START

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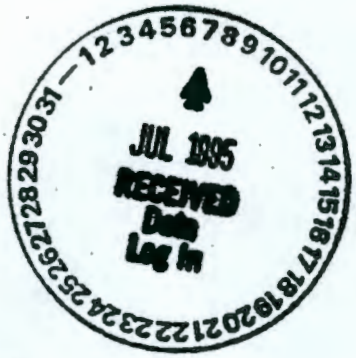
Lockheed Environmental Systems & Technologies Co.
Lockheed Analytical Services
975 Kelly Johnson Drive Las Vegas, Nevada 89119-3705
Telephone 702-361-0220 800-582-7605 Facsimile 702-361-8146

LOCKHEED MARTIN

June 26, 1995



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

RE:	Log-in No.:	L4561/L4597
	Quotation No.:	Q400000-B
	SAF:	B95-052
	Document File No.:	0520596/0525596
	WHC Document File No.:	222
	SDG No.:	LK4561

L4561- The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on 20 May 1995. The temperature of the cooler upon receipt was 2°C. Sample containers received agree with the chain-of-custody documentation. Sample containers were received intact. The vials for volatile analyses did not contain headspace. Samples were received in time to meet the analytical holding time requirements.

L4597- The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on 25 May 1995. The temperature of the cooler upon receipt was 2°C. Sample containers received agree with the chain-of-custody documentation. Sample containers were received intact. The vials for volatile analyses did not contain headspace. Samples were received in time to meet the analytical holding time requirements.

The case narratives included in the following attachments provide a detailed description of all events that occurred during sample preparation, analysis, and data review specific to the samples and analytical methods requested.

A list of data qualifiers, chain-of-custody forms, sample receiving checklist, and log-in report are also enclosed representing the samples received within this group.

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

Lockheed Analytical Services

Log-in No.: L4561/L4597
Quotation No.: Q400000-B
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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,

Kathleen M. Hall

Kathleen M. Hall
Client Services Representative

cc: Client Services
Document Control

Lockheed Analytical Services

Log-in No.: L4561/L4597
Quotation No.: Q400000-B
SAF: B95-052
Document File No.: 0520596/0525596
WHC Document File No.: 222
SDG No.: LK4561

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

- Two water samples were received for LK4561 and analyzed in batches 520 bh and 525 bh for selected analytes as requested on the chain of custody. Quality control analysis was performed on the following sample:

Client ID	LAL #		Method
BATCH 520 bh			
BOFKD1	L4561-9	MS, DUP	300.0 Chloride, Nitrate-N, Nitrite-N, Sulfate, Fluoride and Orthophosphate
BATCH 525 bh			
BOFKD3	L4597-9	MS, DUP	300.0 Chloride, Nitrate-N, Nitrite-N, Sulfate, Fluoride and Orthophosphate

Holding Time Requirements

- All samples were analyzed within the method-specific holding time except for batch 520 bh for Method 300.0 Nitrate-n, Nitrite-N and Orthophosphate which were received out 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

June 6, 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

- Two water samples for total metals analysis. The samples were prepared as LAS Batch 520BHT and analyzed for selected analytes as requested on the chain of custody. Sample B0FKD1 (L4561-8) was used for matrix spike and duplicate, post-digestion spike and serial dilution analysis. All data flags due to the performance of the above-mentioned QC sample are also associated with every sample digested with this batch.

Holding Time Requirements

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

Method Blanks

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

Internal Quality Control

- All internal quality control were within acceptance limits.

Sample Results

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

  "P" ICP-AES
  "F" GFAA

Nalini Prabhakar — **Prepared By**

06/24/95 — **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

- Two filtered water samples for dissolved metals analysis. As the measured turbidity of the samples was less than 1 NTU, they were batched as 520BHD for selected dissolved analytes as requested on the chain of custody. For this sample batch sample B0FKD2 (L4561-16) was used for matrix spike and matrix spike duplicate and serial dilution analyses. All data flags due to the performance of the above-mentioned QC sample are also associated with every sample analyzed with this batch.

Holding Time Requirements

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

Method Blanks

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

Internal Quality Control

- All internal quality control were within acceptance limits.

Sample Results

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

"P" ICP-AES
"F" GFAA

Nalini Prabhakar — **Prepared By**

06/21/95 — **Date**

- Antimony is reported by AA for two of the samples due to interferences on the ICP analysis.

CASE NARRATIVE
ORGANIC ANALYSES

Analytical Method CLP 3/90 Volatiles

This data package contains the volatile organic constituents results for the sample collected on May 18 and 23, 1995 and received at Lockheed Analytical Services on May 20 and 25, 1995. The samples and the corresponding laboratory control number can be found on the Method Blank Summary Form IV.

SDG No.: L4561

Login No.: L4561/L4597

The associated samples were analyzed in two analytical batches. The instrument tunes, initial and continuing calibrations were within QC criteria.

Analytical Batch 052495-8260-D1

Holding Times

The samples were analyzed within the required holding time on May 24, 1995.

Surrogate Recoveries

Surrogate recoveries were within QC limits.

Matrix Spike (Ms)/Matrix Spike Duplicate (MSD)

Sample BODKD1 (L4561-5) was the native sample for L4561-5 MS/MSD. Compound recoveries were within QC limits in the Matrix Spike (MS) and Matrix Spike Duplicate (MSD). The Relative Percent Differences (RPDs) between the MS and MSD were within QC limits. Target compound Acetone was detected in the MS along with the spiked compounds.

Method Blank

There were no target compounds and Tentatively Identified Compounds (TICs) detected in the Method Blank (MB).

Internal Standard

All internal standard area counts and retention times were within QC limits for all associated samples analyzed.

Sample Results

Target compounds were detected in the associated client sample analyzed but no TICs were detected.

Analytical Batch 052695-8260-D1

Holding Times

The samples were analyzed within the required holding time on May 26, 1995.

Surrogate Recoveries

Surrogate recoveries were within QC limits.

Matrix Spike (Ms)/Matrix Spike Duplicate (MSD)

Refer to analytical batch 052495-8260-D1 for the associated Matrix Spike (MS) and Matrix Spike Duplicate (MSD) results.

Method Blank

There were no target compounds and Tentatively Identified Compounds (TICs) detected in the Method Blank (MB).

Internal Standard

The internal standard area counts and retention times were within QC limits for all associated samples analyzed.

Sample Results

Target compound Acetone was detected in sample BODKD6 (L4597-2). There were no TICs detected in the associated client samples analyzed.

Prepared By
Patricia Lonergan

June 26, 1995

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.

Analytical Method

Carbon-14

The carbon-14 analysis was performed using LAL-91-SOP-0209. All samples were analyzed on batch #23714, which contains a method blank (MBB), duplicate (DUP), laboratory control sample (LCS), and matrix spike (MS). No problems were encountered during preparation or analysis, and all QC criteria were met.

Gross Alpha Beta

The gross alpha beta analysis was performed using LAL-91-SOP-0060. All samples were analyzed on batch #23735, which contains an MBB, DUP, LCS and MS. No problems were encountered during preparation or analysis, and all QC criteria were met.

Strontium

The strontium analysis was performed using LAL-91-SOP-0196. All samples were analyzed on batch #23734, which contains and MBB, DUP and LCS. No problems were encountered during preparation or analysis. There was insufficient sample for a matrix spike analysis. All other QC criteria were met.

Tritium

The tritium analysis was performed using LAL-91-SOP-0066. All samples were analyzed on batch #23736, which contains an MBB, DUP, LCS and MS. No problems were encountered during preparation or analysis. All QC criteria were met.

Yvonne M. Jacoby
Prepared By

June 21, 1995
Date

Lockheed Analytical Services

DATA QUALIFIERS FOR INORGANIC ANALYSES

[Revised 08/28/92]

For Use on the Analytical Data Reporting Forms	
B	***For CLP Analyses Only*** – Reported value is less than the contract required detection limit (CRDL) but greater than or equal to the instrument detection limit (IDL).
C	***For Routine, Non-CLP Analyses Only*** – 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	***For CLP Analyses Only*** – 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	***For CLP Reporting Only*** – Constituent was analyzed for but not detected (sample quantitation must be corrected for dilution and percent moisture).
W	***For AAS Only*** – 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	
a[1]	The spike recovery and/or RPD for matrix spike and matrix spike duplicates cannot be evaluated due to insufficient spiking level compared to the elevated sample analyte concentration.
b[1]	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 ORGANIC ANALYSES

[Revised 04/12/1995]

For Use On The Analytical Data Reporting Forms	
A	***For CLP analyses Only*** **--** The TIC is a suspected aldol-condensation product.
B	Any constituent that was also detected in the associated blank whose concentration was greater than the practical or reporting detection limit (PQL or RDL).
C	Constituent confirmed by GC/MS analysis. *[pesticide/PCB analyses only]*
D	Constituent detected in the diluted sample. It also indicates that an accurate quantitation is not possible due to surrogates being diluted out of the samples during the course of the analysis.
E	Constituent concentration exceeded the calibration range.
G	The quantitation is not gasoline or diesel but believed to be some other combination of hydrocarbons.
H	Sample analysis performed outside of method- or client-specified maximum holding time requirement.
J	*Estimated value* -- (1) constituent detected at a level less than the RDL or PQL and greater than or equal to the MDL; (2) estimated concentration for TICs ***(For CLP Reporting Only)***.
N	***For CLP Reporting Only*** **--** Tentatively identified constituents (TICs) identified based on mass spectral library search.
P	***For CLP Reporting Only*** **--** The percent difference between the concentrations detected on both GC columns was greater than 25 percent *[pesticide/PCB analyses only]*.
U	***For CLP Reporting Only*** **--** Constituent was analyzed for but not detected (sample quantitation must be corrected for dilution and percent moisture).
X, Y, or Z	Analyst-defined qualifier.
N/A (% Moisture)	N/A in the % moisture cell indicates that data are reported on an "*as received*" basis. A value in the % moisture cell indicates that data are reported based on a "*dry weight*" basis.
For Use On The QC Data Reporting Forms	
*****	QC data (i.e., percent recovery data for matrix spike, matrix spike duplicate, laboratory control standard, or surrogates; and RPD for matrix spike duplicate or unspiked duplicate) exceeded acceptance limits.
a[1]	The spike recovery and/or RPD for matrix spike and matrix spike duplicates cannot be evaluated due to insufficient spiking level compared to the elevated sample analyte concentration.
b[1]	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.

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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	***For Alpha Spectrometry Only***-- 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.
a[1]	The spike recovery and/or RPD for matrix spike and duplicates cannot be evaluated due to insufficient spiking level compared to the elevated sample analyte concentration.
b[1]	The RPD cannot be computed because the sample and/or duplicate concentration was below the MDA.

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

Revised - Report Types changed

KF

LOCKHEED ANALYTICAL SERVICES
LOGIN CHAIN OF CUSTODY REPORT (ln01)
Jun 05 1995, 10:58 am

Login Number: L4561
Account: 596 Bechtel Hanford, Inc. * Richland, WA
Project: BECHTEL-HANFORD Bechtel Hanford Project

Laboratory Sample Number	Client Sample Number	Collect Date	Receive Date	PR	Due Date
L4561-1	B0FKD1	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: RFG01-43E					
Water 1 S SCREENING		Hold:14-NOV-95			
L4561-2	B0FKD5	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: RFG19-121E					
Water 1 S CLP 3/90 VOLATILES		Hold:30-MAY-95			
L4561-3	B0FKD5	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: RFG18-46A5					
L4561-4	B0FKD5	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: RFG18-46A5					
L4561-5	B0FKD1	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: RFG19-121E					
Water 1 S CLP 3/90 VOLATILES		Hold:30-MAY-95			
L4561-6	B0FKD1	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: RFG18-46A5					
L4561-7	B0FKD1	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: RFG18-46A5					
L4561-8	B0FKD1	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052, FUR=As,Pb					
Location: RFG01-07A					
Water 1 S CLP FURNACE		Hold:14-NOV-95			
Water 1 S CLP ICP		Hold:14-NOV-95			
L4561-9	B0FKD1	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: RFG19-103C					
Water 1 S 300.0 CHLORIDE		Hold:15-JUN-95			
Water 1 S 300.0 FLUORIDE		Hold:15-JUN-95			
Water 1 S 300.0 NITRATE		Hold:20-MAY-95			
Water 1 S 300.0 NITRITE		Hold:20-MAY-95			

017

05205-96

LOCKHEED ANALYTICAL SERVICES
LOGIN CHAIN OF CUSTODY REPORT (ln01)
Jun 05 1995, 10:58 am

Login Number: L4561
Account: 596 Bechtel Hanford, Inc. * Richland, WA
Project: BECHTEL-HANFORD Bechtel Hanford Project

Laboratory Sample Number	Client Sample Number	Collect Date	Receive Date	PR	Due Date
Water 1 S 300.0 PHOSPHATE		Hold:20-MAY-95			
Water 1 S 300.0 SULFATE		Hold:15-JUN-95			
L4561-10	B0FKD1	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: 156V-090G					
Water 1 S GR ALP/BETA LAL-0060		Hold:14-NOV-95			
Water 1 S SR-90 LAL-0196		Hold:14-NOV-95			
L4561-11	B0FKD1	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: 156V-092D					
L4561-12	B0FKD1	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: 156V-073					
L4561-13	B0FKD1	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: 156V-045					
L4561-14	B0FKD1	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: 156V-092D					
L4561-15	B0FKD1	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: 156V-069					
Water 1 S C-14 LAL-0209		Hold:14-NOV-95			
Water 1 S TRITIUM(H3) LAL-0066		Hold:14-NOV-95			
L4561-16	B0FKD2	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052, FUR=As,Pb					
Location: RFG01-07A					
Filt H20 15 S CLP FURNACE		Hold:14-NOV-95			
Filt H20 15 S CLP ICP		Hold:14-NOV-95			
L4561-17	REPORT TYPE	20-MAY-95	20-MAY-95		24-JUN-95
SAF# B95-052					
Location:					
Water 1 S EDD - DISK DEL.					
Water 1 S GCMS4A					
Water 1 S INORG TYPE 4A RPT					
Water 1 S RAD RPT TYPE 4F					

Signature: K Hamann

Date: 6-1-95

018

LOGIN CHAIN OF CUSTODY REPORT (ln01)
May 23 1995, 08:52 am

Login Number: L4561
Account: 596 Bechtel Hanford, Inc. * Richland, WA
Project: BECHTEL-HANFORD Bechtel Hanford Project

Laboratory Sample Number	Client Sample Number	Collect Date	Receive Date	PR	Due Date
L4561-1	B0FKD1	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: RFG01-43E					
Water 1 S SCREENING		Hold:14-NOV-95			
L4561-2	B0FKD5	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: RFG18-46A5					
Water 1 S CLP 3/90 VOLATILES		Hold:30-MAY-95			
L4561-3	B0FKD5	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: RFG18-46A5					
L4561-4	B0FKD5	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: RFG18-46A5					
L4561-5	B0FKD1	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: RFG18-46A5					
Water 1 S CLP 3/90 VOLATILES		Hold:30-MAY-95			
L4561-6	B0FKD1	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: RFG18-46A5					
L4561-7	B0FKD1	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: RFG18-46A5					
L4561-8	B0FKD1	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052, FUR=As,Pb					
Location: RFG01-07A					
Water 1 S CLP FURNACE		Hold:14-NOV-95			
Water 1 S CLP ICP		Hold:14-NOV-95			
L4561-9	B0FKD1	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: RFG01-07A					
Water 1 S 300.0 CHLORIDE		Hold:15-JUN-95			
Water 1 S 300.0 FLUORIDE		Hold:15-JUN-95			
Water 1 S 300.0 NITRATE		Hold:20-MAY-95			
Water 1 S 300.0 NITRITE		Hold:20-MAY-95			

9613446.2586

LOGIN CHAIN OF CUSTODY REPORT (ln01)
May 23 1995, 08:52 am

Login Number: L4561
Account: 596 Bechtel Hanford, Inc. * Richland, WA
Project: BECHTEL-HANFORD Bechtel Hanford Project

Laboratory Sample Number	Client Sample Number	Collect Date	Receive Date	PR	Due Date
Water 1 S 300.0 PHOSPHATE		Hold:20-MAY-95			
Water 1 S 300.0 SULFATE		Hold:15-JUN-95			
L4561-10	B0FKD1	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: 157					
Water 1 S GR ALP/BETA LAL-0060		Hold:14-NOV-95			
Water 1 S SR-90 LAL-0196		Hold:14-NOV-95			
L4561-11	B0FKD1	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: 157					
L4561-12	B0FKD1	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: 157					
L4561-13	B0FKD1	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: 157					
L4561-14	B0FKD1	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: 157					
L4561-15	B0FKD1	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052					
Location: 157					
Water 1 S C-14 LAL-0209		Hold:14-NOV-95			
Water 1 S TRITIUM(H3) LAL-0066		Hold:14-NOV-95			
L4561-16	B0FKD2	18-MAY-95	20-MAY-95		24-JUN-95
temp 2; SAF# B95-052, FUR=As,Pb					
Location: RFG01-07A					
Filt H20 15 S CLP FURNACE		Hold:14-NOV-95			
Filt H20 15 S CLP ICP		Hold:14-NOV-95			
L4561-17	REPORT TYPE	20-MAY-95	20-MAY-95		24-JUN-95
SAF# B95-052					
Location:					
Water 1 S EDD - DISK DEL.					
Water 1 S INORG TYPE 4 RPT					
Water 1 S RAD RPT TYPE 4					

Signature: Mundt

Date: 5-23-95

020

0520596

Bechtel Hanford, Inc. **L4561** **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**

Data Turnaround: ☐ Priority ■ Normal

Collector: K. Lee / A. Rizzo	Company Contact: Bob Raidl	Telephone: (509) 372-9641
Project Designation: 100-FR-3 Groundwater - Round 7	Sampling Location: 100 F	SAF No.: B95-052
Ice Chest No.: ~~DRY~~ ER-5	Field Logbook No.: EFL 1054	Method of Shipment: Federal Express
Shipped To: Lockheed	Offsite Property No.: W95-0-0304-30	Bill of Lading/Air Bill No.: 2904622666

Possible Sample Hazards/Remarks:

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

			Preservation	HNO_3	Cool 4°C	HCl	HNO_3	Cool 4°C	Cool 4°C		HNO_3		HCl
			Type of Container	P/G	P/G	Gs	P/G	G	P/G		P/G		Gs
			No. of Container(s)	1	1	3	5	1	1		1		3
			Volume	1L	500mL	40mL	1L	1L	20mL		1L		40mL
SAMPLE ANALYSIS				ICP Metals-TAL. AA Metals-As, Pb. (Unfiltered)	Anions (IC) - F, Cl, SO_4, PO_4, NO_3, NO_2.	VOA-TCL	Gross Alpha, Gross Beta, Sr-90	Tritium, C-14	Activity Scan		ICP Metals-TAL. AA Metals-As, Pb. (Filtered)		VOA-TCL
Sample No.	Matrix*	Date Sampled	Time Sampled										
B0FKD1	W	5-18-95	1429	X	X	X	X	X	X				
B0FKD2	W	5-18-95	1429								X		
B0FKD5	W	5-18-95	1429										X

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
A. Rizzo / CERS	5-19-95 0800	[signature] / ERC Buck Ha…	5-19-95 0800
[signature] / ERC Buck Ha…	5-19-95 0900		

SPECIAL INSTRUCTIONS
Sample analysis for PO_4, NO_2, and NO_3 by EPA 300.0 is being requested for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met.

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

LABORATORY SECTION	Received By: Paula Davis	Title: Sample Custodian	Date/Time: 5-20-95 / 9:00 Am
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

9613446.2587

Environmental Restoration Contractor **ERC Team**

Interoffice Memorandum

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

TO: W. S. Thompson N3-06 DATE: April 27, 1995

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

SUBJECT: **1995 Round 7 sampling for 100-FR-3**

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 except two of the wells listed in the attachment were reviewed for radiological content based on the previous 4 years of sampling data. 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 9,900 pCi/l $\beta(H^3)$ and 50 pCi/l α.

The remaining wells are in locations that do not provide a credible path whereby they could become contaminated at the above listed levels.

