be due to physical interferences. All calcium results are flagged with an "E".

Hongsheng LI

7/25/95

Prepared By

Date

BM
7-25-95

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**CASE NARRATIVE
INORGANIC 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 in good condition on July 13, 1995 and logged in as L4903.
- The samples were prepared as LAS Batch 713BHT and analyzed for selected analytes as requested on the chain of custody. Sample BOG864 (L4903-2) was used for matrix spike and duplicate, and serial dilution. All data flags due to the performance of the above-mentioned QC are associated with every sample digested with this batch.

Holding Time Requirements

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

Internal Quality Control

All internal quality control were within acceptance limits.

Hongsheng LI

7/25/95

Prepared By

Date

BM
9-20-95 - 007

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Chain-of-Custody Information

L4903

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Data Turnaround
 Priority
 Normal

Collector <i>K.D. Lee</i>	Company Contact R. E. Peterson	Telephone (509) 372-9638
Project Designation 100-KR-4 Groundwater Sampling - Round 8	Sampling Location 100 K	SAF No. B95-069
Ice Chest No. <i>SML-574</i>	Field Logbook No. <i>FEFL-1049</i>	Method of Shipment Federal Express
Shipped To Lockheed	Offsite Property No. <i>W95-0-0209-40</i>	Bill of Lading/Air Bill No. <i>2904634359</i>

Possible Sample Hazards/Remarks	Preservation	HNO ₃	Cool 4°C	Cool 4°C	HNO ₃	Cool 4°C	Cool 4°C	HNO ₃
	Type of Container	G	G	P/G	P/G	G	P/G	G
	No. of Container(s)	1	1	1	6	1	1	1
Special Handling and/or Storage Maintain samples between 2°C and 6°C.	Volume	500mL	500mL	250mL	1L	1L	20mL	500mL

SAMPLE ANALYSIS	ICP Metals - TAL (Unfiltered)	Anions (IC) - F, Cl, SO ₄ , NO ₃ , NO ₂ , PO ₄	Turbidity	Gross Alpha, Gross Beta, U-234/235 /238, Sr-90, Gamma Spec	Tritium, C-14	Activity Scan	ICP Metals - TAL (Filtered)
-----------------	-------------------------------	--	-----------	--	---------------	---------------	-----------------------------

Sample No.	Matrix*	Date Sampled	Time Sampled							
BOG 864	W	7/11/95	0940	X	X	X	X	X	X	
BOG 865	W	7/11/95	0940							X

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS	Matrix*
Relinquished By <i>K. Lee</i> Date/Time <i>7/11/95 1400</i>	Received By <i>GR</i> Date/Time <i>1400</i>	Sample analysis for phosphate, nitrate, and nitrite by EPA 300.0; and turbidity by EPA 180.1 is being requested for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met. The Activity Scan is for all sample numbers listed 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
Relinquished By <i>[Signature]</i> Date/Time <i>0900</i>	Received By <i>[Signature]</i> Date/Time <i>7-11-95</i>		
Relinquished By <i>[Signature]</i> Date/Time <i>7-12-95</i>	Received By _____ Date/Time _____		
Relinquished By _____ Date/Time _____	Received By _____ Date/Time _____		

LABORATORY SECTION	Received By <i>Arviller</i>	Title <i>Sample Custodian</i>	Date/Time <i>7-13-95 0830</i>
FINAL SAMPLE DISPOSITION	Disposal Method <i>[Signature]</i>	Disposed By <i>[Signature]</i>	Date/Time _____

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END OF PACKAGE

DATA VALIDATION REPORT
for
100-KR-4 GROUNDWATER ROUND 8
General Chemistry Analysis
SDG LK4903-LAS
LATA VB403.94

Bechtel Hanford Inc.
P.O. Box 969
Richland, Washington

October 2, 1995

Table of Contents

Data Validation Narrative	000002
INTRODUCTION	000002
ANALYSES REQUESTED	000002
DATA QUALITY OBJECTIVES	000002
REFERENCES	000004
GLOSSARY OF VALIDATION APPLIED QUALIFIERS (CHEMISTRY)	000005
GLOSSARY OF LABORATORY APPLIED QUALIFIERS	000006
Qualification Summary Table	000007
Data Summary Table	000009
Sample Results	000011
Checklist	000013
Laboratory Case Narrative	000024
Chain-of-Custody Information	000028
END OF PACKAGE	000030

100-KR-4 GROUNDWATER ROUND 8
Data Validation Narrative

INTRODUCTION

All samples in Sample Delivery Group (SDG) LK4903-LAS (VB403.94) were validated at level D as defined in the Data Validation Procedures for Chemical Analysis (WHC-SD-EN-SPP-002, Rev.2).

The analyses were performed by Lockheed Analytical Services.

ANALYSES REQUESTED

See Table 1.

DATA QUALITY OBJECTIVES

Precision:	Goals for precision were met.
Accuracy:	Goals for accuracy were met.
Sample Result Verification:	All sample results were supported in the raw data.
Detection Limits:	Detection limit goals were met for all sample results as specified in the <i>Remedial Investigation/Feasibility Study Work Plan for the 100-KR-4 Operable Unit</i> , DOE/RL-90-21, Rev. 0.
Completeness:	The data package was 86% complete for all requested analyses.

MAJOR DEFICIENCIES

Major deficiencies were identified during validation which required qualification of data as unusable. See the "**Qualification Summary Table**".

MINOR DEFICIENCIES

Minor deficiencies were identified during validation which required qualification of data as estimated. See the "**Qualification Summary Table**".

**Table 1
Chain-of-Custody
Analysis Request**

LATA ID #: VB403.94

SDG: LK4903-LAS

Sample Information					Analyses Requested	
SAMPLE NO.	DATE COLLECTED	MATRIX	SAF	FIELD QC INFO	1	2
B0G864	11-Jul-95	WATER	B95-069	Split of B0G814	X	X

Method References:

	Analysis	Method
1.	Anions (Cl, F, NO ₂ , NO ₃ , PO ₄ , SO ₄)	300.0
2.	Turbidity	180.1

REFERENCES

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

WHC 1992, *Remedial Investigation/Feasibility Study Work Plan for the 100-KR-4 Operable Unit*, DOE/RL-90-21, Rev. 0, Department of Energy-Hanford, Richland, Washington.

