

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

0044359

LK4903

LOCKHEED MARTIN

August 17, 1995

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



RE: Log-in No.:
Quotation No.:
SAF:
Document File No.:
WHC Document File No.:
SDG No.:

L4903
Q400000-B
B95-069
0713596
246
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.

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

**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-ISOTOPIC 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	B0G864	11-JUL-95	13-JUL-95	17-AUG-95
Water 1	S C-14 LAL-0209	Hold:07-JAN-96		
Water 1	S TRITIUM(H3) LAL-0066	Hold:07-JAN-96		
L4903-12 TEMP 4 Location: RFG02-23A Filt H2O 15	B0G865 S 6010 ICP METALS	11-JUL-95	13-JUL-95	17-AUG-95
		Hold:07-JAN-96		
L4903-13 Location:	REPORT TYPE	13-JUL-95	13-JUL-95	17-AUG-95
Water 1	S EDD - DISK DEL.			
Water 1	S INORG TYPE 4A RPT			
Water 1	S RAD RPT TYPE 4F			

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

C 713 596

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>FEL-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	SPECIAL INSTRUCTIONS
Relinquished By <i>K. D. Lee</i>	Date/Time 7/11/95 1400	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.
Received By <i>R. E. Peterson</i>	Date/Time 7-11-95	
Relinquished By <i>R. E. Peterson</i>	Date/Time 0900	
Received By <i>B. Whitton</i>	Date/Time 7-12-95	
Relinquished By	Date/Time	
Received By	Date/Time	
Relinquished By	Date/Time	
Received By	Date/Time	

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

LABORATORY SECTION	Received By <i>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

FEDER 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:
 tape hazard labels
 custody seals appropriate sample labels

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

9. Is the information on the COC and Sample bottles in agreement?

Yes No

Notes: _____

Sample Custodian/Laboratory Paula Davis / LRS Date: 7-13-95

Faxed
Telephoned To: K. Hall On 7-13-95 By Paula Davis
PCO 7-13-95

LOCKHEED MARTIN



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. H. H.
secondary review signature

7-13-95
date

018

C71359

**Lockheed Analytical Services
Sample Receiving Checklist**

Client Name: *Westinghouse - Hartford*

Job No. *L4903*

Cooler ID: *11a*

COOLER CONDITION UPON RECEIPT

Temperature of cooler upon receipt: *9E*

temperature of temp. blank upon receipt:

	Yes	No	* Comments/Discrepancies
custody seals intact			
chain of custody present	<input checked="" type="checkbox"/>		
blue ice (or equiv.) present/frozen	<input checked="" type="checkbox"/>		
rad survey completed	<input checked="" type="checkbox"/>		

SAMPLE CONDITION UPON RECEIPT

	Yes	No	* Comments/Discrepancies
all bottles labeled	<input checked="" type="checkbox"/>		
samples intact	<input checked="" type="checkbox"/>		
proper container used for sample type	<input checked="" type="checkbox"/>		
sample volume sufficient for analysis	<input checked="" type="checkbox"/>		
proper pres. indicated on the COC	<input checked="" type="checkbox"/>		
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	<input checked="" type="checkbox"/>		
samples to subcontract			<i>not Time.</i>

ADDITIONAL COMMENTS/DISCREPANCIES

Completed by / date: *Paul C. Davis 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

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-0
	L4903-5		Water	GR ALP/BETA LAL-
	L4903-5		Water	SR-90 LAL-0196 -
	L4903-5		Water	U-ISOTOPIC LAL-0
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 RP
	L4903-13		Water	RAD RPT TYPE 4F

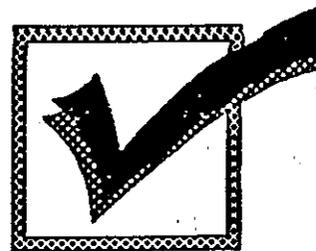
LOCKHEED ANALYTICAL SERVICES

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>R. L. Lunde</u>	Analysis Date: <u>07/17/95</u>
Client(s) Name:	LAL Batch ID: <u>713-bh</u>
Method No: <u>300.0</u> Address: <u>5 Br/F/1404</u>	Instrument: <u>(C-245) 72</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, NO 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: <u>AD</u>
14. Has the status 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.

R. L. Lunde 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

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 LTD	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 Rm 07/18/95	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>no nitrites</i> <2.0 ug/L	U
CCB	<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. CURVE: QUADRATIC

CALIB. DATE: 7/17/95
 CALIB. TIME: 9:23
 R SQUARED: 0.99999

INTERCEPT: 0.391
 LINEAR COEFF.: 6.347E-05
 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 - LOW LEVEL
 DETERMINATION OF SULFATE BY METHOD 300.0 (IC)**

LAL BATCH: 713-BH	CALIB. DATE: 7/17/95	INTERCEPT: 2.212
CALIB. CURVE: QUADRATIC	CALIB. TIME: 9:23	LINEAR COEFF.: 2.059E-04
	R SQUARED: 0.99999	QUADRATIC COEFF.: -1.999E-13

STANDARD DATA

MANUFACTURER: FISHER		LOT NUMBER: 942865
STANDARD ID	CONCENTRATION	RESPONSE
AUTOCAL1	0 ug/L	0
AUTOCAL2	40 ug/L	273972
AUTOCAL3	40 ug/L	202036
AUTOCAL4	100 ug/L	466014
AUTOCAL5	200 ug/L	841896
AUTOCAL6	2000 ug/L	9806530
AUTOCAL7	10000 ug/L	51095758