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

9613446.2589

WHC/BHI SAMPLE CHECK-IN LIST

Date/Time Received: 5-20-95 / 9:00 AM SDG #: ML

Work Order Number: ML SAF #: B95-052

Shipping Container ID: FR-5 Chain of Custody # _____

1. Custody Seals on shipping container intact? Yes [X] No [ ]
2. Custody Seals dated and signed? Yes [X] No [ ]
3. Chain-of-Custody record present? Yes [X] No [ ]
4. Cooler temperature 2°C
5. Vermiculite/packing materials is Wet [ ] Dry [X]
6. Number of samples in shipping container: 16
7. Sample holding times exceeded: Yes [X] No [ ]
8. Samples have: _____ tape _____ hazard labels
   X custody seals _____ appropriate sample labels
9. Samples are: X in good condition _____ leaking
   _____ broken _____ have air bubbles
10. Were any anomalies identified in sample receipt? Yes [ ] No [X]
11. Description of anomalies (include sample numbers): _____

Sample Custodian: Paul C Davis On: 5-20-95

Telephoned To: Kathleen Hall On 5-20-95 By Paul C Davis

Post-it® Fax Note 7671	Date 5-23-95	# of pages ▶ 6
To Kathleen Hall	From Tony Miller	
Co./Dept.	Co.	
Phone #	Phone #	
Fax #	Fax #	

FORM NO. LS-042, Rev. 1, 2/95

023

0580596

Sample Login

Login Review Checklist

Lot Number L4561

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

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

Sample Summary Report N/A	Yes	No
1. Are all sample IDs correct?	X	
2. Are all samples present?	X	
3. Are all matrices correct? (e.g., TCLP analyses should be on a TCLP leachate, field blanks should be water)	X	
4. Are all analyses on the chain of custody/login quotation included?	X	
5. Are analyses logged in for the correct container? (e.g., analyses requiring preservation logged in for a preserved container and vice versa)	X	
6. Are samples logged in according to laboratory batching procedures? (e.g., TCLP regular leaching and associated metals/semivolatile organics should be logged in on the same bottle)	X	

Login Chain of Custody Report	Yes	No
1. Are the Collect, Receive , and Due dates correct for every sample?	X	
2. Have appropriate sample comments been included? (e.g., MS/MSD designation, comments from the client concerning method modifications)	X	

Sample Receiving Checklist	Yes	No
1. Are any discrepancies between the chain of custody and the login noted? (e.g., client IDs different on chains of custody and bottle labels, samples not sent, samples lost from breakage)		X

Primary review signature — Date: 5-23-95

Secondary review signature — Date: 5-23-95

KKG 5.25.95

Lockheed Analytical Services
Sample Receiving Checklist

Client Name: Westinghouse Job No. L4156| Cooler ID:

COOLER CONDITION UPON RECEIPT			
Temperature of cooler upon receipt:	2°C		
temperature of temp. blank upon receipt:			
	Yes	**No**	*** Comments/Discrepancies**
custody seals intact	X		
chain of custody present	X		
blue ice (or equiv.) present/frozen	X		
rad survey completed	X		
SAMPLE CONDITION UPON RECEIPT			
	Yes	**No**	*** Comments/Discrepancies**
all bottles labeled	X		
samples intact	X		
proper container used for sample type	X		
sample volume sufficient for analysis	X		
proper pres. indicated on the COC	X		
VOA's contain headspace		X	
are samples bi-phasic (if so, indicate sample ID'S):			N/A
MISCELLANEOUS ITEMS			
	Yes	**No**	*** Comments/Discrepancies**
samples with short holding times	X		Nitrate, Nitrate
samples to subcontract		X	
ADDITIONAL COMMENTS/DISCREPANCIES			
Completed by / date:	[signature] 5-22-95		
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*			

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025

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

Client Sample Number	LAL Sample Number	SDG Number	Matrix	Method
B0FKD1	L4561-1		Water	SCREENING
	L4561-5		Water	CLP 3/90 VOLATII
	L4561-8		Water	CLP FURNACE
	L4561-8		Water	CLP ICP
	L4561-9		Water	300.0 CHLORIDE
	L4561-9		Water	300.0 FLUORIDE
	L4561-9		Water	300.0 NITRATE
	L4561-9		Water	300.0 NITRITE
	L4561-9		Water	300.0 PHOSPHATE
	L4561-9		Water	300.0 SULFATE
	L4561-10		Water	GR ALP/BETA LAL
	L4561-10		Water	SR-90 LAL-0196
	L4561-15		Water	C-14 LAL-0209
	L4561-15		Water	TRITIUM(H3) LAL
B0FKD2	L4561-16		Filt H20	CLP FURNACE
	L4561-16		Filt H20	CLP ICP
B0FKD5	L4561-2		Water	CLP 3/90 VOLATIL
REPORT TYPE	L4561-17		Water	EDD - DISK DEL
	L4561-17		Water	INORG TYPE 4 RPT
	L4561-17		Water	RAD RPT TYPE 4

026

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9615116.2593 - Report Types Changed

KFG

LOCKHEED ANALYTICAL SERVICES
LOGIN CHAIN OF CUSTODY REPORT (ln01)
Jun 05 1995, 10:58 am

Login Number: L4597
Account: 596 Bechtel Hanford, Inc. * Richland, WA
Project: BECHTEL-HANFORD Bechtel Hanford Project

Laboratory Sample Number	Client Sample Number	Collect Date	Receive Date	PR	Due Date
L4597-1	B0FKD3	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052					
Location: RFG01-43E					
Water 1 S SCREENING		Hold:19-NOV-95			
L4597-2	B0FKD6	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052					
Location: RFG19-97G					
Water 1 S CLP 3/90 VOLATILES		Hold:04-JUN-95			
L4597-3	B0FKD6	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052					
Location: RFG18-46A5					
L4597-4	B0FKD6	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052					
Location: RFG18-46A5					
L4597-5	B0FKD3	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052					
Location: RFG19-97G					
Water 1 S CLP 3/90 VOLATILES		Hold:04-JUN-95			
L4597-6	B0FKD3	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052					
Location: RFG18-46A5					
L4597-7	B0FKD3	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052					
Location: RFG18-46A5					
L4597-8	B0FKD3	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052, FUR=As,Pb					
Location: RFG01-07A					
Water 1 S CLP FURNACE		Hold:19-NOV-95			
Water 1 S CLP ICP		Hold:19-NOV-95			
L4597-9	B0FKD3	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052					
Location: RFG19-103C					
Water 1 S 300.0 CHLORIDE		Hold:20-JUN-95			
Water 1 S 300.0 FLUORIDE		Hold:20-JUN-95			
Water 1 S 300.0 NITRATE		Hold:25-MAY-95			
Water 1 S 300.0 NITRITE		Hold:25-MAY-95			

027

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9613446.2594

LOCKHEED ANALYTICAL SERVICES
LOGIN CHAIN OF CUSTODY REPORT (ln01)
Jun 05 1995, 10:58 am

Login Number: L4597
Account: 596 Bechtel Hanford, Inc. * Richland, WA
Project: BECHTEL-HANFORD Bechtel Hanford Project

Laboratory Sample Number	Client Sample Number	Collect Date	Receive Date	PR	Due Date
Water 1 S 300.0 PHOSPHATE		Hold:25-MAY-95			
Water 1 S 300.0 SULFATE		Hold:20-JUN-95			
L4597-10	B0FKD3	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052					
Location: 156-012					
Water 1 S GR ALP/BETA LAL-0060		Hold:19-NOV-95			
Water 1 S SR-90 LAL-0196		Hold:19-NOV-95			
L4597-11	B0FKD3	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052					
Location: 156-012					
L4597-12	B0FKD3	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052					
Location: 156-012					
L4597-13	B0FKD3	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052					
Location: 156-012					
L4597-14	B0FKD3	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052					
Location: 156-012					
L4597-15	B0FKD3	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052					
Location: 156-022B					
Water 1 S C-14 LAL-0209		Hold:19-NOV-95			
Water 1 S TRITIUM(H3) LAL-0066		Hold:19-NOV-95			
L4597-16	B0FKD4	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052, FUR=As,Pb					
Location: RFG01-07A					
Filt H20 15 S CLP FURNACE		Hold:19-NOV-95			
Filt H20 15 S CLP ICP		Hold:19-NOV-95			
L4597-17	REPORT TYPE	25-MAY-95	25-MAY-95		29-JUN-95
SAF# B95-052					
Location:					
Water 1 S EDD - DISK DEL.					
Water 1 S GCMS4A					
Water 1 S INORG TYPE 4A RPT					
Water 1 S RAD RPT TYPE 4F					

Signature: K Yamamoto

Date: 6-1-95 028

0525596

9613446.2595

LOCKHEED ANALYTICAL SERVICES
LOGIN CHAIN OF CUSTODY REPORT (ln01)
May 25 1995, 01:11 pm

Login Number: L4597
Account: 596 Bechtel Hanford, Inc. * Richland, WA
Project: BECHTEL-HANFORD Bechtel Hanford Project

Laboratory Sample Number	Client Sample Number	Collect Date	Receive Date	PR	Due Date
L4597-1	B0FKD3	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052					
Location: 157					
Water 1 S SCREENING		Hold:19-NOV-95			
L4597-2	B0FKD6	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052					
Location: 157					
Water 1 S CLP 3/90 VOLATILES		Hold:04-JUN-95			
L4597-3	B0FKD6	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052					
Location: 157					
L4597-4	B0FKD6	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052					
Location: 157					
L4597-5	B0FKD3	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052					
Location: 157					
Water 1 S CLP 3/90 VOLATILES		Hold:04-JUN-95			
L4597-6	B0FKD3	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052					
Location: 157					
L4597-7	B0FKD3	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052					
Location: 157					
L4597-8	B0FKD3	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052, FUR=As,Pb					
Location: 157					
Water 1 S CLP FURNACE		Hold:19-NOV-95			
Water 1 S CLP ICP		Hold:19-NOV-95			
L4597-9	B0FKD3	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052					
Location: 157					
Water 1 S 300.0 CHLORIDE		Hold:20-JUN-95			
Water 1 S 300.0 FLUORIDE		Hold:20-JUN-95			
Water 1 S 300.0 NITRATE		Hold:25-MAY-95			
Water 1 S 300.0 NITRITE		Hold:25-MAY-95			

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LOCKHEED ANALYTICAL SERVICES
LOGIN CHAIN OF CUSTODY REPORT (ln01)
May 25 1995, 01:11 pm

Login Number: L4597
Account: 596 Bechtel Hanford, Inc. * Richland, WA
Project: BECHTEL-HANFORD Bechtel Hanford Project

Laboratory Sample Number			Client Sample Number	Collect Date	Receive Date	PR	Due Date
Water	1	S	300.0 PHOSPHATE	Hold:25-MAY-95			
Water	1	S	300.0 SULFATE	Hold:20-JUN-95			
L4597-10			B0FKD3	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052							
Location: 157							
Water	1	S	GR ALP/BETA LAL-0060	Hold:19-NOV-95			
Water	1	S	SR-90 LAL-0196	Hold:19-NOV-95			
L4597-11			B0FKD3	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052							
Location: 157							
L4597-12			B0FKD3	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052							
Location: 157							
L4597-13			B0FKD3	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052							
Location: 157							
L4597-14			B0FKD3	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052							
Location: 157							
L4597-15			B0FKD3	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052							
Location: 157							
Water	1	S	C-14 LAL-0209	Hold:19-NOV-95			
Water	1	S	TRITIUM(H3) LAL-0066	Hold:19-NOV-95			
L4597-16			B0FKD4	23-MAY-95	25-MAY-95		29-JUN-95
temp 2; SAF# B95-052, FUR=As,Pb							
Location: 157							
Filt H20	15	S	CLP FURNACE	Hold:19-NOV-95			
Filt H20	15	S	CLP ICP	Hold:19-NOV-95			
L4597-17			REPORT TYPE	25-MAY-95	25-MAY-95		29-JUN-95
SAF# B95-052							
Location:							
Water	1	S	EDD - DISK DEL.				
Water	1	S	INORG TYPE 4 RPT				
Water	1	S	RAD RPT TYPE 4				

Signature: _____

Date: 5-25-95 030

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Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST L4597

Page 1 of 1

Data Turnaround: ☐ Priority ■ Normal

Collector	Company Contact: Bob Raidl	Telephone: (509) 372-9641
Project Designation: 100-FR-3 Groundwater - Round 7	Sampling Location: 100 F	SAF No.: B95-052
Ice Chest No.: ~~1SW 52977~~ ER-10	Field Logbook No.: [illegible]	Method of Shipment: Federal Express
Shipped To: Lockheed	Offsite Property No.: W95-0-0204-31	Bill of Lading/Air Bill No.: 8910462[illegible]941
Possible Sample Hazards/Remarks		

Preservation	HNO_3	Cool 4°C	HCl	HNO_3	Cool 4°C	Cool 4°C		HNO_3		HCl
Type of Container	P/G	P/G	Gs	P/G	G	P/G		P/G		Gs
No. of Container(s)	1	1	3	5	1	1		1		3
Volume	1L	500mL	40mL	1L	1L	20mL		1L		40mL
SAMPLE ANALYSIS	ICP Metals-TAL. AA Metals-As, Pb. (Unfiltered)	Anions (IC) - F, Cl, SO_4, PO_4, NO_2, NO_3.	VOA-TCL	Gross Alpha, Gross Beta, Sr-90	Tritium, C-14	Activity Scan		ICP Metals-TAL. AA Metals-As, Pb. (Filtered)		VOA-TCL

Sample No.	Matrix*	Date Sampled	Time Sampled
B0FKD3	W	[illegible]	1200
B0FKD4	W	5-23-95	1200
B0FKD6	W	5-23-95	1200

CHAIN OF POSSESSION

	Sign/Print Names	Date/Time
Relinquished By	[illegible] (ERC)	5-23-95 1315
Received By	Ernie Bechtel Hanford	5-23-95 1315
Relinquished By	Ernie Bechtel Hanford	5-24-95 0810
Received By		
Relinquished By		
Received By		
Relinquished By		
Received By		

SPECIAL INSTRUCTIONS

Sample analysis for PO_4, NO_2, and NO_3 by EPA 300.0 is being requested for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met.

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: [illegible]	Title: Sample Custodian	Date/Time: 5-25-95 0900
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

0531 & 0532

Environmental Restoration Contractor **ERC Team**

Interoffice Memorandum

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

TO: W. S. Thompson N3-06

DATE: April 27, 1995

COPIES: R. L. Biggerstaff H4-91

FROM: S. K. De Mers
Radiological Controls
N3-06/376-2764

SUBJECT: **1995 Round 7 sampling for 100-FR-3**

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 except two of the wells listed in the attachment were reviewed for radiological content based on the previous 4 years of sampling data. 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 9,900 pCi/l $\beta(H^3)$ and 50 pCi/l α.

The remaining wells are in locations that do not provide a credible path whereby they could become contaminated at the above listed levels.

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

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WHC/BHI SAMPLE CHECK-IN LIST

L4597 Westinghouse

Date/Time Received: 5-25-95 SDG #: N/A

Work Order Number: N/A SAF #: B95-052

Shipping Container ID: ER-10 Chain of Custody # N/A

1. Custody Seals on shipping container intact? Yes [X] No [ ]
2. Custody Seals dated and signed? Yes [X] No [ ]
3. Chain-of-Custody record present? Yes [X] No [ ]
4. Cooler temperature 2°C
5. Vermiculite/packing materials is Wet [ ] Dry [X]
6. Number of samples in shipping container: 16
7. Sample holding times exceeded: Yes [ ] No [X]
8. Samples have: ____ tape ____ hazard labels
   X custody seals X appropriate sample labels
9. Samples are: X in good condition ____ leaking
   ____ broken ____ have air bubbles
10. Were any anomalies identified in sample receipt? Yes [ ] No [X]
11. Description of anomalies (include sample numbers): ____

Sample Custodian: A Miller On: 5-25-95

Telephoned To: Kathleen Hall On 5-25-95 By Anthony Miller

Post-it® Fax Note 7671	Date 5-25-95	# of pages ▶ 6
To Kathleen Hall	From Tony Miller	
Co./Dept.	Co.	
Phone #	Phone #	
Fax #	Fax #	

FORM NO. LS-042, Rev. 1, 2/95

033

052559

9613446.2600

LOCKHEED MARTIN

Sample Login
Login Review Checklist

Lot Number L4597

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

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

SAMPLE SUMMARY REPORT	YES	NO	N/A	Comment
1. Are all sample ID's correct?	X			
2. Are all samples present?	X			
3. Are all matrices indicated correctly?	X			
4. Are all analyses on the COC logged in for the appropriate samples?	X			
5. Are all analyses logged in for the correct container?	X			
6. Are samples logged in according to LAS batching procedures?	X			

LOGIN CHAIN OF CUSTODY	YES	NO	N/A	Comment
1. Are the collect, receive, and due dates correct for every sample?	X			
2. Have all appropriate comments been indicated in the comment section?	X			

SAMPLE RECEIVING CHECKLIST	YES	NO	N/A	Comment
1. Are all discrepancies between the COC and the login noted (if applicable)?			X	

M Mills 5-25-95
primary review signature date

Paul C Davis 5-25-95 0934
secondary review signature date

KFG 5.25.95

05255G6

Lockheed Analytical Services
Sample Receiving Checklist

Client Name: Westinghouse Job No. L4597 Cooler ID:

COOLER CONDITION UPON RECEIPT			
Temperature of cooler upon receipt:	2°C		
temperature of temp. blank upon receipt:			
	Yes	**No**	*** Comments/Discrepancies**
custody seals intact	X		
chain of custody present	X		
blue ice (or equiv.) present/frozen	X		
rad survey completed	X		
SAMPLE CONDITION UPON RECEIPT			
	Yes	**No**	*** Comments/Discrepancies**
all bottles labeled	X		
samples intact	X		
proper container used for sample type	X		
sample volume sufficient for analysis	X		
proper pres. indicated on the COC	X		
VOA's contain headspace		X	
are samples bi-phasic (if so, indicate sample ID'S):			N/A
MISCELLANEOUS ITEMS			
	Yes	**No**	*** Comments/Discrepancies**
samples with short holding times	X		Nitrate
samples to subcontract		X	
ADDITIONAL COMMENTS/DISCREPANCIES			
Completed by / date:	MMB 5-25-95		
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*			

9613446.2602

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

Client Sample Number	LAL Sample Number	SDG Number	Matrix	Method
B0FKD3	L4597-1		Water	SCREENING
	L4597-5		Water	CLP 3/90 VOLATIL
	L4597-8		Water	CLP FURNACE
	L4597-8		Water	CLP ICP
	L4597-9		Water	300.0 CHLORIDE
	L4597-9		Water	300.0 FLUORIDE
	L4597-9		Water	300.0 NITRATE
	L4597-9		Water	300.0 NITRITE
	L4597-9		Water	300.0 PHOSPHATE
	L4597-9		Water	300.0 SULFATE
	L4597-10		Water	GR ALP/BETA LAL-
	L4597-10		Water	SR-90 LAL-0196
	L4597-15		Water	C-14 LAL-0209
	L4597-15		Water	TRITIUM(H3) LAL-
B0FKD4	L4597-16		Filt H20	CLP FURNACE
	L4597-16		Filt H20	CLP ICP
B0FKD6	L4597-2		Water	CLP 3/90 VOLATIL
REPORT TYPE	L4597-17		Water	EDD - DISK DEL.
	L4597-17		Water	INORG TYPE 4 RPT
	L4597-17		Water	RAD RPT TYPE 4

0525596

LOCKHEED ANALYTICAL SERVICES

COMMON IONS AND ADDITIONAL ANALYTES

Sample Results

Client Sample ID: B0FKD1	Date Collected: 18-MAY-95
Matrix: Water	Date Received: 20-MAY-95

Constituent	Units	Method	Result	Reporting Det|Limit	Data Qualifier(s)	Date Analyzed	LAS Batch|ID	LAS Sample|ID
Chloride	mg/L	300.0	14.	0.02		24-MAY-95	23324	L4561-9
Fluoride	mg/L	300.0	0.73	0.1		24-MAY-95	23325	L4561-9
Nitrate-N	mg/L	300.0	20.	0.02	H	24-MAY-95	23326	L4561-9
Nitrite-N	mg/L	300.0	< 0.01	0.01	H	24-MAY-95	23327	L4561-9
Ortho Phosphate	mg/L	300.0	< 0.1	0.1	H	24-MAY-95	23328	L4561-9
Sulfate	mg/L	300.0	66.	0.1		24-MAY-95	23329	L4561-9

LOCKHEED ANALYTICAL SERVICES

COMMON IONS AND ADDITIONAL ANALYTES

Sample Results

Client Sample ID: B0FKD3	Date Collected: 23-MAY-95
Matrix: Water	Date Received: 25-MAY-95

Constituent	Units	Method	Result	Reporting Det|Limit	Data Qualifier(s)	Date Analyzed	LAS Batch|ID	LAS Sample|ID
Chloride	mg/L	300.0	35.	0.02		25-MAY-95	23386	L4597-9
Fluoride	mg/L	300.0	0.35	0.1		26-MAY-95	23387	L4597-9
Nitrate-N	mg/L	300.0	20.	0.02		25-MAY-95	23388	L4597-9
Nitrite-N	mg/L	300.0	< 0.01	0.01		25-MAY-95	23389	L4597-9
Ortho Phosphate	mg/L	300.0	< 0.1	0.1		25-MAY-95	23390	L4597-9
Sulfate	mg/L	300.0	97.	0.1		25-MAY-95	23391	L4597-9

9613446.2605

Nonmetals Analytical Data Technical Review Checklist
(Analyst)

Analyst Name *(Print)*: Andy Benolkin	**Analysis Date:** 5/24/95
Client(s) Name:	**LAL Batch ID:** 520-6H
Method No: 300.0	**Instrument:** IC\S,S2

Description	Yes	No	Comments
Completeness Review 1. Was required method/SOP followed?	✓		
2. Are all raw data available and labeled properly (e.g., methods used, units, sample IDs, dilution factors, reruns)?	✓		
3. Are all nonconformities in the raw data noted and/or explained?	✓		
4. Were all 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?	✓	X	
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):** L4561-9 **SVP Initials:** ✓
14. Has the *status* been updated in the ACS?	✓		

Notes and comments: Sample received out HT for NO_2-N and NO_3-N

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.