GLOSSARY OF VALIDATION APPLIED QUALIFIERS (CHEMISTRY)

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 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.
- 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 are unusable due to an identified QC deficiency.

GLOSSARY OF LABORATORY APPLIED QUALIFIERS

Qualifiers which may be applied by the laboratory in compliance with applicable requirements are as follows.

Commonly used laboratory general chemistry qualifiers:

- U- Indicates the analyte was analyzed for but not detected in the sample.
- B- Indicates the analyte was detected at a concentration below the contract required detection limit.
- H- Analysis performed outside of maximum hold time.

Qualification Summary Table

Qualification Summary Table

General Chemistry

ANALYTE	TYPE	QUALIFIER	SAMPLES AFFECTED	DQO	REASON
Nitrite	MAJOR	UR	B0G864	HOLD TIME	Holding time is exceeded by greater than 2 times.
Turbidity	MINOR	UJ	B0G864	HOLD TIME	Holding time is exceeded by less than 2 times.
Nitrate	MINOR	J	B0G864	HOLD TIME	Holding time is exceeded by greater than 2 times.
Ortho-Phosphate	MINOR	BJ	B0G864	HOLD TIME	Holding time is exceeded by greater than 2 times.

Data Summary Table

**GENERAL CHEMISTRY
DATA SUMMARY TABLE**

LATA ID#: VB403.94		HEIS #:	B0G864	
		Date:	11-Jul-95	
		Matrix:	WATER	
Constituent	CAS #	Units	Results	Q
Chloride by IC	16887-00-6	mg/L	32	
Fluoride by IC	16984-48-8	mg/L	0.086	B
Sulfate by IC	14808-79-8	mg/L	21	
Nitrate by IC	14797-55-8	mg/L	2.5	J
Nitrite by IC	14797-65-0	mg/L	0.002	UR
Ortho-Phosphate by IC	14265-44-2	mg/L	0.081	BJ
Turbidity	TURBIDITY	NTU	0.00	UJ

Sample Results (Form I's)

LOCKHEED ANALYTICAL SERVICES

Sample Results

Client Sample ID: B0G864	Date Collected: 11-JUL-95
Matrix: Water	Date Received: 13-JUL-95
Percent Solids: N/A	

Constituent	Units	Method	Result	Project Reporting Limit	Data Qualifier(s)	Date Analyzed	LAS Batch ID	LAS Sample ID
Turbidity	NTU	180.1	0.00	N/A	X UJ	14-JUL-95	25270	L4903-4
Chloride	mg/L	300.0	32.	0.020		17-JUL-95	25263	L4903-3
Fluoride	mg/L	300.0	0.086	0.10	B	17-JUL-95	25264	L4903-3
Nitrate-N	mg/L	300.0	2.5	0.020	X J	17-JUL-95	25265	L4903-3
Nitrite-N	mg/L	300.0	< 0.002	0.010	X UR	17-JUL-95	25266	L4903-3
Ortho Phosphate	mg/L	300.0	0.081	0.10	X BT	17-JUL-95	25267	L4903-3
Sulfate	mg/L	300.0	21.	0.10		17-JUL-95	25268	L4903-3

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Checklist

**LATA GENERAL CHEMISTRY
DATA VALIDATION CHECKLIST**

VALIDATION LEVEL:	A	B	C	D	E
VALIDATION PROCEDURE:	<input type="checkbox"/> WHC-CM-5-3, Rev. 0		<input checked="" type="checkbox"/> WHC-SD-EN-SPP-002, Rev. 2		
PROJECT:	100-KR-4 <i>9-26-95</i>	SDG:		LK4903-LAS	
VALIDATOR:	BJ SEYMOUR <i>bj</i>	LATA NO:	VB403.94	DATE:	22-Sep-95
REVIEWER:	BJ MORRIS <i>BJ</i>	LAB:	LAS	CASE:	N/A
SAF NO:	B95-069	QAPP NO:	DOE/RL-90-21 Rev. 0	SAP NO:	N/A
ANALYSES REQUESTED					
<input checked="" type="checkbox"/>	Anions 300.0	<input checked="" type="checkbox"/>	Turbidity 180.1	COMMENTS:	
SAMPLE NO.		MATRIX			
B0G864		WATER			

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present?
Is a case narrative present?

YES	NO	N/A
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. HOLDING TIMES

Are sample holding times acceptable?

YES	NO	N/A
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

See **HOLDING TIME SUMMARY** form

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

Were initial calibrations performed on all instruments?
Are initial calibrations acceptable?
Were calibration checks performed on all instruments?
Are calibration checks acceptable?
Validation calculation checks were performed and are acceptable.

YES	NO	N/A
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If **NO(s)** are checked, see **CALIBRATION DATA SUMMARY** form

**LATA GENERAL CHEMISTRY
DATA VALIDATION CHECKLIST**

4. BLANKS

YES NO N/A

Were laboratory blanks performed for all applicable analyses?

Are laboratory blank results acceptable?

Were preparation blanks analyzed?

Are preparation blank results acceptable?

If NO(s) are checked, see BLANK AND SAMPLE DATA SUMMARY form

5. ACCURACY

YES NO N/A

Were spike samples analyzed at the proper frequency?

Are all spike sample recoveries acceptable?

Were laboratory control samples (LCS) analyzed at the proper frequency?

Are all LCS recoveries acceptable?

Validation calculation checks were performed and are acceptable.

If NO(s) are checked, see ACCURACY DATA SUMMARY form

6. PRECISION

YES NO N/A

Were laboratory duplicates analyzed at the proper frequency?

Are all duplicate RPD values acceptable?

Were MS/MSDs analyzed?

Are all MS/MSD RPD values acceptable?

Validation calculation checks were performed and are acceptable.

If NO(s) are checked, see PRECISION DATA SUMMARY form

7. FIELD QC SAMPLES

YES NO N/A

Were field QC samples (field/trip blanks, duplicates, splits, performance audit) identified?

Are field/trip blank results acceptable? (see Blank Data Summary form)

Are field duplicate RPD values acceptable? (see Field QC calculations)

Are field split RPD values acceptable? (see Field QC calculations)

Are performance audit sample results acceptable?