INITIAL CALIBRATION VERIFICATION STANDARD

SAMPLE ID	TRUE VALUE	FOUND	RECOVERY
ICVL	1000 ug/L	985 ug/L	99 %

INITIAL CALIBRATION BLANK

SAMPLE ID	FOUND	FLAG
ICB	< 30.0 ug/L	U

CONTINUING CALIBRATION VERIFICATION STANDARDS

SAMPLE ID	TRUE VALUE	FOUND	RECOVERY
CCVL	2000 ug/L	2092 ug/L	105 %
CCVL	2000 ug/L	2017 ug/L	101 %

CONTINUING CALIBRATION BLANKS

SAMPLE ID	FOUND	FLAG
CCB	< 30.0 ug/L	U
CCB	23.0 22.5 ug/L 7/17/95	U

**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
 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	< 10 1.4 ug/L <i>control</i>	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

MANUFACTURER: BAKER		LOT NUMBER: D13143
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 0.1481%	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>µ</i>	1963 ug/L	196% <i>µ</i> 98.2%

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>µ</i>	1953 ug/L	195% <i>µ</i> 97.6%

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 %	

µ 01/18/85

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:

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__

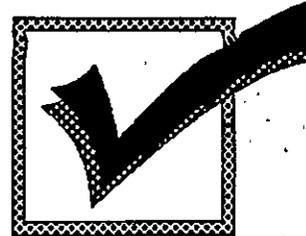
CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	29.0	U		P
7440-36-0	Antimony	58.0	U		P
7440-38-2	Arsenic	98.0	U		P
7440-39-3	Barium	28.4	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium	56700			P
7440-47-3	Chromium	3.0	U		P
7440-48-4	Cobalt	6.0	U		P
7440-50-8	Copper	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:

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: <i>TJS</i>
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

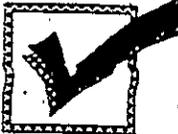
R. Callison 7-17-95
 Secondary Reviewer's Initials/Date 145

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>	[REDACTED]		<i>1st run. * 12 Ag, Cd, Cu, Sb, V, Zn, 13 As. * 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?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2. Are <u>all</u> raw data available and labeled properly (e.g., methods used, units, sample IDs, dilution factors, reruns)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3. Are <u>all</u> abnormalities in the raw data noted and/or explained?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4. Were <u>all</u> the client samples analyzed for all constituents and QC as specified on the LAL Bench Sheets?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Data Quality Assessment			
5. Was the sample properly preserved and analyzed within the method-specified holding time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
6. Were the instrument calibration criteria met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
7. Are the initial and continuing calibration verification samples data bracketing the samples of interest within criteria?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
8. Are the bracketing initial and continuing calibration blank data within criteria?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<i>ICB / CCBs failed for Ni. CALBLANK contaminated with Ni.</i>
9. For ICP Only: Are the interference check standard recovery data within criteria?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

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

** Due to sample heterogeneity.*

*** Recanalysis 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.

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] 18 Jul 95
Analyst Signature/Date

[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
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BATCH #	COMMENTS
712 M1	1 st run. Partial - reanalysis req'd for Ni due to ICB/CCB failures
713 BHD	1 st run. "
18 Jul 95	

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: _____

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	Data Qual	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-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

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	MBA	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



Rec. 19 Aug 1993

National Institute of Standards & Technology

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 ⁹ 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	0.12	0.13	0.51
	* 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. #	
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

James W. Woy
8-24-93

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 $t_{1/2} < 100$ yr 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
1.1294 \pm .0007 g/mL

f: Activity by volume = (d*e): 604.3 dpm/mL (93) 100 μ L weighed the prepared 1M HNO₃ solution

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

Preparation Date: 8/20/93 Preparer's Name: *James W. Woy*

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 $t_{1/2} < 100$ yr decay to prep. date)

b: Wt. of Source transferred: 2.60815 g

Diluent used: 1M 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
1.1294 \pm .0007 g/mL

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

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

Preparer's Name: *James W. Woy* Preparation Date: 8/20/93

Reviewed By: *James W. Woy* Review Date: 8-24-93

SECONDARY/WORKING LEVEL STANDARD-DILUTION RECORD

Dilution Source Information	
Isotope:	<u>U-238</u>
Parent Barcode Number	<u>AA9804</u>
Vendor or Certificate I.D. # of Parent Standard:	_____
Diluted Source Logbook I.D. #:	<u>93-474-14-1</u>
Balance Verification?:	<u>yes</u>
Diluent Used:	<u>1M HNO₃</u>

970-12-1

Dilution	
*Diluent:	<u>1M HNO₃</u>
*Density of diluent (g/ml):	<u>N/A</u>
a: Parent Specific Activity:	<u>272.21 pCi/mi</u>
b: Amount of Source Transferred:	<u>6.0648 g</u>
c: Total amount of Dilution:	<u>144.57 g</u>
d: Total Volume of Dilution:	<u>N/A</u>
e: Activity of Dilution (a * b / c):	<u>N/A</u>
f: Activity of Dilution (a * b / d):	<u>11.42 pCi/ml</u>
Dilution Logbook I.D. #:	<u>94-677-71-1</u>

Prepared By: Agnes Wong

Preparation Date: 7-11-95

Reviewed By: A.J.C. Mal

Review Date: 7/12/95

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

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 Reeves CP 8/8/95

Signed

Date

Signed

Date

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