A C Benolkin 5/30/95
Analyst's Signature/Date

YR 6/1/95
Secondary Reviewer's Initials/Date

CLP

INORGANIC ANALYSES DATA SHEET

1

CLIENT ID NO.: B0FKD1

Lab Name: LOCKHEED_ANALYTICAL_SVC__ Contract: HANFORD___

Lab Code: LOCK__ Case No.: B95-05 SAS No.: _____ SDG No.: LK4561

Matrix (soil/water): WATER Lab Sample ID: L4561-8___

Level (low/med): LOW__ Date Received: 05/20/95

% 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_	33.0	U		P
7440-36-0	Antimony_	6.7	B		F
7440-38-2	Arsenic__	11.7			F
7440-39-3	Barium___	46.2	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium__	3.0	U		P
7440-70-2	Calcium__	62800			P
7440-47-3	Chromium_	3.0	U		P
7440-48-4	Cobalt___	6.0	U		P
7440-50-8	Copper___	2.0	U		P
7439-89-6	Iron_____	34.4	B		P
7439-92-1	Lead_____	2.0	U		F
7439-95-4	Magnesium	19900			P
7439-96-5	Manganese	2.0	U		P
7440-02-0	Nickel___	12.0	U		P
7440-09-7	Potassium	7190			P
7440-22-4	Silver___	3.0	U		P
7440-23-5	Sodium___	59400			P
7440-62-2	Vanadium_	18.3	B		P
7440-66-6	Zinc_____	5.2	B		P

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

_____

_____

_____

_____

CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.: B0FKD3

Lab Name: LOCKHEED_ANALYTICAL_SVC__ Contract: HANFORD___

Lab Code: LOCK__ Case No.: B95-05 SAS No.: _____ SDG No.: LK4561

Matrix (soil/water): WATER Lab Sample ID: L4597-8___

Level (low/med): LOW__ Date Received: 05/25/95

% 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	251			P
7440-36-0	Antimony	4.0	U		F
7440-38-2	Arsenic	3.1	B		F
7440-39-3	Barium	57.5	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	3.0	U		P
7440-70-2	Calcium	106000			P
7440-47-3	Chromium	15.4			P
7440-48-4	Cobalt	6.0	U		P
7440-50-8	Copper	2.0	U		P
7439-89-6	Iron	59.7	B		P
7439-92-1	Lead	2.0	U		F
7439-95-4	Magnesium	25100			P
7439-96-5	Manganese	2.0	U		P
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	6550			P
7440-22-4	Silver	4.0	B		P
7440-23-5	Sodium	33300			P
7440-62-2	Vanadium	4.9	B		P
7440-66-6	Zinc	4.0	B		P

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN

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9613446.2608 CLP

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Lab Name: LOCKHEED_ANALYTICAL_SVC__ Contract: HANFORD___

Lab Code: LOCK__ Case No.: B95-05 SAS No.: _____ SDG No.:LK4561

SOW No.: 3/90_

CLIENT ID NO.	Lab Sample ID
B0FKD2	L4561-16
B0FKD2D	L4561-16D
B0FKD2S	L4561-16S
B0FKD4	L4597-16

Were ICP interelement corrections applied ? Yes/No YES

Were ICP background corrections applied ? Yes/No YES

If yes - were raw data generated before application of background corrections ? Yes/No NO_

Comments:

TWO WATER SAMPLES FOR DISSOLVED METALS ANALYSIS. SAMPLE B0FKD2 (L4561-16) WAS USED FOR MATRIX SPIKE AND DUPLICATE.

SAF # B95-052 / SDG # LK4561F.

LAS BATCH 520BHD. LAS LOGINS L4561F AND L4597F.

Written by : N. Prabhakar Name: Nalini Prabhakar

Date: 6/21/95 Title: QC Coordinator

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Reviewed by: Yee Ren Name: YEE REN

Date: 6/26/95 Title: Scientist

CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.: B0FKD2

Lab Name: LOCKHEED_ANALYTICAL_SVC__ Contract: HANFORD___

Lab Code: LOCK__ Case No.: B95-05 SAS No.: _____ SDG No.: LK4561

Matrix (soil/water): WATER Lab Sample ID: L4561-16__

Level (low/med): LOW__ Date Received: 05/20/95

% 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	33.0	U		P
7440-36-0	Antimony	54.0	U		P
7440-38-2	Arsenic	11.1			F
7440-39-3	Barium	44.3	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	3.0	U		P
7440-70-2	Calcium	65400			P
7440-47-3	Chromium	3.0	U		P
7440-48-4	Cobalt	6.0	U		P
7440-50-8	Copper	2.0	U		P
7439-89-6	Iron	12.0	U		P
7439-92-1	Lead	2.0	U		F
7439-95-4	Magnesium	19900			P
7439-96-5	Manganese	2.0	U		P
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	6850			P
7440-22-4	Silver	3.0	U		P
7440-23-5	Sodium	58300			P
7440-62-2	Vanadium	14.2	B		P
7440-66-6	Zinc	3.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

_____

_____

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FORM I - IN

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CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.: B0FKD4

Lab Name: LOCKHEED_ANALYTICAL_SVC__ Contract: HANFORD___

Lab Code: LOCK__ Case No.: B95-05 SAS No.: _____ SDG No.: LK4561

Matrix (soil/water): WATER Lab Sample ID: L4597-16__

Level (low/med): LOW__ Date Received: 05/25/95

% 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	33.0	U		P
7440-36-0	Antimony	54.2	B		P
7440-38-2	Arsenic	4.3	B		F
7440-39-3	Barium	52.5	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	3.0	U		P
7440-70-2	Calcium	105000			P
7440-47-3	Chromium	11.4			P
7440-48-4	Cobalt	6.0	U		P
7440-50-8	Copper	2.0	U		P
7439-89-6	Iron	12.0	U		P
7439-92-1	Lead	2.0	U		F
7439-95-4	Magnesium	23900			P
7439-96-5	Manganese	2.0	U		P
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	6510			P
7440-22-4	Silver	3.0	U		P
7440-23-5	Sodium	31600			P
7440-62-2	Vanadium	3.0	B		P
7440-66-6	Zinc	3.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

_____

_____

_____

_____

Lockheed Analytical Laboratory

9613446.2011

Metals Analytical Data Technical Review Checklist (Analyst)

Analyst Name *(Print)*: J. Wood	Instrument: ~~AS~~ – 2e	Method: TLP

Batch Number	Client Name	Code Comments	Bench Sheet included Y/N	ACS updated Y/N
520bhD	Bechtel Hanford	complete	N	N
520bhT	"	complete	N	N

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?	✓		
2. Are all raw data available and labeled properly (e.g., methods used, units, sample IDs, dilution factors, reruns)?	✓		
3. Are all abnormalities in the raw data noted and/or explained?	✓		
4. Were all the client samples analyzed for all constituents and QC as specified on the LAL Bench Sheets?	✓		
Data Quality Assessment 5. Was the sample properly preserved and analyzed within the method-specified holding time?	✓		
6. Were the instrument calibration criteria met?	✓		
7. Are the initial and continuing calibration verification samples data bracketing the samples of interest within criteria?	✓		
8. Are the bracketing initial and continuing calibration blank data within criteria?	✓		
9. *For ICP Only:* Are the interference check standard recovery data within criteria?			

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.

J. Wood 6-16-95
Analyst Signature/Date

D. M. Bay 6/20/95
Secondary Reviewer Initials/Date

9613446.2612

FURNACE RUN LOG
ZE

ANALYST: JMW
ELEMENT: As
DATE: 6-15-95
STD 3 (ABS): 0.110
CCV/CAL STD: 94364
INTEG. TIME 5 SEC
CRA STD(10): 94291C
ICV STD( ): 94353
RUN START TIME: 13:32

BATCH No.
520 BHD
520 BLT

DATA FILE: ZE95166B
POST SPIKE TRUE (µg/L) 20

CUP	SAMPLE	DF	COMMENTS	CUP	SAMPLE	DF	COMMENTS
001	Blank						
002	10						
003	25						
004	50						
005	100						
006	200						
007	ICV						
008	ICB						
009	CRA						
010	PBWS206HD						
011	LCSWS206HD		-91.3				
012	L4561-16						
013	66						
014	165		-94%				
015	L4597-16						
016	PBWS206LT						
017	LCSWS206LT		-37%				
018	L4561-8						
019	84						
020	85		-109%				
021	L4597-8						
022							
023							
024							
025							
026							
027							
028							
029							
030							
031							
032							
033							
034							
035							
036							
037							
038			JMW 6-16-95				
039							

ANALYST: JMW DATE: 6-16-95 REVIEWER: _____ DATE: _____

LOCKHEED ANALYTICAL LABORATORY
VOLATILE ORGANICS ANALYSIS DATA SHEET

CUSTOMER SAMPLE NO.

BODKD5

Lab Job Name:BECHTEL-HANFORD Contract:_

Lab Code:LAS Case No.: SAS No.: SDG No.:L4561

Matrix: (soil/water) WATER Lab Sample ID:L4561-1

Sample wt/vol: 5.00 (g/ml) ML Lab File ID: D4330

Level: (low/med) LOW Date Received: 5/20/95

% Moisture: not dec. 0 Date Analyzed: 5/24/95

GC Column:RTX502.2 ID: 0.53(mm) Dilution Factor: 1.00

Soil Extract Volume: 1.00 (ML) Soil Aliquot Volume: 1.00(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L_	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	10.	U
67-64-1	Acetone	7.	J
75-15-0	Carbon Disulfide	10.	U
75-35-4	1,1-Dichloroethene	10.	U
75-34-3	1,1-Dichloroethane	10.	U
540-59-0	1,2-Dichloroethene (total)	10.	U
67-66-3	Chloroform	10.	U
107-06-2	1,2-Dichloroethane	10.	U
78-93-3	2-Butanone	10.	U
71-55-6	1,1,1-Trichloroethane	10.	U
56-23-5	Carbon Tetrachloride	10.	U
75-27-4	Bromodichloromethane	10.	U
78-87-5	1,2-Dichloropropane	10.	U
10061-01-5	cis-1,3-Dichloropropene	10.	U
79-01-6	Trichloroethene	10.	U
124-48-1	Dibromochloromethane	10.	U
79-00-5	1,1,2-Trichloroethane	10.	U
71-43-2	Benzene	10.	U
10061-02-6	trans-1,3-Dichloropropene	10.	U
75-25-2	Bromoform	10.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	10.	U
79-34-5	1,1,2,2-Tetrachloroethane	10.	U
108-88-3	Toluene	10.	U
108-90-7	Chlorobenzene	10.	U
100-41-4	Ethylbenzene	10.	U
100-42-5	Styrene	10.	U
1330-20-7	Xylenes (total)	10.	U

LOCKHEED ANALYTICAL LABORATORY
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

CUSTOMER SAMPLE NO.

BODKD5

Lab Job Name:BECHTEL-HANFORD Contract:_

Lab Code:LAS Case No.: SAS No.: SDG No.:L4561

Matrix: (soil/water) WATER Lab Sample ID:L4561-1

Sample wt/vol: 5.00 (g/ml) ML Lab File ID: D4330

Level: (low/med) LOW Date Received: 5/20/95

% Moisture: not dec. 0 Date Analyzed: 5/24/95

GC Column:RTX502.2 ID: 0.53(mm) Dilution Factor: 1.00

Soil Extract Volume: 1.00 (uL) Soil Aliquot Volume: 1.00(uL)

Number TICs Found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L_

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
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22.					
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24.					
25.					
26.					
27.					
28.					
29.					
30.					

LOCKHEED ANALYTICAL LABORATORY
VOLATILE ORGANICS ANALYSIS DATA SHEET

CUSTOMER SAMPLE NO.

BODKD1

Lab Job Name:BECHTEL-HANFORD Contract:_

Lab Code:LAS Case No.: SAS No.: SDG No.:L4561

Matrix: (soil/water) WATER Lab Sample ID:L4561-5

Sample wt/vol: 5.00 (g/ml) ML Lab File ID: D4331

Level: (low/med) LOW Date Received: 5/20/95

% Moisture: not dec. 0 Date Analyzed: 5/24/95

GC Column:RTX502.2 ID: 0.53(mm) Dilution Factor: 1.00

Soil Extract Volume: 1.00 (ML) Soil Aliquot Volume: 1.00(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L_	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	10.	U
67-64-1	Acetone	10.	U
75-15-0	Carbon Disulfide	10.	U
75-35-4	1,1-Dichloroethene	10.	U
75-34-3	1,1-Dichloroethane	10.	U
540-59-0	1,2-Dichloroethene (total)	10.	U
67-66-3	Chloroform	10.	U
107-06-2	1,2-Dichloroethane	10.	U
78-93-3	2-Butanone	10.	U
71-55-6	1,1,1-Trichloroethane	10.	U
56-23-5	Carbon Tetrachloride	10.	U
75-27-4	Bromodichloromethane	10.	U
78-87-5	1,2-Dichloropropane	10.	U
10061-01-5	cis-1,3-Dichloropropene	10.	U
79-01-6	Trichloroethene	22.	
124-48-1	Dibromochloromethane	10.	U
79-00-5	1,1,2-Trichloroethane	10.	U
71-43-2	Benzene	10.	U
10061-02-6	trans-1,3-Dichloropropene	10.	U
75-25-2	Bromoform	10.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	10.	U
79-34-5	1,1,2,2-Tetrachloroethane	10.	U
108-88-3	Toluene	10.	U
108-90-7	Chlorobenzene	10.	U
100-41-4	Ethylbenzene	10.	U
100-42-5	Styrene	10.	U
1330-20-7	Xylenes (total)	10.	U

LOCKHEED ANALYTICAL LABORATORY
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

CUSTOMER SAMPLE NO.

BODKD1

Lab Job Name:BECHTEL-HANFORD Contract:_

Lab Code:LAS Case No.: SAS No.: SDG No.:L4561

Matrix: (soil/water) WATER Lab Sample ID:L4561-5

Sample wt/vol: 5.00 (g/ml) ML Lab File ID: D4331

Level: (low/med) LOW Date Received: 5/20/95

% Moisture: not dec. 0 Date Analyzed: 5/24/95

GC Column:RTX502.2 ID: 0.53(mm) Dilution Factor: 1.00

Soil Extract Volume: 1.00 (uL) Soil Aliquot Volume: 1.00(uL)

Number TICs Found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L_

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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LOCKHEED ANALYTICAL LABORATORY
VOLATILE ORGANICS ANALYSIS DATA SHEET

CUSTOMER SAMPLE NO.

BODKD6

Lab Job Name:BECHTEL-HANFORD Contract:_

Lab Code:LAS Case No.: SAS No.: SDG No.:L4561

Matrix: (soil/water) WATER Lab Sample ID:L4597-2

Sample wt/vol: 5.00 (g/ml) ML Lab File ID: D4341

Level: (low/med) LOW Date Received: 5/25/95

% Moisture: not dec. 0 Date Analyzed: 5/26/95

GC Column:RTX502.2 ID: 0.53(mm) Dilution Factor: 1.00

Soil Extract Volume: 1.00 (ML) Soil Aliquot Volume: 1.00(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L_	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	10.	U
67-64-1	Acetone	6.	J
75-15-0	Carbon Disulfide	10.	U
75-35-4	1,1-Dichloroethene	10.	U
75-34-3	1,1-Dichloroethane	10.	U
540-59-0	1,2-Dichloroethene (total)	10.	U
67-66-3	Chloroform	10.	U
107-06-2	1,2-Dichloroethane	10.	U
78-93-3	2-Butanone	10.	U
71-55-6	1,1,1-Trichloroethane	10.	U
56-23-5	Carbon Tetrachloride	10.	U
75-27-4	Bromodichloromethane	10.	U
78-87-5	1,2-Dichloropropane	10.	U
10061-01-5	cis-1,3-Dichloropropene	10.	U
79-01-6	Trichloroethene	10.	U
124-48-1	Dibromochloromethane	10.	U
79-00-5	1,1,2-Trichloroethane	10.	U
71-43-2	Benzene	10.	U
10061-02-6	trans-1,3-Dichloropropene	10.	U
75-25-2	Bromoform	10.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	10.	U
79-34-5	1,1,2,2-Tetrachloroethane	10.	U
108-88-3	Toluene	10.	U
108-90-7	Chlorobenzene	10.	U
100-41-4	Ethylbenzene	10.	U
100-42-5	Styrene	10.	U
1330-20-7	Xylenes (total)	10.	U

LOCKHEED ANALYTICAL LABORATORY
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

CUSTOMER SAMPLE NO.

BODKD6

Lab Job Name:BECHTEL-HANFORD Contract:_

Lab Code:LAS Case No.: SAS No.: SDG No.:L4561

Matrix: (soil/water) WATER Lab Sample ID:L4597-2

Sample wt/vol: 5.00 (g/ml) ML Lab File ID: D4341

Level: (low/med) LOW Date Received: 5/25/95

% Moisture: not dec. 0 Date Analyzed: 5/26/95

GC Column:RTX502.2 ID: 0.53(mm) Dilution Factor: 1.00

Soil Extract Volume: 1.00 (uL) Soil Aliquot Volume: 1.00(uL)

Number TICs Found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L_

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	-				
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LOCKHEED ANALYTICAL LABORATORY
VOLATILE ORGANICS ANALYSIS DATA SHEET

CUSTOMER SAMPLE NO.

BODKD3

Lab Job Name:BECHTEL-HANFORD Contract:_

Lab Code:LAS Case No.: SAS No.: SDG No.:L4561

Matrix: (soil/water) WATER Lab Sample ID:L4597-5

Sample wt/vol: 5.00 (g/ml) ML Lab File ID: D4342

Level: (low/med) LOW Date Received: 5/25/95

% Moisture: not dec. 0 Date Analyzed: 5/26/95

GC Column:RTX502.2 ID: 0.53(mm) Dilution Factor: 1.00

Soil Extract Volume: 1.00 (ML) Soil Aliquot Volume: 1.00(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L_	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	10.	U
67-64-1	Acetone	10.	U
75-15-0	Carbon Disulfide	10.	U
75-35-4	1,1-Dichloroethene	10.	U
75-34-3	1,1-Dichloroethane	10.	U
540-59-0	1,2-Dichloroethene (total)	10.	U
67-66-3	Chloroform	10.	U
107-06-2	1,2-Dichloroethane	10.	U
78-93-3	2-Butanone	10.	U
71-55-6	1,1,1-Trichloroethane	10.	U
56-23-5	Carbon Tetrachloride	10.	U
75-27-4	Bromodichloromethane	10.	U
78-87-5	1,2-Dichloropropane	10.	U
10061-01-5	cis-1,3-Dichloropropene	10.	U
79-01-6	Trichloroethene	10.	U
124-48-1	Dibromochloromethane	10.	U
79-00-5	1,1,2-Trichloroethane	10.	U
71-43-2	Benzene	10.	U
10061-02-6	trans-1,3-Dichloropropene	10.	U
75-25-2	Bromoform	10.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	10.	U
79-34-5	1,1,2,2-Tetrachloroethane	10.	U
108-88-3	Toluene	10.	U
108-90-7	Chlorobenzene	10.	U
100-41-4	Ethylbenzene	10.	U
100-42-5	Styrene	10.	U
1330-20-7	Xylenes (total)	10.	U

LOCKHEED ANALYTICAL LABORATORY
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

CUSTOMER SAMPLE NO.
BODKD3

Lab Job Name:BECHTEL-HANFORD Contract:

Lab Code:LAS Case No.: SAS No.: SDG No.:L4561

Matrix: (soil/water) WATER Lab Sample ID:L4597-5

Sample wt/vol: 5.00 (g/ml) ML Lab File ID: D4342

Level: (low/med) LOW Date Received: 5/25/95

% Moisture: not dec. 0 Date Analyzed: 5/26/95

GC Column:RTX502.2 ID: 0.53(mm) Dilution Factor: 1.00

Soil Extract Volume: 1.00 (uL) Soil Aliquot Volume: 1.00(uL)

Number TICs Found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
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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: B0FKD1 LAL Sample ID: L4561-10

Date Collected: 18-MAY-95 Date Received: 20-MAY-95

Matrix: Water Login Number: L4561

SDG: LK4561

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
Gross Alpha	16-JUN-95	GR ALP/BETA LAL-0060_23735	7.0	3.4	3.8	C	pCi/L
Gross Beta	16-JUN-95	GR ALP/BETA LAL-0060_23735	12.9	2.8	3.5		pCi/L
Total radio-strontium	19-JUN-95	SR-90 LAL-0196_23734	-0.10	0.57	1.0		pCi/L

LOCKHEED ANALYTICAL SERVICES

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0FKD1 LAL Sample ID: L4561-15

Date Collected: 18-MAY-95 Date Received: 20-MAY-95

Matrix: Water Login Number: L4561

SDG: LK4561

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
C-14	13-JUN-95	C-14 LAL-0209_23714	29.	69.	85.		pCi/L
H-3	15-JUN-95	TRITIUM(H3) LAL-0066_23736	340	220	250		pCi/L

LOCKHEED ANALYTICAL SERVICES

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0FKD3 LAL Sample ID: L4597-10

Date Collected: 23-MAY-95 Date Received: 25-MAY-95

Matrix: Water Login Number: L4597

SDG: LK4561

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
Gross Alpha	16-JUN-95	GR ALP/BETA LAL-0060_23735	8.1	4.0	4.5	C	pCi/L
Gross Beta	16-JUN-95	GR ALP/BETA LAL-0060_23735	9.5	2.9	4.0		pCi/L
Total radio-strontium	19-JUN-95	SR-90 LAL-0196_23734	-0.09	0.60	1.1		pCi/L

LOCKHEED ANALYTICAL SERVICES

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0FKD3 | LAL Sample ID: L4597-15

Date Collected: 23-MAY-95 | Date Received: 25-MAY-95

Matrix: Water | Login Number: L4597

SDG: LK4561

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
C-14	13-JUN-95	C-14 LAL-0209_23714	155.	77.	85.		pCi/L
H-3	15-JUN-95	TRITIUM(H3) LAL-0066_23736	5520	550	250		pCi/L

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

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

Description of Solution

a. Mass of solution:	5.0007 grams.
b. Chemical form:	AmCl3 in 0.5N HCl
c. Carrier content:	None added
d. Density:	1.0077 gram/ml @ 20°C.

Radioimpurities

None detected

Radioactive Daughters

None detected

Radionuclide Concentration

0.1994 μCi/gram.

Method of Calibration

Weighed aliquots of the solution were assayed using a liquid scintillation counter.

Uncertainty of Measurement

a. Systematic uncertainty in instrument calibration:	±2.0%
b. Random uncertainty in assay:	±0.7%
c. Random uncertainty in weighing(s):	±0.0%
d. Total uncertainty at the 99% confidence level:	±2.7%

NIST Traceability

This calibration is implicitly traceable to the National Institute of Standards and Technology.