Comments: The following field split was identified: B0G814/B0G864.

Field split results are evaluated in SDG W0623-QES (VB403.95).

LATA GENERAL CHEMISTRY
DATA VALIDATION CHECKLIST

8. ANALYTE QUANTITATION

YES NO N/A

Was analyte quantitation performed properly?

Are results calculated properly?

Validation calculation checks were performed and are acceptable.

Comments:

9. REPORTED RESULTS AND DETECTION LIMITS

YES NO N/A

Are results reported for all requested analyses?

Are all results supported in the raw data?

Do results meet the CRDLs?

Validation calculation checks were performed and are acceptable.

Comments:

VALIDATION SUMMARY

For deficiencies (major and minor) and comments, please refer to the Qualification Summary Table.

LATA GENERAL CHEMISTRY
DATA VALIDATION CHECKLIST

HOLDING TIME SUMMARY

SDG: LK4903-LAS			VALIDATOR: BJ SEYMOUR				DATE: 22-Sep-95			
PROJECT: 100-KR-4			REVIEWER: BJ MORRIS				LATA NO.: VB403.94			
HEIS-SN	MATRIX CODE	ANALYSIS	DATE COLLECTED	PREP DATE	ANALYSIS DATE	PREP HT (days)	Required HT (days)	ANALYSIS HT (days)	Required HT (days)	VAL Q
B0G864	WATER	Anions(Cl,F,SO ₄)	11-Jul-95	N/A	17-Jul-95	N/A	N/A	6	28	NONE
B0G864	WATER	Anions(NO ₂ ,NO ₃ ,PO ₄)	11-Jul-95	N/A	17-Jul-95	N/A	N/A	6	2	J/UR/BJ
B0G864	WATER	Turbidity	11-Jul-95	N/A	14-Jul-95	N/A	N/A	3	2	UJ

000017

**LATA GENERAL CHEMISTRY
CALCULATION SPREADSHEET**

LINEAR REGRESSION ANALYSIS

SDG: LK4903-LAS

Date: 22-Sep-95

LATA No.: VB403.94

Validator: BJ SEYMOUR

Analyte/Calibration Date: 7-17-95/Chloride

Concentration	Absorbance
x	y
0.000	0
20.000	187332
20.000	120604
50.000	529372
100.000	555830
1000.000	6578974
5000.000	34908736

r
0.9999

r²
0.9998

slope
6976.38

x intercept
6.3804

1/slope
0.0001

y intercept
-43281.52

LINEAR REGRESSION ANALYSIS

SDG: LK4903-LAS

Date: 22-Sep-95

LATA No.: VB403.94

Validator: BJ SEYMOUR

Analyte/Calibration Date: 7-17-95/Fluoride

Concentration	Absorbance
x	y
0.000	0
20.000	322011
50.000	282650
100.000	1423150
1000.000	16257752
5000.000	92109900

r
0.9997

r²
0.9995

slope
18479.01

x intercept
33.1577

1/slope
0.0001

y intercept
-603343

**LATA GENERAL CHEMISTRY
CALCULATION SPREADSHEET**

PERCENT RECOVERY (ICV/CCV)

SDG: LK4903-LAS

Date: 22-Sep-95

LATA No.: VB403.94

Validator: BJ SEYMOUR

Analyte	Sample ID	Observed Value	True Value	%R
		O	A	
Chloride	ICV	967.400	1000	97%
Chloride	CCV	993.988	1000	99%
Fluoride	ICV	1010.463	1000	101%
Fluoride	CCV	993.207	1000	99%

**LATA GENERAL CHEMISTRY
CALCULATION SPREADSHEET**

MATRIX SPIKE RECOVERY (MS)

SDG: LK4903-LAS

Date: 22-Sep-95

LATA No.: VB403.94

Validator: BJ SEYMOUR

Analyte	Sample ID	Spike Sample Result	Sample Result	Spike Added	%R
		SSR	SR	SA	
Fluoride	B0G864	1.567	0.086	1.50	99%
Chloride	B0G864	73.339	31.685	40.00	104%

**LATA GENERAL CHEMISTRY
CALCULATION SPREADSHEET**

PERCENT RECOVERY (LCS)

SDG: LK4903-LAS
LATA No.: VB403.94

Date: 22-Sep-95
Validator: BJ SEYMOUR

Analyte	Observed value	True value	%R
	OLCS	ALCS	
Fluoride	961.586	1000	96%
Chloride	963.929	1000	96%

**LATA GENERAL CHEMISTRY
CALCULATION SPREADSHEET**

RELATIVE PERCENT DIFFERENCE

SDG: LK4903-LAS

Date: 22-Sep-95

LATA No.: VB403.94

Validator: BJ SEYMOUR

Analyte	Sample ID	Original (Sample) concentration	Duplicate concentration	RPD
		OS	D	
Fluoride	B0G864	86.092	85.561	0.6%
Chloride	B0G864	31.685	32.191	1.6%

**LATA GENERAL CHEMISTRY
CALCULATION SPREADSHEET**

RESULTS CALCULATION, WATER

SDG: LK4903-LAS

Date: 22-Sep-95

LATA No.: VB403.94

Validator: BJ SEYMOUR

Analyte	Concentration from curve		Dilution Factor	Concentration
	CONCW	units	DFW	
<u>Fluoride-B0G864</u>	<u>86.092</u>	<u>µg/L</u>	<u>1</u>	86.1
<u>Chloride-B0G864</u>	<u>31.685</u>	<u>mg/L</u>	<u>1</u>	31.7
<u>Turbidity-B0G864</u>	<u>0.00</u>	<u>NTU</u>	<u>1</u>	0.0

Laboratory Case Narrative

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



August 17, 1995

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

RE: Log-in No.: L4903
Quotation No.: Q400000-B
SAF: B95-069
Document File No.: 0713596
WHC Document File No.: 246
SDG No.: LK4903



The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on 13 July 1995.

The temperature of the cooler upon receipt was 4°C. Sample containers received agree with the chain-of-custody documentation. Sample containers were received intact. Samples were not received in time to meet the analytical holding time requirements. Method 180.1 Turbidity and Method 300.0 Nitrate, Nitrite and Ortho Phosphate were received out of holding time.