Notes

1. Nuclear data were taken from "Table of Isotopes", Seventh Edition, edited by Virginia S. Shirley.
2. IPL participates in an NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay(and later NIST certification) of Standard Reference Materials. (As in NRC Regulatory Guide 4.15)

Gary A. Gilmore
QUALITY CONTROL

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

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ISOTOPE DILUTION RECORD

Isotope: Am-241

Agnes Wong 4-9-93

Secondary/Working Level Dilution

Date: 4-9-93 Preparer's Name: A. Wong

Pipet Check / Balance Wt. Check Done (✓)

Diluted Source ID (log#): 91-225-60-1

Diluent used: 0.5N HCl

A: Source activity: 21700 dpm/g (9774.8 pCi/g)

B: Amount of source transferred: 10.3235 g

C: Total amount of dilution: 100.1029 g

D: Activity of dilution (A*B/C): 2237.90 dpm/g

E: Density of Diluent: 1.0010 g/ml

★ F: Activity by volume (D*E): 2240.14 dpm/ml

Dilution Log Book ID: ~~92-335~~ AW 92-353-81-1

Reviewed by: EJ Date: 4/9/93

1.6" diameter filter LCS for Gamma Spec. JSS 5/18/93
(in petri dish and sealed)

Prepared by Wee VanHuizen 5/10/93 — Cut Whatman Glass Micro-fiber filter paper (originally 3" dia) to 1.6" dia — Pipetted on filter:

^{137}Cs LAL-0199- 0.200 ml * 975.18 pCi/ml = 195.0 pCi (≡ 197.8 pCi 4-2-91)

^{60}Co LAL-0225-80-1 0.200 ml * (998.11 pCi/ml) 40.3 Bq/ml = 199.6 pCi (≡ 259.1 pCi 4-2-91)

(same pipette amounts as p.80K)

Continued on Page N/A

Read and Understood By

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Agnes Wong — Signed — 4-9-93 — Date

Jarell S. Schutt — Signed — 5-18-93 — Date

U.S. Environmental Protection Agency
Environmental Monitoring Systems Laboratory-Las Vegas
Nuclear Radiation Assessment Division

Calibration Certificate

Description

Principal radionuclide: Strontium-90 — Half-life: 28.6 years

Nominal activity: 27 nano curies

Nominal volume: 5 ml in ampoule/bottle number: 94003-1

Measurement Activity of principal radionuclide

Activity per gram of this solution

5.40 nano curies of Strontium-90

at 0400 hours PST on April 1, 1994

Activity of daughter radionuclide

The principal activity was accompanied at the quoted time by

5.40 nano curies Per gram

of the daughter nuclide Yttrium-90

Total mass of this solution

Approximately 5.0 grams

Method of measurement

The activity of the primary solution was measured by liquid scintillation counting.

The activity of the dilution was measured by liquid scintillation counting.

Useful Life

This radionuclide has decayed through 0.0 half lives since it was observed by EMSL-LV

We recommend that this solution should not be used after August 1994

This dilution was prepared for the 1994 ASTM Collaborative Study of a test method for the determination of Sr-90 in water.

Purity

The manufacturer states that activities other than that of the principal nuclide and of its daughter nuclides, if any, were estimated/known to be:

(1)	less than equal to	%	of the principal activity
(2)	less than equal to	%	of the principal activity
(3)	less than equal to	%	of the principal activity

The activity of impurity (1) is not (2) is not (3) is not included in the quoted figures of the principal activity.

Random Errors

The precision of this standard was such that the certified value of the radioactive concentration of the principal activity had a standard error (sm) not greater than ± 0.1 %
(The 99.7% confidence limits are given by t(sm) where t is obtained from the student t factor for the degree of freedom (n-1)).

The maximum uncertainty due to the assessable systematic errors (dilution, counting, and known uncertainty of the standard) is obtained by the separate arithmetic summation of the positive and negative systematic error ($+\delta - \delta'$). These have been estimated not to exceed +3.8 % or - 3.8 %

the overall uncertainty (often called accuracy) is an estimate of the possible divergence of the quoted result from the true value. It is a combination of random error [t(sm)] at the 99.7% confidence limits and the worst case estimate of the systematic errors ($+\delta, -\delta'$)
The overall uncertainty is therefore calculated on the basis of $+[t(sm)+\delta], -[t(sm)+\delta']$
and is +4.0 %, - 4.0 % of the quoted radioactive concentration.

Decay Schemes

This standardization is based on the following assumptions of the principle nuclide, its daughter nuclides and impurities (no allowance for error in these assumptions or the assumption of quoted half-life have been included in the statement of accuracy above).

Strontium-90 decays 100 percent by beta emission to yttrium-90. Yttrium-90 also decays 100 percent by beta emission.

Chemical Composition of Solution

Carrier content per gram of solution: 30 micrograms strontium

Other components: 0.1 M HCl

Preservative:

Remarks

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Date Certificate Prepared: April 26, 1994

Approval Signature: Paul B. Hahn

82 9613446.2629

PROJECT Sr-90 Notebook No. 0474

Continued From Page _____

INITIAL STANDARD DILUTION RECORD

Standard Information:

Isotope:	Sr-90	Vendor:	EPA
Activity of Standard Received:	2.7×10^4 uCi	Vendor I.D. #	94003-1
Weight of Standard Received (g):	5.0 g	LAL I.D. #:	AC5281
Standard Activity (pCi/g):	5.4×10^3 pCi/g	NIST Traceable ?	yes
Halflife in Years or Days:	28.6 yrs	Certificate #:	94003-1
Reference Date:	4-1-1994	Receiver's Name:	K Free
		Date Received:	5-3-94

Primary Dilution

Balance Verification?:	Yes
Diluent Used:	0.1M HCl
a: Decay Corrected Standard Activity (pCi/g):	5.4×10^3 pCi/g
b: Weight of the Source Transferred (g):	4.9670 g
c: Total diluted weight (g):	49.91 g
d: Total Diluted Volume (mL)	50 mL
e: Activity of Dilution by Weight (pCi/g) [a * b / c]:	537.4 pCi/g
f: Calculated Density of Solution (g/ml) [c / d]:	0.9982 g/mL
g: Activity of Dilution by Volume (pCi/mL) [e * f]:	536.44 pCi/mL
h. Dilution Logbook I.D. #:	~~93-474-81-1~~ 93-474-82-1 CP 4/7/95

Prepared By: Agnes Wong Preparation Date: 6-15-94

Reviewed By: Joe Hutchison Review Date: 6/30/94

Purity/Cross Check Performed By: _____ Check Date: _____

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Signed	Date	Signed	Date

PROJECT Gross Alpha/Beta LCS 9613446.2630

Notebook No. 0474

Continued From Page _____

SECONDARY / WORKING LEVEL STANDARD DILUTION RECORD

Dilution Source Information

Isotope:	Am-241 and Sr-90
From NIST traceable standard?:	Yes
Vendor or Certificate I.D. # of parent standard:	Am-241 IPL - 388-100-1 Sr-90 NIST SRM 4919G
Diluted source logbook I.D. #:	Am-241 91-0225-60-1 Sr-90 91-0225-30-2
Balance verification?:	Yes
Diluent used:	0.1 N HNO_3

Dilution

*Diluent:	0.1 N HNO_3 + 42mg $Sr(NO_3)_2$/mL
*Density of diluent (g/ml):	NA
a. Parent standard activity:	Am-241 9810 pCi/mL Sr-90 6000 pCi/mL on 8/1/90
b. Amount of standard transferred:	Am-241 0.5 mL Sr-90 0.5 mL
c. Total amount of dilution:	500 mL
d. Activity of dilution [a * b / c]:	Am-241 9.81 pCi/mL Sr-90 6.0 pCi/mL on 8/1/90 10.8 pCi/mL on 8/1/94
Dilution logbook I.D. #:	93-0474-94

Prepared by: Joe Hutchison — Preparation date: 8/16/94

Reviewed by: Marcus Wong — Review date: 8 AW 10-4-94

*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.

LAL-91-SOP-0174

Continued on Page

Read and Understood By

Signed	Date	Signed	Date
[signature]	9/20/95		

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9613446.2631

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

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

Description of Solution

a. Mass of solution:	5.0007	grams.
b. Chemical form:	AmCl3 in 0.5N HCl	
c. Carrier content:	None added	
d. Density:	1.0077	gram/ml @ 20°C.

Radioimpurities

None detected

Radioactive Daughters

None detected

Radionuclide Concentration

0.1994 µCi/gram.

Method of Calibration

Weighed aliquots of the solution were assayed using a liquid scintillation counter.

Uncertainty of Measurement

a. Systematic uncertainty in instrument calibration:	±2.0%
b. Random uncertainty in assay:	±0.7%
c. Random uncertainty in weighing(s):	±0.0%
d. Total uncertainty at the 99% confidence level:	±2.7%

NIST Traceability

This calibration is implicitly traceable to the National Institute of Standards and Technology.

Notes

1. Nuclear data were taken from "Table of Isotopes", Seventh Edition, edited by Virginia S. Shirley.
2. IPL participates in an NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay(and later NIST certification) of Standard Reference Materials. (As in NRC Regulatory Guide 4.15)

Gary A Gilmore
QUALITY CONTROL

ISOTOPE PRODUCTS LABORATORIES
1800 No. Keystone Street.,
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National Institute of Standards & Technology

Certificate

Standard Reference Material 4919-G
Radioactivity Standard

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

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

Gaithersburg, MD 20899
[illegible]uary, 1991

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

*Notes on back

NOTES

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

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

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

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

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

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

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

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

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

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

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

4919-G

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

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

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

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

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

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

TO CONVERT FROM EST TO:

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

9613446.2635

ACS 851
RS

U.S. Environmental Protection Agency
Environmental Monitoring Systems Laboratory-Las Vegas
Nuclear Radiation Assessment Division

Calibration Certificate

Description

Principal radionuclide: Strontium-90 — Half-life: 28.6 years

Nominal activity: 27 nano curies

Nominal volume: 5 ml in ampoule/bottle number: 94003-1

Measurement Activity of principal radionuclide

Activity per gram of this solution: 5.40 nano curies of Strontium-90

at 0400 hours PST on April 1, 1994

Activity of daughter radionuclide

The principal activity was accompanied at the quoted time by

5.40 nano curies Per gram

of the daughter nuclide Yttrium-90

Total mass of this solution

Approximately 5.0 grams

Method of measurement

The activity of the primary solution was measured by liquid scintillation counting.

The activity of the dilution was measured by liquid scintillation counting.

Useful Life

This radionuclide has decayed through 0.0 half lives since it was obtained by EMSL-LV

We recommend that this solution should not be used after August 1994

This dilution was prepared for the 1994 ASTM Collaborative Study of a test method for the determination of Sr-90 in water.

841

C-SZ 30

9613446.2636

Purity

The manufacturer states that activities other than that of the principal nuclide and of its daughter nuclides, if any, were estimated/known to be:

(1)	less than equal to	%	of the principal activity
(2)	less than equal to	%	of the principal activity
(3)	less than equal to	%	of the principal activity

The activity of impurity (1) is not (2) is not (3) is not included in the quoted figures of the principal activity.

Random Errors

The precision of this standard was such that the certified value of the radioactive concentration of the principal activity had a standard error (sm) not greater than ± 0.1 %
(The 99.7% confidence limits are given by t(sm) where t is obtained from the student t factor for the degree of freedom (n-1)).

The maximum uncertainty due to the assessable systematic errors (dilution, counting, and known uncertainty of the standard) is obtained by the separate arithmetic summation of the positive and negative systematic error ($+\delta - \delta'$). These have been estimated not to exceed

+3.8 % or - 3.8 %

the overall uncertainty (often called accuracy) is an estimate of the possible divergence of the quoted result from the true value. It is a combination of random error [t(sm)] at the 99.7% confidence limits and the worst case estimate of the systematic errors ($+\delta, -\delta'$)
The overall uncertainty is therefore calculated on the basis of $+ [t(sm) + \delta] . - [t(sm) + \delta]$
and is +4.0 % . - 4.0 % of the quoted radioactive concentration.

Decay Schemes

This standardization is based on the following assumptions of the principle nuclide, its daughter nuclides and impurities (no allowance for error in these assumptions or the assumption of quoted half-life have been included in the statement of accuracy above).

Strontium-90 decays 100 percent by beta emission to yttrium-90. Yttrium-90 also decays 100 percent by beta emission.

Chemical Composition of Solution

Carrier content per gram of solution: 30 micrograms strontium

Other components: 0.1 M HCl

Preservative:

Remarks

Date Certificate Prepared: April 26, 1994

Approval Signature: Paul B. Hahn

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Revised 1/84

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PROJECT Sr-90 9613446.2637

Notebook No. D474

Continued From Page _____

INITIAL STANDARD DILUTION RECORD

Standard Information:

Isotope:	Sr-90	Vendor:	EPA
Activity of Standard Received:	2.7×10^4 uCi	Vendor I.D. #	94003-1
Weight of Standard Received (g):	50 g	LAL I.D. #:	AC5281
Standard Activity (pCi/g):	5.4×10^3 pCi/g	NIST Traceable ?	yes
Halflife in Years or Days:	28.6 yrs	Certificate #:	94003-1
Reference Date:	4-1-1994	Receiver's Name:	K Free
		Date Received:	5-3-94

Primary Dilution

Balance Verification?:	yes
Diluent Used:	0.1M HCl
a: Decay Corrected Standard Activity (pCi/g):	5.4×10^3 pCi/g
b: Weight of the Source Transferred (g):	4.9670 g
c: Total diluted weight (g):	49.91 g
d: Total Diluted Volume (mL)	50 mL
e: Activity of Dilution by Weight (pCi/g) [a * b / c]:	537.4 pCi/g
f: Calculated Density of Solution (g/ml) [c / d]:	0.9982 g/mL
g: Activity of Dilution by Volume (pCi/mL) [e * f]:	536.44 pCi/mL
h. Dilution Logbook I.D. #:	~~93-494-81-1~~ 93-474-82-1 cp 4/7/95

Prepared By: Agnes Wong Preparation Date: 6-15-94

Reviewed By: Joe Hutchison Review Date: 6/30/94

Purity/Cross Check Performed By: _____ Check Date: _____

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Signed	Date	Signed	Date

PROJECT Sr-90 9613446.2638 Notebook No. _____

Continued From Page _____

SECONDARY/WORKING LEVEL STANDARD DILUTION RECORD

Dilution Source Information	
Isotope:	Sr-90
Ref. 4-1-94 Parent Barcode Number	AC5281
Vendor or Certificate I.D. # of Parent Standard:	EPA 94003-1
Diluted Source Logbook I.D. #:	93-474-82-1
Balance Verification?:	Yes
Diluent Used:	0.1 M HCl

Dilution	
*Diluent:	0.1 M HCl
*Density of diluent (g/ml):	N/A
a: Parent Specific Activity:	536.44 pCi/ml
b: Amount of Source Transferred:	5.0018 g
c: Total amount of Dilution:	100.20 g
d: Total Volume of Dilution:	N/A
e: Activity of Dilution [a * b / c]:	N/A
f: Activity of Dilution (a * b / d):	26.78 pCi/ml
Dilution Logbook I.D. #:	94-677-44-1

Prepared By: Agnes Wong Preparation Date: 3-2-95

Reviewed By: Jon Hilton Review Date: 3/3/95

*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.

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Signed Date Signed Agnes Wong 3-3-95 Date

Strontium Carrier Standardization

Strontium Carrier (10 mg/mL):

Use commercially available 10,000 µg Sr/mL ICP Standard or equivalent. Alternately, Dissolve 24.16 g of $Sr(NO_3)_2$ in water and dilute to 1 L in a volumetric flask with water.

Perform calibration check on a 0.5 mL pipet and then carefully pipet 3 - 0.5 mL portions of the strontium carrier solution into separate cleaned dried and tared planchets. Dry the planchet under a drying lamp. Cool the planchets in a desiccator and weigh. Sr Carrier #91-208-100-1 Was recalibrated to give a new calibrated value. Prepped on 1-5-95

	Calib # 1	Calib # 2	Calib # 3
Carrier plus planchet wt.	6.60823	6.65050	6.818936
Tare wt. of planchet	6.59582	6.63805	6.80698
Net wt. of carrier added (mg)	0.01241	0.01245	0.012068

AVERAGE $Sr(NO_3)_2$ ± STD DEV. = 0.01231 g

*Expected mg of $Sr(NO_3)_2$ = cert.value(=10mgofSr/mL) * 0.5 mL * 2.41*

Within 3% of expected (12.08 mg/0.5 mL) value (yes/no) yes

Initial and Date: DW 1-10-95

Read and Understood By

Signed | Date | Signed | Date 845

Signed Wong 1-10-95

Strontium Carrier Standardization

Strontium Carrier (10 mg/mL):

Use commercially available 10,000 μg Sr/mL ICP Standard or equivalent. Alternately, Dissolve 24.16 g of $Sr(NO_3)_2$ in water and dilute to 1 L in a volumetric flask with water.

Perform calibration check on a 0.5 mL pipet and then carefully pipet 3 - 0.5 mL portions of the strontium carrier solution into separate cleaned dried and tared planchets. Dry the planchet under a drying lamp. Cool the planchets in a desiccator and weigh.

	Calib # 1	Calib # 2	Calib # 3
Carrier plus planchet wt.	6.58185 g	6.49626 g	6.56816 g
Tare wt. of planchet	6.56968 g	6.48464 g	6.55620 g
Net wt. of carrier added (mg)	0.01217 g	0.01162	0.01196 g

AVERAGE $Sr(NO_3)_2$ ± STD DEV. = 0.01192 g ± 0.000277

*Expected mg of $Sr(NO_3)_2$ = cert. value (≈10 mg of Sr/mL) * 0.5 mL * 2.41*

Within **3%** of expected (12.08 mg/0.5 mL) value (yes/no) yes

Initial and Date: AW 3-6-94

Continued on Page

Read and Understood By QA Review: 846

Signed Date Signed Date

Signed 3-15-94 Signed 8/4/94

961 3446 2641

CERTIFICATE OF CALIBRATION
BETA STANDARD SOLUTION

AA0114

Radionuclide	C-14	Customer:	LOCKHEED ENVIRONMENTAL	
Half Life:	5730 ± 40 years	P.O.No.:	06LAB2959	
Catalog No.:	7014	Reference Date:	November 15 1992	12:00 PST.
Source No.:	407-124-2	Contained Radioactivity:	1.093	µCi.
		Contained Radioactivity:	40.4	kBq

Description of Solution

a. Mass of solution:	5.0242	grams.
b. Chemical form:	Benzoic Acid Carboxy-C-14 in 0.1N NaOH	
c. Carrier content:	None added	
d. Density:	1.002	g/ml @ 20°C.

Radioimpurities None detected

Radioactive Daughters None

Radionuclide Concentration 0.218 µCi/g.

Method of Calibration

Weighed aliquots of the solution were assayed using a liquid scintillation counter.

Uncertainty of Measurement

a. Systematic uncertainty in instrument calibration:	± 1.8%
b. Random uncertainty in assay:	± 0.5%
c. Random uncertainty in weighing(s):	± 1.0%
d. Total uncertainty at the 99% confidence level:	± 2.2%

NIST Traceability

This calibration is implicitly traceable to the National Institute of Standards and Technology.

Notes

1. Nuclear data were taken from "Table of Radioactive Isotopes", edited by Virginia S. Shirley, 1986.
2. IPL participates in an NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay(and later NIST certification) of Standard Reference Materials (As in NRC Regulatory Guide 4.15).

Anna U. Uma

QUALITY CONTROL

Nov. 17, 1992

Date Signed

ISOTOPE PRODUCTS LABORATORIES
1800 North Keystone Street
Burbank, California 91504
(818) 843 - 7000

9613446.2642

AA 0114

ISOTOPE WEIGHT DILUTION RECORD

Isotope: C-14 Vendor: IPL

Total Received Activity: 1.093 μCi. Vendor ID: 407-124-2

Wt. Received: 5.024 g NIST Traceable (Y)/N Cert. # Implicitly

Activity in Units/g: .215 μCi/g Reference Date: 11-15-92

Activity converted (dpm/g): 482,954 dpm/g Receive Date: 11/18/92

Halflife (Yrs or days) t½ = 5730 ± 40 years Receiver's Name: Jimmy Morales

PRIMARY DILUTION: Balance wt. check done (✓)

a: Source activity: 482,954 dpm/g * (if t½ = <100yr decay to prep. date)

b: Wt. of Source transfered: 4.90951 g

Diluent used: 0.1 N. OH

c: Total diluted weight: 116.53 g

d: Activity of dilution (a*b/c): 20,347 dpm/g ± 2.2%

e: Calculated density of solution: 1.002 g/mL (4M HNO_3 = 1.1294 ± .0007 g/mL)

f: Activity by volume = (d*e): 20,388 dpm/mL

Dilution Log Book ID: LAL-93-474-23-1 ✓

Preparation Date: 10/27/93 Preparer's Name. MJ

SECONDARY OR WORKING LEVEL DILUTION Balance wt. check done (✓)

Log Book ID of source being diluted: N/A

a: Source activity: dpm/g * (if t½ = <100yr decay to prep. date)

b: Wt. of Source transfered: g

Diluent used:

c: Total diluted weight: g

d: Activity of dilution (a*b/c): dpm/g

e: Calculated density of solution: g/mL (4M HNO_3 = 1.1294 ± .0007 g/mL)

f: Activity by volume = (d*e): dpm/mL

Dilution Log Book ID:

862

Signed	Date	Reviewed by Signed	Date
RAS	10/27/93		

9613446.2643

INITIAL STANDARD DILUTION RECORD

Standard Information:			
Isotope:	C-14	Vendor:	Isotope Product
Activity of Standard Received:	1.09 uCi	Vendor I.D. #	
Weight of Standard Received (g):	5.0242 g	LAL I.D. #:	AA0114
Standard Activity (pCi/g):	2.17E+05 pCi/g	NIST Traceable ?	Yes
Halflife in Years or Days:	5730 yrs	Certificate #:	407-124-2
Reference Date:	11/15/92	Preparer's Name:	Mark Young
		Date Received:	11/18/92

Primary Dilution	
Balance Verification?:	Yes
Diluent Used:	0.1 N NaOH
a: Decay Corrected Standard Activity (pCi/g):	2.17E+05 pCi/g
b: Weight of the Source Transferred (g):	4.90951 g
c: Total diluted weight (g):	116.53 g
d: Total Diluted Volume (mL)	116.3 mL
e: Activity of Dilution by Weight (pCi/g) [a * b / c]:	9.139E+03 pCi/g
f: Calculated Density of Solution (g/ml) [c / d]:	1.0020 g/mL
g: Activity of Dilution by Volume (pCi/mL) [e * f]:	9.157E+03 pCi/mL
h. Dilution Logbook I.D. #:	LAL-93-0474-23-1
Prepared By:	Preparation Date: 10/27/93
Reviewed By:	Review Date:
Purity/Cross Check Performed By:	Check Date:

9613446.2644

SECONDARY/WORKING LEVEL STANDARD DILUTION RECORD

Dilution Source Information

Isotope:	C-14
Parent Barcode Number	AA0114
Vendor or Certificate I.D. # of Parent Standard:	407-124-2
Diluted Source Logbook I.D. #:	LAL-93-0474-23-1
Balance Verification?:	Yes
Diluent Used:	0.1 N NaOH

Dilution

*Diluent:	Nanopure w/ 1 mg/ml formaldehyde	
*Density of diluent (g/ml):	1.0006	g/ml
a: Parent Specific Activity:	9.14E+03	pCi/g
b: Amount of Source Transferred:	0.70	g
c: Total amount of Dilution:	250.14	g
d: Total Volume of Dilution:	250	ml
e: Activity of Dilution [a * b / c]:	2.57E+01	pCi/g
f: Activity of Dilution (a * b / d):	2.58E+01	pCi/ml
Dilution Logbook I.D. #:	LAL-94-0677-18-1	

Prepared By: Agnes Wong Preparation Date: 11/19/94

Preparer Signature: _____

Reviewed By: _____ Review Date: _____

Reviewer Signature: _____

*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.

9613446.2645

AA0114

SECONDARY/WORKING LEVEL STANDARD DILUTION RECORD

Dilution Source Information	
Isotope:	C-14
Parent Barcode Number	AA0114
Vendor or Certificate I.D. # of Parent Standard:	
Diluted Source Logbook I.D. #:	93-474-23-1
Balance Verification?:	Yes
Diluent Used:	DDI water in 1mg/ml formaldehyde

Dilution		
*Diluent:	Nanopure water with 1mg/ml formaldehyde	
*Density of diluent (g/ml):	N/A	g/ml
a: Parent Specific Activity: 9267.27	~~20,338~~	~~pCi/g~~ dpm 11-19-94 pCi/ml
b: Amount of Source Transferred:	0.7046	g
c: Total amount of Dilution:	250.14	g
d: Total Volume of Dilution:	N/A	ml
e: Activity of Dilution [a * b / c]:	N/A	pCi/g
f: Activity of Dilution (a * b / d):	26.10	pCi/ml
Dilution Logbook I.D. #:	94-677-18-1 ✓	

Prepared By: Agnes Wong Preparation Date: 11-19-94

Reviewed By: Joe Hutchman Review Date: 12/12/94

*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.

9613446.2646

RECEIVED 11/25/95 RKS

U.S. Environmental Protection Agency
Environmental Monitoring Systems Laboratory-Las Vegas
Nuclear Radiation Assessment Division

Calibration Certificate

Description

Principal radionuclide: Tritium (H-3) Half-life: 12.43 years

Nominal activity: 110 nano curies

Nominal volume: 5 ml in ampoule/bottle number: 2606-1

Measurement Activity of principal radionuclide

Activity per gram of this solution

21.9 nano curies of Tritium

at 0400 hours PST on June 3, 1992

Activity of daughter radionuclide

The principal activity was accompanied at the quoted time by

curies Per gram

of the daughter nuclide

Total mass of this solution

APPROX. 5.0 grams

Method of measurement

The activity of the primary solution and this dilution were measured by liquid scintillation counting.

Counting efficiencies for both standardizations were determined by counting solutions directly traceable to the National Institute of Standards & Technology (NIST).

Useful Life

This radionuclide has decayed through 0.0 half lives since it was obtained by EMSL-LV

We recommend that this solution should not be used after December 1999

Purity

The manufacturer states that activities other than that of the principal nuclide and of its daughter nuclides, if any, were estimated/known to be:

(1) none	less than equal to	%	of the principal activity
(2)	less than equal to	%	of the principal activity
(3)	less than equal to	%	of the principal activity

The activity of impurity (1) is not (2) is not (3) is not included in the quoted figures of the principal activity.

Random Errors

The precision of this standard was such that the certified value of the radioactive concentration of the principal activity had a standard error (sm) not greater than ± 0.4 %

(The 99.7% confidence limits are given by t(sm) where t is obtained from the student t factor for the degree of freedom (n-1)).

The maximum uncertainty due to the assessable systematic errors (dilution, counting, and known uncertainty of the standard) is obtained by the separate arithmetic summation of the positive and negative systematic error ($+\delta - \delta'$). These have been estimated not to exceed

+ 2.9 % or - 2.9 %

the overall uncertainty (often called accuracy) is an estimate of the possible divergence of the quoted result from the true value. It is a combination of random error [t(sm)] at the 99.7% confidence limits and the worst case estimate of the systematic errors ($+\delta$, $-\delta'$)
The overall uncertainty is therefore calculated on the basis of $+ [t(sm) + \delta] . - [t(sm) + \delta']$
and is + 4.3 % . - 4.3 % of the quoted radioactive concentration.

Decay Schemes

This standardization is based on the following assumptions of the principle nuclide, its daughter nuclides and impurities (no allowance for error in these assumptions or the assumption of quoted half-life have been included in the statement of accuracy above).

Tritium decays 100 percent by beta emission. The maximum energy is 18.6 Kev, the average is 5.68 Kev.

Chemical Composition of Solution

Carrier content per gram of solution:

100 percent H_2O

Other components:

Barium less than 0.004 perce
Lead less than 3×10^{-5} percen

Preservative:

Remarks

880

Date Certificate Prepared June 17, 1992

Approval Signature George Dilbeck

9613446.2648

U.S. DEPARTMENT OF COMMERCE
National Institute of Standards & Technology
Gaithersburg, MD 20899

REPORT OF TRACEABILITY

U.S. Environmental Protection Agency
Environmental Monitoring Systems Laboratory
Las Vegas, Nevada

Radionuclide	Hydrogen-3
Source identification	2606-1, prepared by EMSL
Source description	Liquid in 5-mL flame-sealed glass ampoule
Source mass	Approximately 5.0 grams
Source composition	Hydrogen-3 in water
Reference time	0700 EST June 3, 1992

	NIST DATA	EMSL DATA
Radioactivity concentration	810.5 Bq g^{-1}	810.3 Bq g^{-1}
Expanded uncertainty	0.64 percent [L2]*	4.3 percent [3]
Photon-emitting impurities	None observed [4]	None observed
Measuring instrument	$4\pi\beta$ liquid-scintillation counters calibrated with SRM 4926D	Liquid-scintillation counting
Half life	12.43 ± 0.05 years [5]	
Difference from NIST		-0.05 percent [6]

For the Director,

J.M. Robin Hutchinson, Acting Group Leader
Radioactivity Group
Physics Laboratory

Gaithersburg, MD 20899
January 1994

*Notes on next page

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NOTES

(1) The uncertainty analysis methodology and nomenclature used for the reported uncertainties are based on uniform NIST guidelines and are compatible with those adopted by the principal international metrology standardization bodies [cf., B.N. Taylor and C.E. Kuyatt, *NIST Technical Note 1129* (1993)].

(2) The combined standard uncertainty, u_c = 0.32 percent, is the quadratic combination of the standard deviation (or standard deviation of the mean where appropriate), or approximations thereof, for the following component uncertainties:

a)	11 liquid-scintillation measurements on each of 4 vials	0.11 percent
b)	gravimetric	0.05 percent
c)	calibration of SRM 4926D	0.29 percent
d)	background	0.00 percent
e)	half life	0.03 percent

The expanded uncertainty, U = 0.64 percent, is obtained by multiplying u_c by a coverage factor of k = 2 and is assumed to provide an uncertainty interval of at least 95% confidence.

(3) Overall uncertainty reported by EMSL.

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

0.08 $\gamma\ s^{-1}g^{-1}$ for energies between 90 and 2700 keV.

(5) Unterweger, M.P., Coursey, B.M., Schima, F.J., and Mann, W.B., Int. J. Appl. Radiat. Isot., 31, 611 (1980).

(6) This result demonstrates the traceability of EMSL to NIST, for this measurement, to within five percent as specified in the appendix, Traceability Studies, of the EPA-NIST interagency agreement of April 1976, as amended.

For further information call Larry Lucas at 301-975-5546 or Jeffrey Cessna at 301-975-5539.

PROJECT H-39613446.2650 Notebook No. 0721

Continued From Page NA

INITIAL STANDARD DILUTION RECORD

Standard Information:

Isotope:	H-3	Vendor:	EPA
Activity of Standard Received:	.11 uCi	~~Vendor I.D. #~~ 2/7/95	
Weight of Standard Received (g):	5 g	LAL I.D. #:	AC5299
Standard Activity (pCi/g):	21.9 nCi/g 2/7/95 ~~pCi/g~~	NIST Traceable ?	Yes
Halflife in Years or Days:	12.43 yrs	Certificate #:	2606-1
Reference Date:	0400, 6/3/92	Receiver's Name:	Kevin Free
		Date Received:	1/25/95

Primary Dilution

Balance Verification?:	Yes
Diluent Used:	EPA Distilled ASTM Type II Water (Deed Water)
a: Decay Corrected Standard Activity (pCi/g):	~~4.939~~ 21.9 nCi/g 2/7/95 pCi/g on 6/3/92
b: Weight of the Source Transferred (g):	4.939 g
c: Total diluted weight (g):	49.377 g
d: Total Diluted Volume (mL)	~~50~~ 49.5 2/7/95 mL
e: Activity of Dilution by Weight (pCi/g) [a * b / c]:	2190 pCi/g
f: ~~Calculated~~ Density of Solution (g/ml) [c / d]:	0.99777 g/mL
g: Activity of Dilution by Volume (pCi/mL) [e * f]:	2190 pCi/mL on 6/3/92
h. Dilution Logbook I.D. #:	LAL-95-0721-1

Prepared By: Joe Hutchinson/J. Morales/C. Ponieway Preparation Date: 2/7/95

Reviewed By: Joe Hutchinson Review Date: 2/7/95

Purity/Cross Check Performed By: _____ Check Date: _____

Signed _____ Date _____ CP 5/8/95 Signed _____ Date _____

H3- LCS 9613446.2651

PROJECT _____ Notebook No. 721

Continued From Page N/A

SECONDARY/WORKING LEVEL STANDARD DILUTION RECORD

Carrie Romero

Dilution Source Information

Isotope:	H-3 LCS
Parent Barcode Number	AC5299
Vendor or Certificate I.D. # of Parent Standard:	2688-1
Diluted Source Logbook I.D. #:	LAL-95-0721-1
Balance Verification?:	Yes
Diluent Used:	Deep well water - low H3

Dilution

*Diluent:	Deep well water - Low H3	
*Density of diluent (g/ml):	0.99	g/ml
a: Parent Specific Activity:	2190	pCi/g
b: Amount of Source Transferred:	~~3.0~~ 5.0	g
c: Total amount of Dilution:	3208	g
d: Total Volume of Dilution:	3176	ml
e: Activity of Dilution [a * b / c]:	3.413	pCi/g
f: Activity of Dilution (a * b / d):	3.448	pCi/ml = 3448 pCi/L on 6/3/92
Dilution Logbook I,D. #:	LAL-95-0721-5	

Prepared By: J. A. Mark Preparation Date: 4/14/95

Reviewed By: Joe Hutchinson Review Date: 4/14/95

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

Read and Understood By

884

Signed	Date	Signed	Date
		CP	5/8/95

INITIAL STANDARD DILUTION RECORD

Standard Information:

Isotope:	H-3	Vendor:	EPA
Activity of Standard Received:	.11 uCi	~~Vendor I.D. #~~ 2/7/95	
Weight of Standard Received (g):	5 g	LAL I.D. #:	AC 5299
Standard Activity (pCi/g):	21.9 nCi/g ~~pCi/g~~ 2/7/95	NIST Traceable ?	Yes
Halflife in Years or Days:	12.43 yrs	Certificate #:	2606-1
Reference Date:	0400, 6/3/92	Receiver's Name:	Kevin Free
		Date Received:	1/25/95

Primary Dilution

Balance Verification?: Yes

Diluent Used: EPA Distilled ASTM Type II Water (Deaed Water)

a: Decay Corrected Standard Activity (pCi/g): ~~4.939~~ 21.9 nCi/g 2/7/95 pCi/g on 6/3/92

b: Weight of the Source Transferred (g): 4.939 g

c: Total diluted weight (g): 49.377 g

d: Total Diluted Volume (mL) ~~50~~ 49.5 2/7/95 mL

e: Activity of Dilution by Weight (pCi/g) [a * b / c]: 2190 pCi/g

f: ~~Calculated~~ Known Density of Solution (g/ml) [c / d]: 0.99777 g/mL

g: Activity of Dilution by Volume (pCi/mL) [e * f]: 2190 pCi/mL on 6/3/92

h. Dilution Logbook I.D. #: C. Ponieway LAL-95-0721-1

Prepared By: Joe Hutchinson / S. Morales / C. Ponieway Preparation Date: 2/7/95

Reviewed By: Joe Hutchinson Review Date: 2/7/95

Purity/Cross Check Performed By: _____ Check Date: _____

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Signed _____ Date _____ CP 5/8/95 Signed _____ Date _____

PROJECT 9613446.2653 Continued From Page

SECONDARY/WORKING LEVEL STANDARD DILUTION RECORD

Dilution Source Information

Isotope:	H-3 LCS
Parent Barcode Number	AC 5299
Vendor or Certificate I.D. # of Parent Standard:	
Diluted Source Logbook I.D. #:	95-0721-1
Balance Verification?:	Yes
Diluent Used:	Dead water

Dilution

*Diluent:	Low Bkg water	
*Density of diluent (g/ml):	1	g/ml
a: Parent Specific Activity:	2190	pCi/~~g~~ ml
b: Amount of Source Transferred:	1.0	~~g~~ ml
c: Total amount of Dilution:	10.0	~~g~~ ml
d: Total Volume of Dilution:	10.0	ml
e: Activity of Dilution [a * b / c]:	219.0	pCi/~~g~~ ml @ 6/3/92
f: Activity of Dilution (a * b / d):	486.2 DPM/ml	~~pCi/ml~~
Dilution Logbook I.D. #:	94-0677-67	

Prepared By: [signature] Preparation Date: 6/14/95

Reviewed By: [signature] Review Date: 6/14/95

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

Read and Understood By

886

Signed	Date	Signed	Date
		[signature]	6/14/95

8/08/95

Data Validation Check List

for Project 100-FR-3

HEIS Samp Number	Client Sample Number	Master DP File Number	DP Sequence Number	Laboratory	Y/N	VOA	Y/N	SEMI VOA	Y/N	PEST/PCB	Y/N	WETCHEM	Y/N	METALS	COMMENTS	Y/N	RADCHEM	Date OSM Rcvd DP
B0FKD1		LK4561		LOCKHEED	Y	7/07/95	N		N		Y	7/07/95	Y	7/07/95		Y	7/07/95	7/07/95
B0FKD2		LK4561		LOCKHEED	N		N		N		N		Y	7/07/95		N		7/07/95
B0FKD3		LK4561		LOCKHEED	Y	7/07/95	N		N		Y	7/07/95	Y	7/07/95		Y	7/07/95	7/07/95
B0FKD4		LK4561		LOCKHEED	N		N		N		N		Y	7/07/95		N		7/07/95
B0FKD5		LK4561		LOCKHEED	Y	7/07/95	N		N		N		N			N		7/07/95
B0FKD6		LK4561		LOCKHEED	Y	7/07/95	N		N		N		N			N		7/07/95

Data Entry Complete: DP [signature]

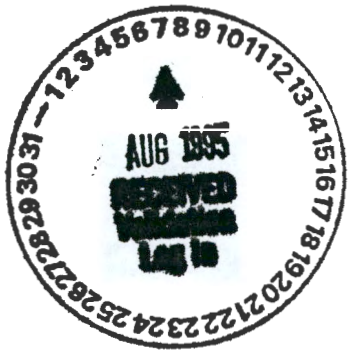
DATATRAC [signature] 8/10/95

Validation Rcvd 08/07/95

9613446.2655

Los Alamos Technical Associates, Inc.

8633 Gage Blvd. / Kennewick, WA 99336 / Telephone (509) 783-4369 / FAX (509) 783-9661



August 7, 1995
LATA95-162

Ms. Joan Kessner
Bechtel
345 Hills
Richland, WA 99352

Subject: VB403.78, SDG LK4561-LAS

Dear Ms. Kessner:

Attached is the data validation report for analytical results for 100-FR-3 Groundwater Round 7, (SDG LK4561-LAS). The package was received by Los Alamos Technical Associates on July 17, 1995. This data package was placed on hold July 31, 1995 to request missing information deemed necessary to the validation effort. The final information request was closed on August 1, 1995 placing the package back in active status.

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

Sincerely,

Marsha C. Webb

Marsha C. Webb
Deputy Project Manager

Attachment

cc: Jeanette Duncan, CH2M Hill
Don Smith, LATA
VW403.78
MCW/lb

mcw

DATA VALIDATION REPORT
for
100-FR-3 GROUNDWATER ROUND 7
General Chemistry Analysis
SDG LK4561-LAS
LATA VB403.78

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

August 7, 1995

Table of Contents

100-FR-3 Groundwater Round 7
Data Validation Narrative

INTRODUCTION

All samples in Sample Delivery Group (SDG) LK4561-LAS (VB403.78) 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 *Remedial Investigation/Feasibility Study Work Plan for the 100-FR-3 Operable Unit*, DOE/RL 91-53, Rev.0.

Completeness: The data package was 83% 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 #: VB403.78 SDG: LK4561-LAS

Sample Information							Analyses Requested
SAMPLE NO.	DATE COLLECTED	MATRIX	SAF	SAMPLING LOCATION	FIELD QC INFO	TEMP °C	1
B0FKD1	18-May-95	WATER	B95-052	199-F7-1	SPLIT W/B0FK67	2	X
B0FKD3	23-May-95	WATER	B95-052	199-F5-4	SPLIT W/B0FK65	2	X

Method References:

	Analysis	Method
1.	Anions (IC) (F, Cl, SO_4, NO_2, NO_3, PO_4)	300.0

REFERENCES

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

DOE 1992, *Remedial Investigation/Feasibility Study Work Plan for the 100-FR-3 Operable Unit*, DOE/RL 91-53, 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.

H- Sample analysis performed outside of method or client specified maximum holding time requirement.

Qualification Summary Table

Qualification Summary Table

General Chemistry

ANALYTE	TYPE	QUALIFIER	SAMPLES AFFECTED	DQO	REASON
Nitrite by IC	MAJOR	UR	B0FKD1	HOLD TIME	Holding time is exceeded by greater than 2 times.
Ortho-Phosphate by IC	MAJOR	UR	B0FKD1	HOLD TIME	Holding time is exceeded by greater than 2 times.
Nitrate by IC	MINOR	J	B0FKD1	HOLD TIME	Holding time is exceeded by greater than 2 times.

General Chemistry Field QC

ANALYTE	TYPE	QUALIFIER	FIELD QC SAMPLES	DQO	ASSESSMENT
Fluoride	Field Split	NONE	B0FK87/B0FKD1 B0FK88/B0FKD3	PRECISION	Field split precision is unacceptable.