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.

bis 9-24-95

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Lockheed Analytical Services

Log-in No.: L4903
Quotation No.: Q400000-B
SAF: B95-069
Document File No.: 0713596
WHC Document File No.: 246
SDG No.: LK4903

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

bts 9-24-95

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**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 LK4903 and analyzed in batch 713 bh for selected analytes as requested on the chain of custody. Quality control analysis was performed on the following sample:

Client ID	LAL #		Method
BOG864	L4903-4	DUP, MS	180.1 Turbidity
BOG864	L4903-3	DUP, MS	300.0 Chloride, Fluoride, Nitrate-Nitrogen, Nitrite-Nitrogen, Orthophosphate and Sulfate

Holding Time Requirements

- All samples were analyzed within the method-specific holding times with the exception of Method 180.1 Turbidity; Method 300.0 Nitrate-Nitrogen, Nitrite-Nitrogen and Orthophosphate which were received outside of holding time. All associated samples are flagged with an "H".

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
 Prepared By

July 20, 1995
 Date

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bis 9-24-95
~~006~~

Chain-of-Custody Information

Bechtel Hanford, Inc.

L4903

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Data Turnaround

Priority
 Normal

Collector <i>K. D. Lee</i>	Company Contact R. E. Peterson	Telephone (509) 372-9638
Project Designation 100-KR-4 Groundwater Sampling - Round 8	Sampling Location 100 K	SAF No. B95-069
Ice Chest No. <i>SML-574</i>	Field Logbook No. <i>FFL-1049</i>	Method of Shipment Federal Express
Shipped To Lockheed	Offsite Property No. <i>W95-0-02091-40</i>	Bill of Lading/Air Bill No. <i>2904634 354</i>

Possible Sample Hazards/Remarks	Preservation	HNO ₃	Cool 4°C	Cool 4°C	HNO ₃	Cool 4°C	Cool 4°C	HNO ₃		
	Type of Container	G	G	P/G	P/G	G	P/G	G		
	No. of Container(s)	1	1	1	6	1	1	1		
Special Handling and/or Storage Maintain samples between 2°C and 6°C.	Volume	500mL	500mL	250mL	1L	1L	20mL	500mL		

SAMPLE ANALYSIS	ICP Metals - TAL (Unfiltered)	Anions (IC) - F, Cl, SO ₄ , NO ₂ , NO ₃ , PO ₄	Turbidity	Gross Alpha, Gross Beta, U-234/235, /238, Sr-90, Gamma Spec	Tritium, C-14	Activity Scan	ICP Metals - TAL (Filtered)
-----------------	-------------------------------	--	-----------	---	---------------	---------------	-----------------------------

Sample No.	Matrix*	Date Sampled	Time Sampled								
BOG 864	W	7/11/95	0940	X	X	X	X	X	X		
BOG 865	W	7/11/95	0940							X	

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS	Matrix*
Relinquished By <i>K. Lee</i>	Date/Time 7/11/95 1400	Received By <i>G.R.</i>	Date/Time 1400
Relinquished By <i>[Signature]</i>	Date/Time 0900	Received By <i>[Signature]</i>	Date/Time 7-11-95
Relinquished By <i>[Signature]</i>	Date/Time 7-12-95	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

Sample analysis for phosphate, nitrate, and nitrite by EPA 300.0; and turbidity by EPA 180.1 is being requested for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met.

The Activity Scan is for all sample numbers listed 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>[Signature]</i>	Title <i>Sample Custodian</i>	Date/Time 7-13 95 0830
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

310
sec 15

000029

END OF PACKAGE

DATA VALIDATION REPORT
for
100-KR-4 GROUNDWATER ROUND 8
Radiochemistry Analysis
SDG LK4903-LAS
LATA VB403.94

Bechtel Hanford Inc.
P.O. Box 969
Richland, Washington

October 2, 1995

Table of Contents

Data Validation Narrative	000002
INTRODUCTION	000002
ANALYSES REQUESTED	000002
DATA QUALITY OBJECTIVES	000002
REFERENCES	000004
GLOSSARY OF VALIDATION APPLIED QUALIFIERS (RADIOCHEMISTRY) ..	000005
GLOSSARY OF LABORATORY APPLIED QUALIFIERS	000006
Qualification Summary Table	000007
Data Summary Table	000009
Sample Results	000011
Checklist	000014
Laboratory Case Narrative	000027
Chain-of-Custody Information	000030
Supplemental Information	000033
END OF PACKAGE	000035

**100-KR-4 GROUNDWATER ROUND 8
Data Validation Narrative**

INTRODUCTION

All samples in Sample Delivery Group (SDG) LK4903-LAS (VB403.94) were validated at level D as defined in the Data Validation Procedures for Radiochemical Analyses (WHC-SD-EN-SPP-001, Rev. 1)

The analyses were performed by Lockheed Analytical Services.

ANALYSES REQUESTED

See Table 1.

DATA QUALITY OBJECTIVES

Precision:	Goals for precision were met.
Accuracy:	Goals for accuracy were met.
Sample Result Verification:	All sample results were supported in the raw data.
Detection Limits:	Detection limit goals were met for all sample results as specified in the <i>Remedial Investigation/Feasibility Study Work Plan for the 100-KR-4 Operable Unit</i> , DOE/RL-90-21, Rev. 0.
Completeness:	The data package was 100% complete for all requested analyses.

MAJOR DEFICIENCIES

No major deficiencies were identified during data validation which required qualification of data as unusable.

MINOR DEFICIENCIES

No minor deficiencies were identified during data validation which required qualification of data as estimated.

**Table 1
Chain-of-Custody
Analysis Request**

LATA ID #: VB403.94

SDG: LK4903-LAS

Sample Information					Analyses Requested								
SAMPLE NO.	DATE COLLECTED	MATRIX	SAF	FIELD QC INFO	1	2	3	4	5	6	7	8	9
B0G864	11-Jul-95	WATER	B95-069	Split of B0G814	X	X	X	X	X	X	X	X	X

Method References:

<u>Analysis</u>	<u>Method</u>
1. Uranium-234/235/238	LAL-91-SOP-0108
2. Gamma Scan	LAL-91-SOP-0063
3. Gross Alpha	LAL-91-SOP-0060
4. Gross Beta	LAL-91-SOP-0060
5. Strontium-90	LAL-91-SOP-0196
6. Carbon-14	LAL-91-SOP-0209
7. Tritium	LAL-91-SOP-0066
8. Activity Scan	Lab Specific
9. Rad Screen	Lab Specific

NOTE:

NOTE 1: The Rad screen was deemed unnecessary prior to off-site shipment.

REFERENCES

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

DOE 1992, *Remedial Investigation/Feasibility Study Work Plan for the 100-KR-4 Operable Unit*, DOE/RL-90-21, Rev. 0, Department of Energy-Hanford, Richland, Washington.

GLOSSARY OF VALIDATION APPLIED QUALIFIERS (RADIOCHEMISTRY)

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

- U- Indicates the constituent was analyzed for, but was not detected at a concentration above the Minimum Detectable Activity (MDA). The concentration reported is the sample result corrected for sample aliquot size, dilution factors, and percent solids (in the case of solid matrices) by the laboratory. The associated data should be considered usable for decision making purposes.
- UJ- Indicates the constituent was analyzed for and was not detected at a concentration above the Minimum Detectable Activity (MDA). Due to a quality control deficiency identified during data validation, the result reported may not accurately reflect the sample concentration. The associated data should be considered usable for decision making purposes.
- J- Indicates a constituent was analyzed for and detected. The associated value is estimated due to a quality control deficiency identified during validation. The data should be considered usable for decision making purposes.
- R- Indicates the constituent was analyzed for and detected; however, due to an identified quality control deficiency the data should be considered unusable for decision making purposes.
- UR- Indicates the constituent was analyzed for and not detected; however, due to an identified quality control deficiency the data should be considered unusable for decision making purposes.

GLOSSARY OF LABORATORY APPLIED QUALIFIERS

Qualifiers which may be applied by the laboratory in compliance with applicable requirements are as follows.

Commonly used laboratory radiochemistry qualifiers:

- U- Indicates the analyte was analyzed for but not detected in the sample.
- J- Indicates the value reported is estimated due to the presence of interference.
- C- Indicates the presence of high TDS in sample required reduction of sample size which increased the MDA.

Qualification Summary Table

Qualification Summary Table

Radiochemistry

ANALYTE	TYPE	QUALIFIER	SAMPLES AFFECTED	DQO	REASON
No qualifiers were assigned by the validator.					

Comment:

1. The "U" qualifiers added to the Data Summary Tables and Form Is are laboratory concentration qualifiers to indicate that the results are <MDA and have not been applied as a result of validation.
2. The following field split was identified: B0G814/B0G864. Field split results will be evaluated in SDG W0623-QES (VB403.95).

Data Summary Table

**RADIOCHEMISTRY
DATA SUMMARY TABLE**

LATA ID#: VB403.94		HEIS #:	B0G864	
		Date:	11-Jul-95	
		Matrix:	WATER	
Constituent	CAS #	Units	Results	Q
Gross Alpha	ALPHA	pCi/L	2.3	
Gross Beta	BETA	pCi/L	31.7	
Strontium-90	10098-97-2	pCi/L	-0.29	U
Uranium-233/234	U-233/234	pCi/L	2.18	
Uranium-235	15117-96-1	pCi/L	0.131	
Uranium-238	U-238	pCi/L	2.04	
Carbon-14	14762-75-5	pCi/L	2090	
Tritium	10028-17-8	pCi/L	101000	

GAMMA-SCAN

Ac-228(Ra-228)		pCi/L	14	U
Cesium-137	10045-97-3	pCi/L	-1.7	U
Cobalt-58	13981-38-9	pCi/L	2.0	U
Cobalt-60	10198-40-0	pCi/L	3.9	U
Europium-152	14683-23-9	pCi/L	-8	U
Europium-154	15585-10-1	pCi/L	13	U
Europium-155	14391-16-3	pCi/L	2	U
Iron-59	14596-12-4	pCi/L	7.0	U
Lead-212	PB-212	pCi/L	6	U
Lead-214(Ra-226)	PB-214	pCi/L	4	U
Radium-226	13982-63-3	pCi/L	30	U
Ruthenium-106	13967-48-1	pCi/L	-9	U
Uranium-235	15117-96-1	pCi/L	-12	U

Sample Results (Form I's)

LOCKHEED ANALYTICAL SERVICES

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0G864

LAL Sample ID: L4903-5

Date Collected: 11-JUL-95

Date Received: 13-JUL-95

Matrix: Water

Login Number: L4903

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
Ac-228(Ra-228)	24-JUL-95	GAMMA SPEC LAL-0063_25331	14.	26.	38.		pCi/L u
Co-58	24-JUL-95	GAMMA SPEC LAL-0063_25331	2.0	5.5	9.3		pCi/L u
Co-60	24-JUL-95	GAMMA SPEC LAL-0063_25331	3.9	4.5	10.		pCi/L u
Cs-137	24-JUL-95	GAMMA SPEC LAL-0063_25331	-1.7	5.6	9.8		pCi/L u
Eu-152	24-JUL-95	GAMMA SPEC LAL-0063_25331	-8.	12.	46.		pCi/L u
Eu-154	24-JUL-95	GAMMA SPEC LAL-0063_25331	13.	13.	23.		pCi/L u
Eu-155	24-JUL-95	GAMMA SPEC LAL-0063_25331	2.	10.	17.		pCi/L u
Fe-59	24-JUL-95	GAMMA SPEC LAL-0063_25331	7.0	8.2	18.		pCi/L u
Pb-212	24-JUL-95	GAMMA SPEC LAL-0063_25331	6.	11.	15.		pCi/L u
Pb-214(Ra-226)	24-JUL-95	GAMMA SPEC LAL-0063_25331	4.	13.	19.		pCi/L u
Ra-226(GAMMA)	24-JUL-95	GAMMA SPEC LAL-0063_25331	30	130	180		pCi/L u
Ru-106	24-JUL-95	GAMMA SPEC LAL-0063_25331	-9.	43.	81.		pCi/L u
U-235(GAMMA)	24-JUL-95	GAMMA SPEC LAL-0063_25331	-12.	29.	43.		pCi/L u
Gross Alpha	26-JUL-95	GR ALP/BETA LAL-0060_25332	2.3	1.6	2.0	C	pCi/L
Gross Beta	26-JUL-95	GR ALP/BETA LAL-0060_25332	31.7	3.1	2.2		pCi/L
Total radio-strontium	03-AUG-95	SR-90 LAL-0196_25333	-0.29	0.42	0.77		pCi/L u
U-233/4	04-AUG-95	U-ISOTOPIC LAL-0108_25334	2.18	0.36	0.13		pCi/L
U-235	04-AUG-95	U-ISOTOPIC LAL-0108_25334	0.131	0.087	0.079		pCi/L
U-238	04-AUG-95	U-ISOTOPIC LAL-0108_25334	2.04	0.34	0.096		pCi/L