Comments:

1. Data qualification is not required based on field split precision, however field split results are noted here to alert the data user to uncertainties in the data set during decision making processes.
2. B0FK65, and B0FK87 were validated in SDG W0560-QES (VB403.75)

Data Summary Table

9613446.2666

GENERAL CHEMISTRY
DATA SUMMARY TABLE

LATA ID#: VB403.78		HEIS #:	B0FKD1		B0FKD3	
		Date:	18-May-95		23-May-95	
		Matrix:	WATER		WATER	
Constituent	CAS #	Units	Results	Q	Results	Q
Chloride by IC	16887-00-6	mg/L	14		35	
Fluoride by IC	16984-48-8	mg/L	0.73		0.35	
Nitrate-N by IC	14797-55-8	mg/L	20	J	20	
Nitrite-N by IC	14797-65-0	mg/L	0.01	UR	0.01	U
Ortho Phosphate by IC	14265-44-2	mg/L	0.1	UR	0.1	U
Sulfate by IC	14808-79-8	mg/L	66		97	

Sample Results (Form I's)

9613446.2668

LOCKHEED ANALYTICAL SERVICES

COMMON IONS AND ADDITIONAL ANALYTES

Sample Results

Client Sample ID: B0FKD1	Date Collected: 18-MAY-95
Matrix: Water	Date Received: 20-MAY-95

Constituent	Units	Method	Result	Reporting Det|Limit	Data Qualifier(s)	Date Analyzed	LAS Batch|ID	LAS Sample|ID
Chloride	mg/L	300.0	14.	0.02		24-MAY-95	23324	L4561-9
Fluoride	mg/L	300.0	0.73	0.1		24-MAY-95	23325	L4561-9
Nitrate-N	mg/L	300.0	20.	0.02	~~H~~ J	24-MAY-95	23326	L4561-9
Nitrite-N	mg/L	300.0	< 0.01	0.01	~~H~~ UR	24-MAY-95	23327	L4561-9
Ortho Phosphate	mg/L	300.0	< 0.1	0.1	~~H~~ UR	24-MAY-95	23328	L4561-9
Sulfate	mg/L	300.0	66.	0.1		24-MAY-95	23329	L4561-9

000012

bjs 7-26-95

038

LOCKHEED ANALYTICAL SERVICES

COMMON IONS AND ADDITIONAL ANALYTES

Sample Results

Client Sample ID: B0FKD3	Date Collected: 23-MAY-95
Matrix: Water	Date Received: 25-MAY-95

Constituent	Units	Method	Result	Reporting Det Limit	Data Qualifier(s)	Date Analyzed	LAS Batch ID	LAS Sample ID
Chloride	mg/L	300.0	35.	0.02		25-MAY-95	23386	L4597-9
Fluoride	mg/L	300.0	0.35	0.1		26-MAY-95	23387	L4597-9
Nitrate-N	mg/L	300.0	20.	0.02		25-MAY-95	23388	L4597-9
Nitrite-N	mg/L	300.0	< 0.01	0.01		25-MAY-95	23389	L4597-9
Ortho Phosphate	mg/L	300.0	< 0.1	0.1		25-MAY-95	23390	L4597-9
Sulfate	mg/L	300.0	97.	0.1		25-MAY-95	23391	L4597-9

bjs 7-26-95

039

Checklist

LATA GENERAL CHEMISTRY
DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
VALIDATION PROCEDURE:	☐ WHC-CM-5-3, Rev. 0			☒ WHC-SD-EN-SPP-002, Rev. 2	

PROJECT:	100-FR-3 ROUND 7			SDG:	LK4561-LAS
VALIDATOR:	BJ SEYMOUR 9-26-95	LATA NO:	VB403.78	DATE:	26-Jul-95
REVIEWER:	BJ MORRIS 9/28/95	LAB:	LAS	CASE:	N/A
SAF NO:	B95-052	QAPP NO:	DOE/RL 91-53, R0	SAP NO:	N/A

ANALYSES REQUESTED

☒ Anions 300.0	

SAMPLE NO.	MATRIX	COMMENTS:
B0FKD1 B0FKD3	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?	☒	☐	☐
Were calibration checks performed on all instruments?	☒	☐	☐
Are calibration checks acceptable?	☒	☐	☐
Validation calculation checks were performed and are acceptable.	☒	☐	☐

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?	X		
Are laboratory blank results acceptable?	X		
Were preparation blanks analyzed?	X		
Are preparation blank results acceptable?	X		

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?	X		
Are all spike sample recoveries acceptable?	X		
Were laboratory control samples (LCS) analyzed at the proper frequency?	X		
Are all LCS recoveries acceptable?	X		
Validation calculation checks were performed and are acceptable.	X		

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

6. PRECISION	YES	NO	N/A
Were laboratory duplicates analyzed at the proper frequency?	X		
Are all duplicate RPD values acceptable?	X		
Were MS/MSDs analyzed?			X
Are all MS/MSD RPD values acceptable?			X
Validation calculation checks were performed and are acceptable.	X		

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?	X		
Are field/trip blank results acceptable? (see Blank Data Summary form)			X
Are field duplicate RPD values acceptable? (see Field QC calculations)			X
Are field split RPD values acceptable? (see Field QC calculations)		X	
Are performance audit sample results acceptable?			X

Comments: Sample B0FKD1 is a split of B0FK87

Sample B0FKD3 is a split of B0FK65

B0FK65 and B0FK87 were validated in SDG W0560-QES (VB403.75).

LATA GENERAL CHEMISTRY
DATA VALIDATION CHECKLIST

8. ANALYTE QUANTITATION	YES	NO	N/A
Was analyte quantitation performed properly?	X		
Are results calculated properly?	X		
Validation calculation checks were performed and are acceptable.	X		

Comments:

9. REPORTED RESULTS AND DETECTION LIMITS	YES	NO	N/A
Are results reported for all requested analyses?	X		
Are all results supported in the raw data?	X		
Do results meet the CRDLs?	X		
Validation calculation checks were performed and are acceptable.	X		

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: LK4561-LAS			VALIDATOR: BJ SEYMOUR					DATE: 26-Jul-95		
PROJECT: 100-FR-3 ROUND 7			REVIEWER: BJ MORRIS					LATA NO.: VB403.78		
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
B0FKD1	WATER	Anions(Cl,F,SO_4)	18-May-95	N/A	24-May-95	N/A	*N/A*	6	*28*	NONE
B0FKD3	WATER	Anions(Cl,F,SO_4)	23-May-95	N/A	25-May-95	N/A	*N/A*	2	*28*	NONE
B0FKD1	WATER	Anions(NO_2,NO_3,PO_4)	18-May-95	N/A	24-May-95	N/A	*N/A*	6	*2*	J/UR
B0FKD3	WATER	Anions(NO_2,NO_3,PO_4)	23-May-95	N/A	25-May-95	N/A	*N/A*	2	*2*	NONE

GENERAL CHEM FIELD SPLIT EVALUATION

LATA ID#: VB403.78		HEIS #:	B0FK87		B0FKD1		RPD	DIF	DL
		Date:	18-May-95		18-May-95		W >20%	W >DL	
		Matrix:	WATER		WATER				
			ORIGINAL		SPLIT				mg/L
Constituent	CAS #	Units	Results	Q	Results	Q			
Chloride by IC	16887-00-6	mg/L	12.4		14		12.1%		0.02
Fluoride by IC	16984-48-8	mg/L	0.56		0.73		**26.4%**		0.1
Nitrate-N by IC	14797-55-8	mg/L	21.2	J	20	J	5.8%		0.02
Nitrite-N by IC	14797-65-0	mg/L	0.020	UR	0.01	UR			
Ortho Phosphate by IC	14265-44-2	mg/L	0.50	UR	0.1	UR			
Sulfate by IC	14808-79-8	mg/L	64.3	J	66		2.6%		0.1

LATA ID#: VB403.78		HEIS #:	B0FK65		B0FKD3		RPD	DIF	DL
		Date:	23-May-95		23-May-95		W >20%	W >DL	
		Matrix:	WATER		WATER				
			ORIGINAL		SPLIT				mg/L
Constituent	CAS #	Units	Results	Q	Results	Q			
Chloride by IC	16887-00-6	mg/L	32.5		35		7.4%		0.02
Fluoride by IC	16984-48-8	mg/L	0.17		0.35			0.18	0.1
Nitrate-N by IC	14797-55-8	mg/L	20.4	J	20		2.0%		0.02
Nitrite-N by IC	14797-65-0	mg/L	0.020	UR	0.01	U			
Ortho Phosphate by IC	14265-44-2	mg/L	0.50	UR	0.1	U			
Sulfate by IC	14808-79-8	mg/L	85.0	J	97		13.2%		0.1

EVALUATION:

1. Field splits are not evaluated for precision if both results are non-detect.
2. If both sample results are >5*DL the RPD is used for evaluation.
3. If either sample result is <5*DL the DIF is used for evaluation.
4. Shaded values in the RPD or DIF column indicate a constituent that is outside acceptance criteria.
5. All other positive results have exhibited acceptable precision.

Shaded areas indicate changes by the validator.

LATA GENERAL CHEMISTRY
CALCULATION SPREADSHEET

LINEAR REGRESSION ANALYSIS

SDG: LK4561-LAS Date: 26-Jul-95

LATA No.: VB403.78 Validator: BJ SEYMOUR

Analyte/Calibration Date: Chloride/5-25-95

Concentration x	Absorbance y
0	0
20	91758
20	98752
50	254176
100	605038
1000	6718921
5000	36040619

r	r^2
0.9999	0.9998

slope	x intercept
7218.2194	17.3886

1/slope	y intercept
0.0001	-124501.99

LINEAR REGRESSION ANALYSIS

SDG: LK4561-LAS Date: 26-Jul-95

LATA No.: VB403.78 Validator: BJ SEYMOUR

Analyte/Calibration Date: Fluoride 5-25-95

Concentration x	Absorbance y
0	0
20	248181
20	244743
50	617727
100	1236277
1000	12372593
5000	71398313

r	r^2
0.9996	0.9993

slope	x intercept
14283.4412	23.5757

1/slope	y intercept
0.0001	-328095.26

LATA GENERAL CHEMISTRY
CALCULATION SPREADSHEET

PERCENT RECOVERY (ICV/CCV)

SDG: LK4561-LAS Date: 26-Jul-95

LATA No.: VB403.78 Validator: BJ SEYMOUR

Analyte	Sample ID	Observed Value	True Value	%R
		O	A	
Chloride	ICV	960	1000	96%
Chloride	CCV	942	1000	94%
Fluoride	ICV	995	1000	100%
Fluoride	CCV	1001	1000	100%

LATA GENERAL CHEMISTRY
CALCULATION SPREADSHEET

MATRIX SPIKE RECOVERY (MS)

SDG: LK4561-LAS Date: 26-Jul-95

LATA No.: VB403.78 Validator: BJ SEYMOUR

Analyte	Sample ID	Spike Sample Result	Sample Result	Spike Added	%R
		SSR	SR	SA	
Chloride	B0FKD1	53.51	14.09	40.00	99%
Fluoride	B0FKD3	1.74	0.35	1.50	93%

LATA GENERAL CHEMISTRY
CALCULATION SPREADSHEET

PERCENT RECOVERY (LCS)

SDG: LK4561-LAS Date: 26-Jul-95

LATA No.: VB403.78 Validator: BJ SEYMOUR

Analyte	Observed value	True value	%R
	OLCS	ALCS	
Chloride	980	1000	98%
Fluoride	998	1000	100%

LATA GENERAL CHEMISTRY
CALCULATION SPREADSHEET

RELATIVE PERCENT DIFFERENCE

SDG: LK4561-LAS Date: 26-Jul-95

LATA No.: VB403.78 Validator: BJ SEYMOUR

Analyte	Sample ID	Original (Sample) concentration	Duplicate concentration	RPD
		OS	D	
Chloride	B0FKD1	14.088	14.083	0%
Fluoride	B0FKD3	350.722	324.246	8%

LATA GENERAL CHEMISTRY
CALCULATION SPREADSHEET

RESULTS CALCULATION, WATER

SDG: LK4561-LAS Date: 26-Jul-95

LATA No.: VB403.78 Validator: BJ SEYMOUR

Analyte	Concentration from curve		Dilution Factor	Concentration (mg/L)
B0FKD3	CONCW	units	DFW	
Chloride	14.088	mg/L	1	14
Fluoride	350.722	µg/L	1	0.35

Laboratory Case Narrative

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

- Two water samples were received for LK4561 and analyzed in batches 520 bh and 525 bh for selected analytes as requested on the chain of custody. Quality control analysis was performed on the following sample:

Client ID	LAL #		Method
BATCH 520 bh			
BOFKD1	L4561-9	MS, DUP	300.0 Chloride, Nitrate-N, Nitrite-N, Sulfate, Fluoride and Orthophosphate
BATCH 525 bh			
BOFKD3	L4597-9	MS, DUP	300.0 Chloride, Nitrate-N, Nitrite-N, Sulfate, Fluoride and Orthophosphate

Holding Time Requirements

- All samples were analyzed within the method-specific holding time except for batch 520 bh for Method 300.0 Nitrate-n, Nitrite-N and Orthophosphate which were received out 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

June 6, 1995
Date

bjs 7-26-95

006

Chain-of-Custody Information

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST L4597

Page 1 of 1

Data Turnaround: ☐ Priority ■ Normal

Collector: [illegible]	Company Contact: Bob Raidl	Telephone: (509) 372-9641
Project Designation: 100-FR-3 Groundwater - Round 7	Sampling Location: 100 F	SAF No.: B95-052
Ice Chest No.: ER-10	Field Logbook No.: EFL-1054	Method of Shipment: Federal Express
Shipped To: Lockheed	Offsite Property No.: W95-0-0204-31	Bill of Lading/Air Bill No.: 29046285894
Possible Sample Hazards/Remarks		

Preservation	HNO_3	Cool 4°C	HCl	HNO_3	Cool 4°C	Cool 4°C		HNO_3		HCl
Type of Container	P/G	P/G	G	P/G	G	P/G		P/G		G
No. of Container(s)	1	1	3	5	1	1		1		3
Volume	1L	500mL	40mL	1L	1L	20mL		1L		40mL
SAMPLE ANALYSIS	ICP Metals-TAL. AA Metals-As, Pb. (Unfiltered)	Anions (IC) - F, Cl, SO_4, PO_4, NO_2, NO_3.	VOA-TCL	Gross Alpha, Gross Beta, Sr-90	Tritium, C-14	Activity Scan		ICP Metals-TAL. AA Metals-As, Pb. (Filtered)		VOA TCL
B0FKD3	X	X	X	X	X	X				
B0FKD4								X		
B0FKD6										X

Sample No.	Matrix*	Date Sampled	Time Sampled
B0FKD3	W	5-23-95	1205
B0FKD4	W	5-23-95	1205
B0FKD6	W	5-23-95	1205

CHAIN OF POSSESSION

Sign/Print Names			
Relinquished By: [illegible] (ERC)	Date/Time: 5-23-95 1315	Received By: ERC Kurt Whitter Bechtel Han	Date/Time: 1315 5-23-95
Relinquished By: ERC Kurt Whitter Bechtel Han	Date/Time: 0810 5-24-95	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received By:	Date/Time:

SPECIAL INSTRUCTIONS

Sample analysis for PO_4, NO_2, and NO_3 by EPA 300.0 is being requested for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met.

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: [illegible]	Title: Sample Custodian	Date/Time: 5-25-95 0900	
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time	

B0FKD3 B0FKD4 B0FKD6

Bechtel Hanford, Inc. L4561 **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**

Data Turnaround: ☐ Priority ■ Normal

Collector: K. Lee / A. Rizzo	Company Contact: Bob Raidl	Telephone: (509) 372-9641
Project Designation: 100-FR-3 Groundwater - Round 7	Sampling Location: 100 F	SAF No.: B95-052
Ice Chest No.: ~~DR-7~~ ER-5	Field Logbook No.: EFL 1054	Method of Shipment: Federal Express
Shipped To: Lockheed	Offsite Property No.: W95-0-0209-30	Bill of Lading/Air Bill No.: 2904626666

Possible Sample Hazards/Remarks

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

Preservation				HNO₃	Cool 4°C	HCl	HNO₃	Cool 4°C	Cool 4°C		HNO₃		HCl
Type of Container				P/G	P/G	Gs	P/G	G	P/G		P/G		Gs
No. of Container(s)				1	1	3	5	1	1		1		3
Volume				1L	500mL	40mL	1L	1L	20mL		1L		40mL
SAMPLE ANALYSIS				ICP Metals-TAL. AA Metals-As, Pb. (Unfiltered)	Anions (IC) - F, Cl, SO_4, PO_4, NO_2, NO_3.	VOA-TCL	Gross Alpha, Gross Beta, Sr-90	Tritium, C-14	Activity Scan		ICP Metals-TAL. AA Metals-As, Pb. (Filtered)		VOA TCL
Sample No.	**Matrix***	**Date Sampled**	**Time Sampled**										
B0FKD1	W	5-18-95	1429	X	X	X	X	X	X				
B0FKD2	W	5-18-95	1429								X		
B0FKD5	W	5-18-95	1429										X

9613446.2686

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By: AG Rizzo / A.G. Rizzo CERC	Date/Time: 5-19-95 0800	Received By: Kiehl Whitten ERC Bechtel	Date/Time: 5-19-95 0800
Relinquished By: Kiehl Whitten ERC Bechtel	Date/Time: 5-19-95 0900	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

Sample analysis for PO_4, NO_2, and NO_3 by EPA 300.0 is being requested for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met.

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

LABORATORY SECTION	Received By: Paula Davis	Title: Sample Custodian	Date/Time: 5-20-95 / 9:00 A.M.
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

0000038

SDG 5054 *10 ok 7-26-95*

END OF PACKAGE

DATA VALIDATION REPORT
for
100-FR-3 GROUNDWATER ROUND 7
Radiochemistry Analysis
SDG LK4561-LAS
LATA VB403.78

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

August 7, 1995

Table of Contents

100-FR-3 Groundwater Round 7
Data Validation Narrative

INTRODUCTION

All samples in Sample Delivery Group (SDG) LK4561-LAS (VB403.78) 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 *Remedial Investigation/Feasibility Study Work Plan for the 100-FR-3 Operable Unit*, DOE/RL 91-53, 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.

9613446.2691

Table 1
Chain-of-Custody
Analysis Request

LATA ID #: VB403.78 SDG: LK4561-LAS

Sample Information							Analysis Requested					
SAMPLE NO.	DATE COLLECTED	MATRIX	SAF	SAMPLING LOCATION	FIELD QC INFO	TEMP °C	1	2	3	4	5	6
B0FKD1	18-May-95	WATER	B95-052	199-F7-1	SPLIT W/B0FK87	2	X	X	X	X	X	X
B0FKD3	23-May-95	WATER	B95-052	199-F5-4	SPLIT W/B0FK65	2	X	X	X	X	X	X

Method References:

	Analysis	Method
1.	Gross Alpha	LAL-91-SOP-0060
2.	Gross Beta	LAL-91-SOP-0060
3.	Strontium-90	LAL-91-SOP-0196
4.	Tritium	LAL-91-SOP-0066
5.	Carbon-14	LAL-91-SOP-0209
6.	Activity Scan	Lab Specific

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-FR-3 Operable Unit*, DOE/RL 91-53, 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- 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 assigned by validator.					

Radiochemistry Field QC

ANALYTE	TYPE	QUALIFIER	FIELD QC SAMPLES	DQO	ASSESSMENT
Gross Alpha	Field Split	NONE	B0FK87/B0FKD1	PRECISION	Field split precision not acceptable.
Gross Beta	Field Split	NONE	B0FK87/B0FKD1	PRECISION	Field split precision not acceptable.

Comments:

1. Data qualification is not required based on field split precision, however field split results are noted here to alert the data user to uncertainties in the data set during decision making processes.
2. B0FK87 and B0FK65 were validated in SDG W0560-QES (VB403.75).
3. The U qualifiers on the Form Is are laboratory concentration qualifiers, and were not applied as a result of validation.

Data Summary Table

RADIOCHEMISTRY
DATA SUMMARY TABLE

LATA ID#: VB403.78		HEIS #:	B0FKD1		B0FKD3	
		Date:	18-May-95		23-May-95	
		Matrix:	WATER		WATER	
Constituent	CAS #	Units	Results	Q	Results	Q
Gross Alpha	ALPHA	pCi/L	7.0	C	8.1	C
Gross Beta	BETA	pCi/L	12.9		9.5	
Strontium-90	10098-97-2	pCi/L	-0.10	U	-0.09	U
Carbon-14	14762-75-5	pCi/L	29	U	155	
Tritium	10028-17-8	pCi/L	340		5520	

Sample Results (Form I's)

9613446.2700

LOCKHEED ANALYTICAL SERVICES

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0FKD1 — LAL Sample ID: L4561-10

Date Collected: 18-MAY-95 — Date Received: 20-MAY-95

Matrix: Water — Login Number: L4561

SDG: LK4561

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
Gross Alpha	16-JUN-95	GR ALP/BETA LAL-0060_23735	7.0	3.4	3.8	C	pCi/L
Gross Beta	16-JUN-95	GR ALP/BETA LAL-0060_23735	12.9	2.8	3.5		pCi/L
Total radio-strontium	19-JUN-95	SR-90 LAL-0196_23734	-0.10	0.57	1.0	U	pCi/L

mw 8-13-95

000012

mw 8-7-95 788

LOCKHEED ANALYTICAL SERVICES

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0FKD1 — LAL Sample ID: L4561-15

Date Collected: 18-MAY-95 — Date Received: 20-MAY-95

Matrix: Water — Login Number: L4561

SDG: LK4561

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
C-14	13-JUN-95	C-14 LAL-0209_23714	29.	69.	85.	U	pCi/L
H-3	15-JUN-95	TRITIUM(H3) LAL-0066_23736	340	220	250		pCi/L

8-13-95

000013

8-7-95 789

LOCKHEED ANALYTICAL SERVICES

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0FKD3 — LAL Sample ID: L4597-10

Date Collected: 23-MAY-95 — Date Received: 25-MAY-95

Matrix: Water — Login Number: L4597

SDG: LK4561

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
Gross Alpha	16-JUN-95	GR ALP/BETA LAL-0060_23735	8.1	4.0	4.5	C	pCi/L
Gross Beta	16-JUN-95	GR ALP/BETA LAL-0060_23735	9.5	2.9	4.0		pCi/L
Total radio-strontium	19-JUN-95	SR-90 LAL-0196_23734	-0.09	0.60	1.1	U	pCi/L

8.13.95

 790 8-7-95

LOCKHEED ANALYTICAL SERVICES

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0FKD3 — LAL Sample ID: L4597-15

Date Collected: 23-MAY-95 — Date Received: 25-MAY-95

Matrix: Water — Login Number: L4597

SDG: LK4561

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
C-14	13-JUN-95	C-14 LAL-0209_23714	155.	77.	85.		pCi/L
H-3	15-JUN-95	TRITIUM(H3) LAL-0066_23736	5520	550	250		pCi/L

000015

8-2-95 ~~79T~~

Checklist

LATA RADIOCHEMISTRY
DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E

VALIDATION PROCEDURE: ☐ WHC-CM-5-3, Rev. 0 ☒ WHC-SD-EN-SPP-001, Rev. 1

PROJECT:	100-FR-3 ROUND 7	**SDG:**	LK4561-LAS		
VALIDATOR:	MC WEBB	**LATA NO:**	VB403.78	**DATE:**	2-Aug-95
REVIEWER:	BJ MORRIS	**LAB:**	LAS	**CASE:**	N/A
SAF NO:	B95-052	**QAPP NO:**	DOE/RL 91-53, R0	**SAP NO:**	N/A

ANALYSES REQUESTED

☒ Carbon-14 LAL-91-SOP-0209	☒ Gross Alpha LAL-91-SOP-0060	☒ Gross Beta LAL-91-SOP-0060	☒ Strontium-total LAL-91-SOP-0196	☒ Tritium LAL-91-SOP-0066

SAMPLE NO.	MATRIX
B0FKD1 B0FKD3	WATER

COMMENTS:

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: Initial calibration accepted based on acceptable continuing calibration.