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LOCKHEED ANALYTICAL SERVICES

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0G864

LAL Sample ID: L4903-11

Date Collected: 11-JUL-95

Date Received: 13-JUL-95

Matrix: Water

Login Number: L4903

Constituent	Analyzed	Batch	Activity	Error	MDA	Units
C-14	26-JUL-95	C-14 LAL-0209_25323	2090	180	98.	pci/L
H-3	29-JUL-95	TRITIUM(H3) LAL-0066_25330	101000	4200	260	pci/L

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9-26-95

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Checklist

**LATA RADIOCHEMISTRY
DATA VALIDATION CHECKLIST**

VALIDATION LEVEL:	A	B	C	D	E
VALIDATION PROCEDURE:	<input type="checkbox"/> WHC-CM-5-3, Rev. 0		<input type="checkbox"/> WHC-SD-EN-SPP-001, Rev. 1		
PROJECT:	100-KR-4	SDG:	LK4903-LAS		
VALIDATOR:	AM FREIER	KATA NO:	VB403.94	DATE:	20-Sep-95
REVIEWER:	BJ MORRIS	LAB:	LAS	CASE:	N/A
SAF NO:	B95-069	QAPP NO:	DOE/RL-90-21 Rev. 0	SAP NO:	N/A
ANALYSES REQUESTED					
<input checked="" type="checkbox"/> Uranium-234/235/238 LAL-91-SOP-0108	<input checked="" type="checkbox"/> Gamma Scan LAL-91-SOP-0063	<input checked="" type="checkbox"/> Gross Alpha/Beta LAL-91-SOP-0060	<input checked="" type="checkbox"/> Strontium-90 LAL-91-SOP-0196	<input checked="" type="checkbox"/> Carbon-14 LAL-91-SOP-0209	<input checked="" type="checkbox"/> Tritium LAL-91-SOP-0066
SAMPLE NO.	MATRIX	COMMENTS:			
BOG864	WATER				

- 1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE** YES NO N/A
- Is technical verification documentation present?
- Is a case narrative present?
- 2. HOLDING TIMES** YES NO N/A
- Are sample holding times acceptable?
- Are samples preserved correctly?

See **HOLDING TIME SUMMARY** form

- 3. INSTRUMENT PERFORMANCE AND CALIBRATIONS** YES NO N/A
- Were instruments/detectors calibrated within one year of sample analysis?
- Are initial calibrations acceptable?
- Are standards NIST traceable?
- Are standards acceptable?
- Comments:** Calibration of instruments/detectors was not performed within one year of sample analysis, however continuing calibration data is acceptable. Therefore, no qualifiers are assigned.

**LATA RADIOCHEMISTRY
DATA VALIDATION CHECKLIST**

4. CONTINUING CALIBRATION	YES	NO	N/A
Background checked at proper frequency?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Background check acceptable?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Efficiency checked at proper frequency?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Efficiency check acceptable?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Calibration check standards NIST traceable?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Calibration check standards acceptable?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If NO(s) are checked, see CALIBRATION DATA SUMMARY form

5. BLANKS	YES	NO	N/A
Were method blanks analyzed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are the method blanks free of analytes?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Were method blank results acceptable?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Validation calculation/transcription checks were performed and are acceptable.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If NO(s) are checked, see BLANK DATA SUMMARY form

6. ACCURACY	YES	NO	N/A
Were spike samples analyzed at the proper frequency?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are all spike sample recoveries acceptable?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Were laboratory control standards (LCS) analyzed at the proper frequency?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are all LCS recoveries acceptable?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Was a tracer/chemical carrier added?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Was the tracer/chemical carrier recovery acceptable?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are standard sources traceable?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are standards acceptable?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Validation calculation checks were performed and are acceptable.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If NO(s) are checked, see ACCURACY DATA SUMMARY form

7. PRECISION	YES	NO	N/A
Were laboratory duplicates analyzed at the proper frequency?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are all duplicate RPD values acceptable?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Validation calculation checks were performed and are acceptable.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If NO(s) are checked, see PRECISION DATA SUMMARY form

**LATA RADIOCHEMISTRY
DATA VALIDATION CHECKLIST**

8. FIELD QC SAMPLES

YES NO N/A

Were field QC samples (field/trip blanks, duplicates, splits, performance audit) identified?

Are field/trip blank results acceptable? (see Blank Data Summary form)

Are field duplicate RPD values acceptable? (see Field QC calculations)

Are field split RPD values acceptable? (see Field QC calculations)

Are performance audit sample results acceptable?

Comments: Field split samples: B0G814/B0B864 The field split RPD values will be evaluated in

SDG# W0623-QES. (LATA ID # VB403.95)

9. REPORTED RESULTS AND DETECTION LIMITS

YES NO N/A

Are results reported for all requested analyses?

Are all results supported in the raw data?

Are results calculated properly?

Do MDAs meet the RDLs?

Validation calculation checks were performed and are acceptable.

Comments:

VALIDATION SUMMARY

For deficiencies (major and minor) and comments, please refer to the Qualification Summary Table.

LATA RADIOCHEMISTRY
DATA VALIDATION CHECKLIST

HOLDING TIME SUMMARY

SDG: LK4903-LAS			VALIDATOR: AM FREIER					DATE: 20-Sep-95		
PROJECT: 100-KR-4			REVIEWER: BJ MORRIS					LATA NO.: VB403.94		
HEIS-SN	MATRIX CODE	ANALYSIS	DATE COLLECTED	PREP DATE	ANALYSIS DATE	PREP HT (days)	Required HT (days)	ANALYSIS HT (days)	Required HT (days)	VAL Q
B0G864	WATER	Gross Alpha/Beta	11-Jul-95	N/A	26-Jul-95	N/A	N/A	15	180	NONE
B0G864	WATER	Strontium-90	11-Jul-95	N/A	03-Aug-95	N/A	N/A	23	180	NONE
B0G864	WATER	Uranium-233/34/35/38	11-Jul-95	N/A	04-Aug-95	N/A	N/A	24	180	NONE
B0G864	WATER	Carbon-14	11-Jul-95	N/A	26-Jul-95	N/A	N/A	15	180	NONE
B0G864	WATER	Tritium	11-Jul-95	N/A	28-Jul-95	N/A	N/A	17	180	NONE
B0G864	WATER	Gamma Scan	11-Jul-95	N/A	25-Jul-95	N/A	N/A	14	180	NONE

LATA RADIOCHEMISTRY
CALCULATION SPREADSHEET

MATRIX SPIKE RECOVERY (MS)

SDG: LK4903-LAS

Date: 20-Sep-95

LATA No.: VB403.94

Validator: AM FREIER

Analyte	Sample ID	Spike Sample Result	Sample Result	Spike Added	%R
C-14	B0G864	4290	2090	2610.00	84%
Gross Alpha	B0G864	41.90	2.27	32.20	123%

LATA RADIOCHEMISTRY
CALCULATION SPREADSHEET

PERCENT RECOVERY (LCS)

SDG: LK4903-LAS

Date: 20-Sep-95

LATA No.: VB403.94

Validator: AM FREIER

Analyte	Observed value	True value	%R
H-3	1720	2270	76%
Co-60	217	218	100%
Gross Alpha	40.7	39.2	104%
Sr-90	49.0	51.9	94%
U-238	5.47	5.71	96%

LATA RADIOCHEMISTRY
CALCULATION SPREADSHEET

RELATIVE PERCENT DIFFERENCE

SDG: LK4903-LAS

Date: 20-Sep-95

LATA No.: VB403.94

Validator: AM FREIER

Analyte	Sample ID	Original (Sample) concentration	Duplicate concentration	RPD
C-14	B0G864	2090	1830	13.3%
Cs-137	B0G864	-1.69	0.16	NC
Gross Alpha	B0G864	2.27	2.46	8.03%
Sr-90	B0G864	-0.30	-0.27	NC
U-235	B0G864	0.13	0.15	10.1%

**LATA RADIOCHEMISTRY
CALCULATION SPREADSHEET**

ALPHA SPEC TRACER RECOVERY

SDG: LK4903-LAS
LATA No.: VB403.94

Date: 20-Sep-95
Validator: AM FREIER

<u>Analyte</u>	<u>Sample ID</u>	<u>Gross counts/ minute</u>	<u>Background counts/ minute of tracer</u>	<u>Detector efficiency</u>	<u>Activity (DPM) of tracer added to sample</u>	<u>%R</u>
U-232	B0G864	0.24	0.0257	0.2479	0.90	0.963

**LATA RADIOCHEMISTRY
CALCULATION SPREADSHEET**

MINIMUM DETECTABLE ACTIVITY (MDA)

SDG: LK4903-LAS

Date: 20-Sep-95

LATA No.: VB403.94

Validator: AM FREIER

Analyte	Sample ID	Bkgnd counts/ min (cpm) or Std Dev of bkgnd (cpm)	Count time for assoc. sample	Detector Efficiency	Ingrowth corr. factor	Tracer/ Carrier recovery factor	Decay factor	Chemical yield factor	Sample volume (L or g)	MDA
Gross Alpha	B0G864	0.03	100	0.095	1.00	1.00	1.00	1.00	0.25	2.04
Strontium-90	B0G864	1.01	150.00	0.44	1.05	1.02	1.00	1.00	0.50	0.77
U-235	B0G864	0.0007	720	0.25	1.00	0.96	1.00	1.00	0.20	0.079
C-14	B0G864	2.22	25	0.69	1.00	1.00	1.00	1.00	0.01	97.73

**LATA RADIOCHEMISTRY
CALCULATION SPREADSHEET**

RESULTS CALCULATION GROSS ALPHA/BETA AND TRITIUM

SDG: LK4903-LAS
LATA No.: VB403.94

Date: 20-Sep-95
Validator: AM FREIER

<u>Analyte</u>	<u>Gross Counts per minute</u>	<u>Background Counts per minute</u>	<u>Activity of alpha fraction in beta channel</u>	<u>Detector Efficiency</u>	<u>Sample volume (L or g)</u>	<u>Result</u>
Gross Alpha	0.15	0.03	1.00	0.10	0.25	2.3
Tritium	430.42	0.87	1.00	0.19	0.01	100777

**LATA RADIOCHEMISTRY
CALCULATION SPREADSHEET**

RESULTS CALCULATION TOTAL STRONTIUM

SDG: LK4903-LAS

Date: 20-Sep-95

LATA No.: VB403.94

Validator: AM FREIER

<u>Analyte</u>	<u>Gross Counts per minute</u>	<u>Background Counts per minute</u>	<u>Ingrowth correction Factor</u>	<u>Detector Efficiency</u>	<u>Carrier recovery factor</u>	<u>Strontium decay factor</u>	<u>Sample volume (L or g)</u>	<u>Result</u>
Strontium	0.86	1.01	1.05	0.44	1.02	1.00	0.50	-0.29

LATA RADIOCHEMISTRY
CALCULATION SPREADSHEET

RESULTS CALCULATION ALPHA SPEC ISOTOPES

SDG: LK4903-LAS

Date: 20-Sep-95

LATA No.: VB403.94

Validator: AM FREIER

<u>Analyte</u>	<u>Gross Counts per minute</u>	<u>Background Counts per minute</u>	<u>Detector Efficiency</u>	<u>Tracer recovery factor</u>	<u>Sample volume (L or g)</u>	<u>Result</u>
<u>Uranium-233/234</u>	<u>0.24</u>	<u>0.01</u>	<u>0.2479</u>	<u>0.96</u>	<u>0.20</u>	<u>2.18</u>

Laboratory Case Narrative

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 times were met.