LATA RADIOCHEMISTRY
DATA VALIDATION CHECKLIST

4. CONTINUING CALIBRATION	YES	NO	N/A
Background checked at proper frequency?	X		
Background check acceptable?	X		
Efficiency checked at proper frequency?	X		
Efficiency check acceptable?	X		
Calibration check standards NIST traceable?	X		
Calibration check standards acceptable?	X		

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

5. BLANKS	YES	NO	N/A
Were method blanks analyzed?	X		
Are the method blanks free of analytes?	X		
Were method blank results acceptable?	X		
Validation calculation/transcription checks were performed and are acceptable.	X		

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

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

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

7. PRECISION	YES	NO	N/A
Were laboratory duplicates analyzed at the proper frequency?	X		
Are all duplicate RPD values acceptable?	X		
Validation calculation checks were performed and are acceptable.	X		

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?	X		
Are field/trip blank results acceptable? (see Blank Data Summary form)			X
Are field duplicate RPD values acceptable? (see Field QC calculations)			X
Are field split RPD values acceptable? (see Field QC calculations)		X	
Are performance audit sample results acceptable?			X

Comments: The following are field QC split parirs: B0FK87/B0FKD1 and B0FK65/B0FKD3.

B0FK65 and B0FK87 were validated in SDG W0560-QES (VB403.75).

9. REPORTED RESULTS AND DETECTION LIMITS	YES	NO	N/A
Are results reported for all requested analyses?	X		
Are all results supported in the raw data?	X		
Are results calculated properly?	X		
Do MDAs meet the RDLs?	X		
Validation calculation checks were performed and are acceptable.	X		

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:	LK4561-LAS		VALIDATOR: MC WEBB					DATE:	02-Aug-95	
PROJECT:	100-FR-3 ROUND 7		REVIEWER: BJ MORRIS					LATA NO.:	VB403.78	
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
B0FKD1	WATER	Tritium	18-May-95	N/A	15-Jun-95	N/A	***180***	28	***180***	NONE
B0FKD2	WATER	Tritium	18-May-95	N/A	15-Jun-95	N/A	***180***	28	***180***	NONE
B0FKD1	WATER	Carbon-14	18-May-95	N/A	13-Jun-95	N/A	***180***	26	***180***	NONE
B0FKD2	WATER	Carbon-14	18-May-95	N/A	13-Jun-95	N/A	***180***	26	***180***	NONE
B0FKD1	WATER	Gross Alpha	18-May-95	N/A	16-Jun-95	N/A	***180***	29	***180***	NONE
B0FKD2	WATER	Gross Alpha	18-May-95	N/A	16-Jun-95	N/A	***180***	29	***180***	NONE
B0FKD1	WATER	Gross Beta	18-May-95	N/A	16-Jun-95	N/A	***180***	29	***180***	NONE
B0FKD2	WATER	Gross Beta	18-May-95	N/A	16-Jun-95	N/A	***180***	29	***180***	NONE
B0FKD1	WATER	Strontium-total	18-May-95	N/A	19-Jun-95	N/A	***180***	32	***180***	NONE
B0FKD2	WATER	Strontium-total	18-May-95	N/A	19-Jun-95	N/A	***180***	32	***180***	NONE

RADIOCHEMISTRY FIELD DUPLICATE EVALUATION

LATA ID#: VB403.78		HEIS #:	B0FK87		B0FKD1		RPD	DIF	DL
		Date:	18-May-95		18-May-95		W >20%	W >DL	SAME
		Matrix:	WATER		WATER		S >35%	S >2*DL	UNITS AS
			ORIGINAL		DUPLICATE				RESULTS
Constituent	CAS #	Units	Results	Q	Results	Q			
Gross Alpha	ALPHA	pCi/L	3.56E+00		7.0	C		3.44	3
Gross Beta	BETA	pCi/L	7.90E+00		12.9			5.00	4
Strontium-90	10098-97-2	pCi/L	1.26E-02	U	-0.10	U			
Carbon-14	14762-75-5	pCi/L	2.14E+00	U	29	U			
Tritium	10028-17-8	pCi/L	3.96E+02		340			56	400

EVALUATION:

1. Field duplicates are not evaluated for precision if both results are non-detect.
2. If both sample results are >5*DL the RPD is used for evaluation.
3. If either sample result is <5*DL the DIF is used for evaluation.
4. Shaded values in the RPD or DIF column indicate a constituent that is outside acceptance criteria.
5. All other positive results have exhibited acceptable precision.

RADIOCHEMISTRY FIELD DUPLICATE EVALUATION

LATA ID#: VB403.78		HEIS #:	B0FK65		B0FKD3		RPD	DIF	DL
		Date:	23-May-95		23-May-95		W >20%	W >DL	SAME
		Matrix:	WATER		WATER		S >35%	S >2*DL	UNITS AS
			ORIGINAL		DUPLICATE				RESULTS
Constituent	CAS #	Units	Results	Q	Results	Q			
Gross Alpha	ALPHA	pCi/L	6.51E+00		8.1	C		1.59	3
Gross Beta	BETA	pCi/L	7.61E+00		9.5			1.89	4
Strontium-90	10098-97-2	pCi/L	-5.06E-02	U	-0.09	U			
Carbon-14	14762-75-5	pCi/L	6.98E+00	U	155			155	200
Tritium	10028-17-8	pCi/L	6.30E+03		5520		13.2%		400

EVALUATION:

1. Field duplicates are not evaluated for precision if both results are non-detect.
2. If both sample results are >5*DL the RPD is used for evaluation.
3. If either sample result is <5*DL the DIF is used for evaluation.
4. All positive results have exhibited acceptable precision.

Shaded areas indicate changes by the validator.

LATA RADIOCHEMISTRY
CALCULATION SPREADSHEET

MATRIX SPIKE RECOVERY (MS)

SDG: LK4561-LAS Date: 2-Aug-95

LATA No.: VB403.78 Validator: MC WEBB

Analyte	Sample ID	Spike Sample Result	Sample Result	Spike Added	%R
Tritium	B0FKD3	9840	5520	3620	119.3%
Carbon-14	B0FKD1	2630	29.4	2610	99.6%
Gross Alpha	B0FKD3	61.5	8.09	59.7	89.5%
Gross Beta	B0FKD3	83.20	9.51	61.80	119.2%
Total Strontium	Insufficient sample				N/A

LATA RADIOCHEMISTRY
CALCULATION SPREADSHEET

PERCENT RECOVERY (LCS)

SDG: LK4561-LAS Date: 2-Aug-95

LATA No.: VB403.78 Validator: MC WEBB

Analyte	Observed value	True value	%R
Carbon-14	2510	2610	96.2%
Total Strontium	50.3	52	96.7%
Gross Alpha	36.7	39.2	93.6%
Gross Beta	45.2	42.7	105.9%
Tritium	2520	2910	86.6%

LATA RADIOCHEMISTRY
CALCULATION SPREADSHEET

RELATIVE PERCENT DIFFERENCE

SDG: LK4561-LAS Date: 2-Aug-95

LATA No.: VB403.78 Validator: MC WEBB

Analyte	Sample ID	Original (Sample) concentration	Duplicate concentration	RPD
Tritium	B0FKD1	343.03	471.06	31.5%
Carbon-14	B0FKD1	29.4	-31.5	-5800.0%
Total Strontium	B0FKD1	-0.104	-0.0471	-75.3%
Gross Alpha	B0FKD1	6.99	8.17	15.6%
Gross Beta	B0FKD1	12.90	11.90	8.1%

LATA RADIOCHEMISTRY
CALCULATION SPREADSHEET

MINIMUM DETECTABLE ACTIVITY (MDA)

SDG: LK4561-LAS
LATA No.: VB403.78

Date: 2-Aug-95
Validator: MC WEBB

Analyte	Sample ID	Bkgrnd counts/ min (cpm) or Std Dev of bkgrnd (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
Carbon-14	B0FKD1	1.68	30	0.629	1	1	1	1	0.01	85
Tritium	B0FKD1	0.92	20	0.204	1	1	1	1	0.01	250
Alpha	B0FKD1	0.04	100	0.09	1.00	1.00	1.00	1.00	0.16	3.7
Beta	B0FKD1	0.99	100	0.41	1.00	1.00	1.00	1.00	0.16	3.4
Strontium-90	B0FKD1	0.97	150.00	0.45	1.10	0.73	1.00	1.00	0.50	1.0

LATA RADIOCHEMISTRY
CALCULATION SPREADSHEET

RESULTS CALCULATION GROSS ALPHA/BETA AND TRITIUM

SDG: LK4561-LAS Date: 2-Aug-95

LATA No.: VB403.78 Validator: MC WEBB

B0FKD1	Gross Counts per minute	Background Counts per minute	Activity of alpha fraction in beta channel	Detector Efficiency	Sample volume (L or g)	Result
Carbon-14 B0FKD1	2.09	1.68	1	0.629	0.01	29
Tritium B0FKD1	2.48	0.92	1	0.205	0.01	343
Alpha B0FKD1	0.27	0.043	1	0.090	0.160	7
Beta B0FKD1	2.87	0.992	1	0.410	0.160	12.9

LATA RADIOCHEMISTRY
CALCULATION SPREADSHEET

RESULTS CALCULATION TOTAL STRONTIUM

SDG: LK4561-LAS

Date: 2-Aug-95

LATA No.: VB403.78

Validator: MC WEBB

Analyte	Gross Counts per minute	Background Counts per minute	Ingrowth correction Factor	Detector Efficiency	Carrier recovery factor	Strontium decay factor	Sample volume (L or g)	Result
Strontium-90 B0FKD1	0.93	0.99	1.10	0.45	0.730	1	0.50	-0.1

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.

Analytical Method

Carbon-14

The carbon-14 analysis was performed using LAL-91-SOP-0209. All samples were analyzed on batch #23714, which contains a method blank (MBB), duplicate (DUP), laboratory control sample (LCS), and matrix spike (MS). No problems were encountered during preparation or analysis, and all QC criteria were met.

Gross Alpha Beta

The gross alpha beta analysis was performed using LAL-91-SOP-0060. All samples were analyzed on batch #23735, which contains an MBB, DUP, LCS and MS. No problems were encountered during preparation or analysis, and all QC criteria were met.

Strontium

The strontium analysis was performed using LAL-91-SOP-0196. All samples were analyzed on batch #23734, which contains and MBB, DUP and LCS. No problems were encountered during preparation or analysis. There was insufficient sample for a matrix spike analysis. All other QC criteria were met.

8-7-96

011

Tritium

The tritium analysis was performed using LAL-91-SOP-0066. All samples were analyzed on batch #23736, which contains an MBB, DUP, LCS and MS. No problems were encountered during preparation or analysis. All QC criteria were met.

Yvonne M. Jacoby
Prepared By

June 21, 1995
Date

8-7-95

012

Chain-of-Custody Information

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST L4597

Page 1 of 1

Data Turnaround: ☐ Priority ■ Normal

Collector: [illegible]	Company Contact: Bob Raidl	Telephone: (509) 372-9641
Project Designation: 100-FR-3 Groundwater - Round 7	Sampling Location: 100 F	SAF No.: B95-052
Ice Chest No.: ~~DR-1~~ ER-10	Field Logbook No.: EFL-1054	Method of Shipment: Federal Express
Shipped To: Lockheed	Offsite Property No.: W95-0-0204-31	Bill of Lading/Air Bill No.: 3904628894

Possible Sample Hazards/Remarks

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

			Preservation	HNO_3	Cool 4°C	HCl	HNO_3	Cool 4°C	Cool 4°C		HNO_3		HCl
			Type of Container	P/G	P/G	Gs	P/G	G	P/G		P/G		Gs
			No. of Container(s)	1	1	3	5	1	1		1		3
			Volume	1L	500mL	40mL	1L	1L	20mL		1L		40mL
SAMPLE ANALYSIS				ICP Metals-TAL. AA Metals-As, Pb. (Unfiltered)	Anions (IC) - F, Cl, SO_4, PO_4, NO_2, NO_3.	VOA-TCL	Gross Alpha, Gross Beta, Sr-90	Tritium, C-14	Activity Scan		ICP Metals-TAL. AA Metals-As, Pb. (Filtered)		VOA TCL
Sample No.	**Matrix***	**Date Sampled**	**Time Sampled**										
B0FKD3	W	5-23-95	1255	X	X	X	X	X	X				
B0FKD4	W	5-23-95	1255								X		
B0FKD6	W	5-23-95	1255										X

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
[illegible] (ERC)	5-23-95 1315	[illegible] Bechtel Hanford ERC	5-23-95 1315
[illegible] Bechtel Hanford ERC	5-24-95 0810		

SPECIAL INSTRUCTIONS

Sample analysis for PO_4, NO_2, and NO_3 by EPA 300.0 is being requested for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met.

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: [illegible]	Title: Sample Custodian	Date/Time: 5-25-95 /0900
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

9613462272

0000833

[illegible] 8-7-95

Bechtel Hanford, Inc.	L4561	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	Page 1 of 1

Collector K. Lee / A. Rizzo	Company Contact Bob Raidl	Telephone (509) 372-9641	Data Turnaround ☐ Priority ■ Normal
Project Designation 100-FR-3 Groundwater - Round 7	Sampling Location 100 F	SAF No. B95-052	
Ice Chest No. DR-7 ER-5	Field Logbook No. EFL 1054	Method of Shipment Federal Express	
Shipped To Lockheed	Offsite Property No. W95-0-0209-30	Bill of Lading/Air Bill No. 2904626666	

Possible Sample Hazards/Remarks											
	Preservation	HNO_3	Cool 4°C	HCl	HNO_3	Cool 4°C	Cool 4°C		HNO_3		HCl
	Type of Container	P/G	P/G	Gs	P/G	G	P/G		P/G		Gs
	No. of Container(s)	1	1	3	5	1	1		1		3
Special Handling and/or Storage Maintain samples between 2°C and 6°C.	Volume	1L	500mL	40mL	1L	1L	20mL		1L		40mL
SAMPLE ANALYSIS		ICP Metals-TAL. AA Metals-As, Pb. (Unfiltered)	Anions (IC) - F, Cl, SO_4, PO_4, NO_3, NO_2.	VOA-TCL	Gross Alpha, Gross Beta, Sr-90	Tritium, C-14	Activity Scan		ICP Metals-TAL. AA Metals-As, Pb. (Filtered)		VOA TCL

Sample No.	Matrix*	Date Sampled	Time Sampled										
B0FKD1	W	5-18-95	1429	X	X	X	X	X	X				
B0FKD2	W	5-18-95	1429								X		
B0FKD5	W	5-18-95	1429										X

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By A. Rizzo (ERC)	Date/Time 5-19-95 0800	Received By [illegible] ERC Buck Hm	Date/Time 5-19-95 0800
Relinquished By [illegible] ERC Buck Hm	Date/Time 5-19-95 0900	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS
Sample analysis for PO_4, NO_2, and NO_3 by EPA 300.0 is being requested for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met.

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 [illegible] Davis	Title Sample Custodian	Date/Time 5-20-95 / 9:00 AM
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

9613446.2722

5-4-95 [illegible]

END OF PACKAGE

DATA VALIDATION REPORT
for
100-FR-3 GROUNDWATER ROUND 7
Metals Analysis
SDG LK4561-LAS
LATA VB403.78

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

August 7, 1995

Table of Contents

100-FR-3 Groundwater Round 7
Data Validation Narrative

INTRODUCTION

All samples in Sample Delivery Group (SDG) LK4561-LAS (VB403.78) 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 *Remedial Investigation/Feasibility Study Work Plan for the 100-FR-3 Operable Unit*, DOE/RL 91-53, 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**".

9613446.2727

Table 1
Chain-of-Custody
Analysis Request

LATA ID #: VB403.78 SDG: LK4561-LAS

Sample Information							Analyses Requested					
SAMPLE NO.	DATE COLLECTED	MATRIX	SAF	SAMPLING LOCATION	FIELD QC INFO	TEMP °C	1	2	3	4	5	6
B0FKD1	18-May-95	WATER	B95-052	199-F7-1	SPLIT W/B0FK87	2	X		X		X	
B0FKD2	18-May-95	WATER	B95-052	199-F7-1	SPLIT W/B0FK88	2		X		X		X
B0FKD3	23-May-95	WATER	B95-052	199-F5-4	SPLIT W/B0FK65	2	X		X		X	
B0FKD4	23-May-95	WATER	B95-052	199-F5-4	SPLIT W/B0FK66	2		X		X		X

Method References:

	Analysis	Method
1.	ICP Metals (TAL) (Unfiltered)	CLP
2.	ICP Metals (TAL) (Filtered)	CLP
3.	Arsenic (Unfiltered)	CLP
4.	Arsenic (Filtered)	CLP
5.	Lead (Unfiltered)	CLP
6.	Lead (Filtered)	CLP

REFERENCES

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

DOE 1992, *Remedial Investigation/Feasibility Study Work Plan for the 100-FR-3 Operable Unit*, DOE/RL 91-53, 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.

M- Indicates duplicate injection precision criteria were not met during graphite furnace (GFAA) analysis.

N- Indicates spiked sample recovery was not within the control limits.

S- Indicates the reported value was determined by the Method of Standard Additions (MSA).

W- Indicates post-digestion spike for GFAA analysis is outside control limits and the sample absorbance is less than 50% of the spike absorbance.

*- Indicates duplicate analysis was not within control limits.

+- Indicates the correlation coefficient (r) for the MSA was less than 0.995.

Qualification Summary Table

Qualification Summary Table

Inorganics (Metals)

ANALYTE	TYPE	QUALIFIER	SAMPLES AFFECTED	DQO	REASON
Copper	MINOR	UJ	B0FKD1 B0FKD3	BLANKS	Preparation blank value is negative and outside acceptance criteria.
Aluminum	MINOR	U	B0FKD3	BLANKS	Calibration blank value is positive and outside acceptance criteria.
Iron	MINOR	U	B0FKD1 B0FKD3	BLANKS	Calibration blank value is positive and outside acceptance criteria.

Inorganics (Metals) Field QC

ANALYTE	TYPE	QUALIFIER	FIELD QC SAMPLES	DQO	ASSESSMENT
ALL	Field Split	NONE	B0FK65/B0FKD3 B0FK66/B0FKD4 B0FK87/B0FKD1 B0FK88/B0FKD2	PRECISION	Field split precision is acceptable.