Chemical Recoveries and MDAs can be found on the preparation sheets and calculation sheets, respectively, on the attached raw data for each method.

Alpha Spectrometer 1

Analytical Method Uranium Isotopic

The uranium isotopic analysis was performed using standard operating procedure (SOP), LAL-91-SOP-0108. The samples were analyzed in workgroup 25334. No problems were encountered during analysis. All QC criteria were met, and no re-analyses were performed.

Gamma Spectrometry

Analytical Method Gamma Spectrum Analysis

The gamma spectrum analysis was performed using SOP, LAL-91-SOP-0063. The samples were analyzed in workgroup 25331. No problems were encountered during analysis. All QC criteria were met, and no re-analyses were performed.

Gas Proportional Counter

Analytical Method Gross Alpha Beta

The gross alpha beta analysis was performed using SOP, LAL-91-SOP-0060. The samples were analyzed in workgroup 25332. No problems were encountered during analysis. All QC criteria were met, and no re-analyses were performed.

Analytical Method Strontium-90

The strontium-90 analysis was performed using SOP, LAL-91-SOP-0196. The samples were analyzed in workgroup 25333. No problems were encountered during analysis. All QC criteria were met, and no re-analyses were performed.

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Liquid Scintillation Counter

Analytical Method Carbon-14

The carbon-14 analysis was performed using SOP, LAL-91-SOP-0209. The samples were analyzed in workgroup 25323. No problems were encountered during analysis and all QC criteria were met, with the following exception: Sample BOG864 (L4903-11) had an activity of above 200 pCi/L. This was a direct spike C-14 screen. The workgroup was re-prepared and re-analyzed twice; however, the first workgroup (25323) contained the best results and is therefore reported.

Analytical Method Tritium

The tritium analysis was performed using SOP, LAL-91-SOP-0066. The samples were analyzed in workgroup 25330. No problems were encountered during analysis. All QC criteria were met, and no re-analyses were performed.

Yvonne M. Jacoby
Prepared By

August 17, 1995
Date

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Chain-of-Custody Information

Bechtel Hanford, Inc.

L4903

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Data Turnaround

- Priority
- Normal

Collector <i>K.D. Lee</i>	Company Contact R. E. Peterson	Telephone (509) 372-9638
Project Designation 100-KR-4 Groundwater Sampling - Round 8	Sampling Location 100 K	SAF No. B95-069
Ice Chest No. <i>SML-574</i>	Field Logbook No. <i>EFL-1049</i>	Method of Shipment Federal Express
Shipped To Lockheed	Offsite Property No. <i>W95-0-0204-40</i>	Bill of Lading/Air Bill No. <i>2904634 354</i>

Possible Sample Hazards/Remarks	Preservation	HNO ₃	Cool 4°C	Cool 4°C	HNO ₃	Cool 4°C	Cool 4°C		HNO ₃	
	Type of Container	G	G	P/G	P/G	G	P/G		G	
	No. of Container(s)	1	1	1	6	1	1		1	
Special Handling and/or Storage Maintain samples between 2°C and 6°C.	Volume	500mL	500mL	250mL	1L	1L	20mL		500mL	

SAMPLE ANALYSIS				ICP Metals - TAL (Unfiltered)	Anions (IC) - F, Cl, SO ₄ , NO ₃ , NO ₂ , PO ₄	Turbidity	Gross Alpha, Gross Beta, U-234/235, 238, Sr-90, Gamma Spec	Tritium, C-14	Activity Scan	ICP Metals - TAL (Filtered)
Sample No.	Matrix*	Date Sampled	Time Sampled							
BOG 864	W	7/11/95	0940	X	X	X	X	X	X	
BOG 865	W	7/11/95	0940							X

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS	Matrix*
Relinquished By <i>K. Lee</i> Date/Time <i>7/11/95 1400</i>	Received By <i>GR</i> Date/Time <i>1400</i>	Sample analysis for phosphate, nitrate, and nitrite by EPA 300.0; and turbidity by EPA 180.1 is being requested for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met. The Activity Scan is for all sample numbers listed on this chain of custody.	S - Soil
Relinquished By <i>[Signature]</i> Date/Time <i>0900</i>	Received By <i>B. Whitten</i> Date/Time <i>7-11-95</i>		SE - Sediment
Relinquished By <i>[Signature]</i> Date/Time <i>7-12-95</i>	Received By		SO - Solid
Relinquished By	Received By		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>[Signature]</i>	Title <i>Sample Custodian</i>	Date/Time <i>7-13-95 0830</i>
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

01/13/95

000031

DIE

Supplemental Information

Environmental
Restoration
Contractor

ERC Team

Interoffice Memorandum

Job No. 22192
Written Response Required: NO
CCN: N/A
OU: 100-KR-3
TSD: N/A
ERA: N/A
Subject Code: 5850

TO: W. S. Thompson N3-06 DATE: July 5, 1995

COPIES: R. L. Biggerstaff H4-91 FROM: S. K. De Mers
Radiological Controls
N3-06/376-2764

SUBJECT: 1995 Round 8 sampling for 100-KR-4

There is no need to perform total activities prior to offsite shipment to NRC licensed labs of samples taken from the attached list of wells.

All wells listed in the attachment were reviewed for radiological content. No well listed has a β activity in excess of 100,000 pCi/l ($< .1$ uCi/sample based on a 1 liter sample size) nor any α activity in excess of 10,000 pCi/l ($< .01$ uCi/l based on a 1 liter sample). All wells show activities $< 2,000$ pCi/gm (< 2 nCi/gm D.O.T. limit). The highest activity in recent samples is $1.56 \text{ E}6$ pCi/l $\beta(\text{H}^3)$ and 150 pCi/l α .

Radiological monitoring during sampling will only be required if the wells are located in radiological areas or if the wells themselves are labeled with radiological stickers. Monitoring requirements for down hole work such as pump removal will be determined based on the history of each well on a case by case basis.

skd

AJ
9-27-95
0050
000034