Comments:

1. B0FK65, B0FK66, B0FK87, and B0FK88 were validated in SDG W0560-QES (VB403.75)

Data Summary Table

METALS
DATA SUMMARY TABLE

LATA ID#: VB403.78		HEIS #:	B0FKD1		B0FKD2		B0FKD3		B0FKD4	
		Date:	18-May-95		18-May-95		23-May-95		23-May-95	
		Matrix:	WATER		WATER		WATER		WATER	
Constituent	CAS #	Units	Results	Q	Results	Q	Results	Q	Results	Q
Aluminum	7429-90-5	µg/L	33.0	U	33.0	U	251	*U*	33.0	U
Antimony	7440-36-0	µg/L	6.7	B	54.0	U	4.0	U	54.2	B
Arsenic	7440-38-2	µg/L	11.7		11.1		3.1	B	4.3	B
Barium	7440-39-3	µg/L	46.2	B	44.3	B	57.5	B	52.5	B
Beryllium	7440-41-7	µg/L	1.0	U	1.0	U	1.0	U	1.0	U
Cadmium	7440-43-9	µg/L	3.0	U	3.0	U	3.0	U	3.0	U
Calcium	7440-70-2	µg/L	62800		65400		106000		105000	
Chromium	7440-47-3	µg/L	3.0	U	3.0	U	15.4		11.4	
Cobalt	7440-48-4	µg/L	6.0	U	6.0	U	6.0	U	6.0	U
Copper	7440-50-8	µg/L	2.0	*UJ*	2.0	U	2.0	*UJ*	2.0	U
Iron	7439-89-6	µg/L	34.4	*U*	12.0	U	59.7	*U*	12.0	U
Lead	7439-92-1	µg/L	2.0	U	2.0	U	2.0	U	2.0	U
Magnesium	7439-95-4	µg/L	19900		19900		25100		23900	
Manganese	7439-96-5	µg/L	2.0	U	2.0	U	2.0	U	2.0	U
Nickel	7440-02-0	µg/L	12.0	U	12.0	U	12.0	U	12.0	U
Potassium	7440-09-7	µg/L	7190		6850		6550		6510	
Silver	7440-22-4	µg/L	3.0	U	3.0	U	4.0	B	3.0	U
Sodium	7440-23-5	µg/L	59400		58300		33300		31600	
Vanadium	7440-62-2	µg/L	18.3	B	14.2	B	4.9	B	3.0	B
Zinc	7440-66-6	µg/L	5.2	B	3.0	U	4.0	B	3.0	U

Sample Results (Form I's)

CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.: B0FKD1

Lab Name: LOCKHEED_ANALYTICAL_SVC__ Contract: HANFORD___

Lab Code: LOCK__ Case No.: B95-05 SAS No.: _____ SDG No.: LK4561

Matrix (soil/water): WATER Lab Sample ID: L4561-8___

Level (low/med): LOW__ Date Received: 05/20/95

% 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	33.0	U		P	
7440-36-0	Antimony	6.7	B		F	
7440-38-2	Arsenic	11.7			F	
7440-39-3	Barium	46.2	B		P	
7440-41-7	Beryllium	1.0	U		P	
7440-43-9	Cadmium	3.0	U		P	
7440-70-2	Calcium	62800			P	
7440-47-3	Chromium	3.0	U		P	
7440-48-4	Cobalt	6.0	U		P	
7440-50-8	Copper	2.0	~~U~~		P	UJ
7439-89-6	Iron	34.4	~~B~~		P	U
7439-92-1	Lead	2.0	U		F	
7439-95-4	Magnesium	19900			P	
7439-96-5	Manganese	2.0	U		P	
7440-02-0	Nickel	12.0	U		P	
7440-09-7	Potassium	7190			P	
7440-22-4	Silver	3.0	U		P	
7440-23-5	Sodium	59400			P	
7440-62-2	Vanadium	18.3	B		P	
7440-66-6	Zinc	5.2	B		P	

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN

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CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

B0FKD2

Lab Name: LOCKHEED_ANALYTICAL_SVC__ Contract: HANFORD___

Lab Code: LOCK__ Case No.: B95-05 SAS No.: _____ SDG No.: LK4561

Matrix (soil/water): WATER Lab Sample ID: L4561-16__

Level (low/med): LOW__ Date Received: 05/20/95

% 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	33.0	U		P
7440-36-0	Antimony	54.0	U		P
7440-38-2	Arsenic	11.1			F
7440-39-3	Barium	44.3	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	3.0	U		P
7440-70-2	Calcium	65400			P
7440-47-3	Chromium	3.0	U		P
7440-48-4	Cobalt	6.0	U		P
7440-50-8	Copper	2.0	U		P
7439-89-6	Iron	12.0	U		P
7439-92-1	Lead	2.0	U		F
7439-95-4	Magnesium	19900			P
7439-96-5	Manganese	2.0	U		P
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	6850			P
7440-22-4	Silver	3.0	U		P
7440-23-5	Sodium	58300			P
7440-62-2	Vanadium	14.2	B		P
7440-66-6	Zinc	3.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

FORM I - IN

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CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.: B0FKD3

Lab Name: LOCKHEED_ANALYTICAL_SVC__ Contract: HANFORD___

Lab Code: LOCK__ Case No.: B95-05 SAS No.: _____ SDG No.: LK4561

Matrix (soil/water): WATER Lab Sample ID: L4597-8___

Level (low/med): LOW__ Date Received: 05/25/95

% 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	251			P	V
7440-36-0	Antimony	4.0	U		F	
7440-38-2	Arsenic	3.1	B		F	
7440-39-3	Barium	57.5	B		P	
7440-41-7	Beryllium	1.0	U		P	
7440-43-9	Cadmium	3.0	U		P	
7440-70-2	Calcium	106000			P	
7440-47-3	Chromium	15.4			P	
7440-48-4	Cobalt	6.0	U		P	
7440-50-8	Copper	2.0	~~U~~		P	UJ
7439-89-6	Iron	59.7	~~B~~		P	U
7439-92-1	Lead	2.0	U		F	
7439-95-4	Magnesium	25100			P	
7439-96-5	Manganese	2.0	U		P	
7440-02-0	Nickel	12.0	U		P	
7440-09-7	Potassium	6550			P	
7440-22-4	Silver	4.0	B		P	
7440-23-5	Sodium	33300			P	
7440-62-2	Vanadium	4.9	B		P	
7440-66-6	Zinc	4.0	B		P	

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN

ILMO3.0

BM 8-1-95

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CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

B0FKD4

Lab Name: LOCKHEED_ANALYTICAL_SVC__ Contract: HANFORD___

Lab Code: LOCK__ Case No.: B95-05 SAS No.: _____ SDG No.: LK4561

Matrix (soil/water): WATER Lab Sample ID: L4597-16__

Level (low/med): LOW__ Date Received: 05/25/95

% 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_	33.0	U		P
7440-36-0	Antimony_	54.2	B		P
7440-38-2	Arsenic__	4.3	B		F
7440-39-3	Barium___	52.5	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium__	3.0	U		P
7440-70-2	Calcium__	105000			P
7440-47-3	Chromium_	11.4			P
7440-48-4	Cobalt___	6.0	U		P
7440-50-8	Copper___	2.0	U		P
7439-89-6	Iron_____	12.0	U		P
7439-92-1	Lead_____	2.0	U		F
7439-95-4	Magnesium	23900			P
7439-96-5	Manganese	2.0	U		P
7440-02-0	Nickel___	12.0	U		P
7440-09-7	Potassium	6510			P
7440-22-4	Silver___	3.0	U		P
7440-23-5	Sodium___	31600			P
7440-62-2	Vanadium_	3.0	B		P
7440-66-6	Zinc_____	3.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

FORM I - IN

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BM 6-1-95

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Checklist

9613446.2741

LATA INORGANIC (METALS) DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E

VALIDATION PROCEDURE: ☐ WHC-CM-5-3, Rev. 0 ☒ WHC-SD-EN-SPP-002, Rev. 2

PROJECT:	100-FR-3 ROUND 7		SDG:	LK4561-LAS	
VALIDATOR:	BJ MORRIS 8.7.95	LATA NO:	VB403.78	DATE:	31-Jul-95
REVIEWER:	AM FREIER 8/7/95	LAB:	LAS	CASE:	N/A
SAF NO:	B95-052	QAPP NO:	DOE/RL 91-53, R0	SAP NO:	N/A

ANALYSES REQUESTED

☒ ICP Metals CLP	☒ Lead CLP	☒ Arsenic CLP

SAMPLE NO.	MATRIX
B0FKD1 B0FKD3	WATER (unfiltered)
B0FKD2 B0FKD4	WATER (filtered)

COMMENTS:

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

See HOLDING TIME SUMMARY form

	YES	NO	N/A
3. INSTRUMENT PERFORMANCE AND CALIBRATIONS			
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?	X		
Are ICB and CCB results acceptable?		X	
Were preparation blanks analyzed?	X		
Are preparation blank results acceptable?		X	

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?	X		
Are all spike sample recoveries acceptable?	X		
Are all elements spiked at an appropriate level?			X
Was a post digestion spike analyzed?			X
Are all post digestion spike recoveries acceptable?			X
Were laboratory control samples (LCS) analyzed at the proper frequency?	X		
Are all LCS recoveries acceptable?	X		
Validation calculation checks were performed and are acceptable.	X		

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

6. PRECISION	YES	NO	N/A
Were laboratory duplicates analyzed at the proper frequency?	X		
Are all duplicate RPD values acceptable?	X		
Were MS/MSDs analyzed?			X
Are all MS/MSD RPD values acceptable?			X
Were ICP serial dilution samples analyzed at the proper frequency?	X		
Are all ICP serial dilution %D values acceptable?	X		
Validation calculation checks were performed and are acceptable.	X		

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

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?	X		
Are field/trip blank results acceptable? (see Blank Data Summary form)			X
Are field duplicate RPD values acceptable? (see Field QC evaluation)			X
Are field split RPD values acceptable? (see Field QC evaluation)	X		
Are performance audit sample results acceptable?			X

Comments: The following field splits were identified: B0FK65/B0FKD3; B0FK66/B0FKD4 B0FK87/B0FKD1; B0FK88/B0FKD2

Samples B0FK65, B0FK66, B0FK87 and B0FK88 were validated in SDG W0560-QES (VB403.75).

8. FURNACE AA QUALITY CONTROL	YES	NO	N/A
Were duplicate injections required?	X		
Are all duplicate injection %RSD values acceptable?	X		
Were analytical spikes required?	X		
Are all analytical spike recoveries acceptable?	X		
Was MSA required?			X
Are all MSA results acceptable?			X
Validation calculation checks were performed and are acceptable.	X		

Comments:

9. REPORTED RESULTS AND DETECTION LIMITS	YES	NO	N/A
Are results reported for all requested analyses?	X		
Are all results supported in the raw data?	X		
Are results calculated properly?	X		
Do results meet the CRDLs?	X		
Validation calculation checks were performed and are acceptable.	X		

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: LK4561-LAS			VALIDATOR: BJ MORRIS					DATE: 31-Jul-95		
PROJECT: 100-FR-3 ROUND 7			REVIEWER: MC WEBB					LATA NO.: VB403.78		
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
B0FKD1	WATER	ICP Metals/AA Metals	18-May-95	N/A	16-Jun-95	N/A	***N/A***	29	***180***	NONE
B0FKD2	WATER	ICP Metals/AA Metals	18-May-95	N/A	17-Jun-95	N/A	***N/A***	30	***180***	NONE
B0FKD3	WATER	ICP Metals/AA Metals	23-May-95	N/A	16-Jun-95	N/A	***N/A***	24	***180***	NONE
B0FKD4	WATER	ICP Metals/AA Metals	23-May-95	N/A	17-Jun-95	N/A	***N/A***	25	***180***	NONE

LATA INORGANIC (METALS)
DATA VALIDATION CHECKLIST

BLANK DATA SUMMARY

SDG:	LK4561-LAS		VALIDATOR:	BJ MORRIS					DATE:	31-Jul-95
PROJECT:	100-FR-3 ROUND 7		REVIEWER:	MC WEBB					LATA NO.:	VB403.78
BLANK ID	ANALYTE	RESULT	LAB Q	RT	UNITS	2X RESULT	5X RESULT	10X RESULT	SAMPLES AFFECTED	VAL Q
Cal	Aluminum	61.1	B		µg/L		305.5		B0FKD3	U
Prep	Copper	-2.870	B		µg/L			28.7	B0FKD1 B0FKD3	UJ
Cal	Iron	39.2	B		µg/L		196		B0FKD1 B0FKD3	U

000021

CLP

3
BLANKS

Lab Name: LOCKHEED_ANALYTICAL_SVC__ Contract: HANFORD___

Lab Code: LOCK__ Case No.: B95-05 SAS No.: _____ SDG No.: LK4561

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) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum	33.0	U	33.0	U	33.0	U	33.0	U	56.730	B	P
Antimony	4.0	U	4.0	U	4.0	U	4.0	U	4.000	U	F
Arsenic	3.0	U	3.0	U	3.0	U	3.0	U	3.000	U	F
Barium	10.0	U	10.0	U	10.0	U	10.0	U	10.000	U	P
Beryllium	1.0	U	1.0	U	1.0	U	1.0	U	1.000	U	P
Cadmium	3.0	U	3.0	U	3.0	U	3.0	U	3.000	U	P
Calcium	25.0	U	25.0	U	25.0	U	25.0	U	118.650	B	P
Chromium	3.0	U	3.0	U	3.0	U	3.0	U	3.000	U	P
Cobalt	6.0	U	6.0	U	6.0	U	6.0	U	6.000	U	P
Copper	2.0	U	2.0	U	2.0	U	-2.6	B	-2.870	B	P
Iron	12.0	U	12.0	U	12.0	U	12.0	U	13.350	B	P
Lead	2.0	U	2.0	U	2.0	U	2.0	U	2.000	U	F
Magnesium	35.0	U	35.0	U	35.0	U	35.0	U	35.000	U	P
Manganese	2.0	U	2.0	U	2.0	U	2.0	U	2.000	U	P
Nickel	12.0	U	12.0	U	12.0	U	12.0	U	12.000	U	P
Potassium	700.0	U	700.0	U	700.0	U	700.0	U	700.000	U	P
Silver	3.0	U	3.0	U	3.0	U	3.0	U	3.000	U	P
Sodium	42.0	U	42.0	U	42.0	U	42.0	U	54.980	B	P
Vanadium	3.0	U	3.0	U	3.0	U	3.0	U	3.000	U	P
Zinc	3.0	U	3.0	U	3.0	U	3.0	U	3.000	U	P

CLP

3
BLANKS

Lab Name: LOCKHEED_ANALYTICAL_SVC__ Contract: HANFORD___

Lab Code: LOCK__ Case No.: B95-05 SAS No.: _____ SDG No.: LK4561

Preparation Blank Matrix (soil/water): _____

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

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum			33.0	U	61.1	B					P
Antimony											NR
Arsenic			3.0	U							F
Barium			10.0	U	10.0	U					P
Beryllium			1.0	U	1.0	U					P
Cadmium			3.0	U	3.0	U					P
Calcium			25.0	U	96.1	B					P
Chromium			3.0	U	3.0	U					P
Cobalt			6.0	U	6.0	U					P
Copper			2.0	U	2.0	U					P
Iron			12.0	U	39.2	B					P
Lead			2.0	U							F
Magnesium			35.0	U	144.5	B					P
Manganese			2.0	U	2.9	B					P
Nickel			12.0	U	12.0	U					P
Potassium			700.0	U	700.0	U					P
Silver			3.0	U	3.0	U					P
Sodium			42.0	U	42.0	U					P
Vanadium			3.0	U	3.0	U					P
Zinc			3.0	U	3.0	U					P

961344G 2748

METALS FIELD SPLIT EVALUATION

LATA ID#:	HEIS #:	B0FK65		B0FKD3		RPD	DIF	DL
	Date:	23-May-95		23-May-95				
	Matrix:	WATER		WATER				µg/L
		ORIGINAL		SPLIT				
Constituent	Units	Results	Q	Results	Q			
Aluminum	µg/L	24.9	B	251	*U*		24.9	200
Antimony	µg/L	33.6	B	4.0	U		33.6	60
Arsenic	µg/L	2.1	*BJ*	3.1	B		1.0	10
Barium	µg/L	57.4	B	57.5	B		0.1	200
Beryllium	µg/L	0.60	U	1.0	U			
Cadmium	µg/L	2.4	U	3.0	U			
Calcium	µg/L	105000		106000		0.9%		5000
Chromium	µg/L	13.7	B	15.4			1.7	10
Cobalt	µg/L	3.4	U	6.0	U			
Copper	µg/L	13.9	B	2.0	*UJ*		13.9	25
Iron	µg/L	86.4	*U*	59.7	*U*			
Lead	µg/L	0.80	*UJ*	2.0	U			
Magnesium	µg/L	24900		25100			200	5000
Manganese	µg/L	6.2	B	2.0	U		6.2	15
Nickel	µg/L	15.4	U	12.0	U			
Potassium	µg/L	6620		6550			70	5000
Silver	µg/L	4.1	U	4.0	B		4.0	10
Sodium	µg/L	32000		33300		4.0%		5000
Vanadium	µg/L	16.5	B	4.9	B		11.6	50
Zinc	µg/L	14.5	*U*	4.0	B		4.0	20

EVALUATION:

1. Field splits are not evaluated for precision if both results are non-detect.
2. If both sample results are >5*DL the RPD is used for evaluation.
3. If either sample result is <5*DL the DIF is used for evaluation.
4. All positive results have exhibited acceptable precision.

000024

Shaded areas indicate changes by the validator.

METALS FIELD SPLIT EVALUATION

LATA ID#:	HEIS #:	B0FK66		B0FKD4		RPD	DIF	DL
	Date:	23-May-95		23-May-95				
	Matrix:	WATER		WATER				µg/L
		ORIGINAL		SPLIT				
Constituent	Units	Results	Q	Results	Q			
Aluminum	µg/L	23.4	U	33.0	U			
Antimony	µg/L	26.3	U	54.2	B		54.2	60
Arsenic	µg/L	2.0	BJ	4.3	B		2.3	10
Barium	µg/L	56.8	B	52.5	B		4.3	200
Beryllium	µg/L	0.60	U	1.0	U			
Cadmium	µg/L	2.4	U	3.0	U			
Calcium	µg/L	105000		105000		0.0%		5000
Chromium	µg/L	12.2	B	11.4			0.8	10
Cobalt	µg/L	3.4	U	6.0	U			
Copper	µg/L	14.0	B	2.0	U		14.0	25
Iron	µg/L	59.6	U	12.0	U			
Lead	µg/L	0.80	UJ	2.0	U			
Magnesium	µg/L	24800		23900			900	5000
Manganese	µg/L	5.2	B	2.0	U		5.2	15
Nickel	µg/L	15.4	U	12.0	U			
Potassium	µg/L	5490		6510			1020	5000
Silver	µg/L	4.1	U	3.0	U			
Sodium	µg/L	31800		31600		0.6%		5000
Vanadium	µg/L	16.7	B	3.0	B		13.7	50
Zinc	µg/L	12.3	U	3.0	U			

EVALUATION:

1. Field splits are not evaluated for precision if both results are non-detect.
2. If both sample results are >5*DL the RPD is used for evaluation.
3. If either sample result is <5*DL the DIF is used for evaluation.
4. All positive results have exhibited acceptable precision.

Shaded areas indicate changes by the validator.

METALS FIELD SPLIT EVALUATION

LATA ID#:	HEIS #:	B0FK87		B0FKD1		RPD	DIF	DL
	Date:	18-May-95		18-May-95				
	Matrix:	WATER		WATER				µg/L
		ORIGINAL		SPLIT				
Constituent	Units	Results	Q	Results	Q			
Aluminum	µg/L	23.4	U	33.0	U			
Antimony	µg/L	26.3	U	6.7	B		6.7	60
Arsenic	µg/L	10.9	*J*	11.7			0.8	10
Barium	µg/L	44.9	B	46.2	B		1.3	200
Beryllium	µg/L	0.60	U	1.0	U			
Cadmium	µg/L	2.4	U	3.0	U			
Calcium	µg/L	60200		62800		4.2%		5000
Chromium	µg/L	4.7	U	3.0	U			
Cobalt	µg/L	3.4	U	6.0	U			
Copper	µg/L	9.8	U	2.0	*UJ*			
Iron	µg/L	45.0	*U*	34.4	*U*			
Lead	µg/L	0.80	*UJ*	2.0	U			
Magnesium	µg/L	18900		19900			1000	5000
Manganese	µg/L	4.0	B	2.0	U		4.0	15
Nickel	µg/L	15.4	U	12.0	U			
Potassium	µg/L	6690		7190			500	5000
Silver	µg/L	4.1	U	3.0	U			
Sodium	µg/L	55200		59400		7.3%		5000
Vanadium	µg/L	21.1	B	18.3	B		2.8	50
Zinc	µg/L	16.3	*U*	5.2	B		5.2	20

EVALUATION:

1. Field splits are not evaluated for precision if both results are non-detect.
2. If both sample results are >5*DL the RPD is used for evaluation.
3. If either sample result is <5*DL the DIF is used for evaluation.
4. All positive results have exhibited acceptable precision.

Shaded areas indicate changes by the validator.

METALS FIELD SPLIT EVALUATION

LATA ID#:	HEIS #:	B0FK88		B0FKD2		RPD	DIF	DL
	Date:	18-May-95		18-May-95				
	Matrix:	WATER		WATER				µg/L
		ORIGINAL		SPLIT				
Constituent	Units	Results	Q	Results	Q			
Aluminum	µg/L	23.4	U	33.0	U			
Antimony	µg/L	42.8	B	54.0	U		42.8	.60
Arsenic	µg/L	9.0	***BJ***	11.1			2.1	10
Barium	µg/L	46.4	B	44.3	B		2.1	200
Beryllium	µg/L	0.60	U	1.0	U			
Cadmium	µg/L	2.4	U	3.0	U			
Calcium	µg/L	62100		65400		**5.2%**		5000
Chromium	µg/L	4.7	U	3.0	U			
Cobalt	µg/L	3.4	U	6.0	U			
Copper	µg/L	11.2	B	2.0	U		11.2	25
Iron	µg/L	34.7	***U***	12.0	U			
Lead	µg/L	0.80	***UJ***	2.0	U			
Magnesium	µg/L	19500		19900			400	5000
Manganese	µg/L	4.7	B	2.0	U		4.7	15
Nickel	µg/L	15.4	U	12.0	U			
Potassium	µg/L	5510		6850			1340	5000
Silver	µg/L	4.1	U	3.0	U			
Sodium	µg/L	57100		58300		2.1%		5000
Vanadium	µg/L	23.2	B	14.2	B		9.0	50
Zinc	µg/L	13.6	***U***	3.0	U			

EVALUATION:

1. Field splits are not evaluated for precision if both results are non-detect.
2. If both sample results are >5*DL the RPD is used for evaluation.
3. If either sample result is <5*DL the DIF is used for evaluation.
4. All positive results have exhibited acceptable precision.

Shaded areas indicate changes by the validator.

LATA INORGANIC (METALS)
DATA VALIDATION CHECKLIST

LINEAR REGRESSION ANALYSIS

SDG: LK4561-LAS Date: 31-Jul-95

LATA No.: VB403.78 Validator: BJ MORRIS

Analyte/Calibration Date: As 6-15-95

Concentration x	Absorbance y
0.00	-0.002
10.00	0.024
25.00	0.056
50.00	0.111
100.00	0.214
200.00	0.420

r	r^2
0.9998	0.9997

slope	x intercept
0.0021	-1.2322

1/slope	y intercept
476.7649	0.0026

LINEAR REGRESSION ANALYSIS

SDG: LK4561-LAS Date: 31-Jul-95

LATA No.: VB403.78 Validator: BJ MORRIS

Analyte/Calibration Date: Pb 6-16-95

Concentration x	Absorbance y
0.00	0.001
3.00	0.007
25.00	0.059
50.00	0.121
100.00	0.233
200.00	0.434

r	r^2
0.9992	0.9983

slope	x intercept
0.0022	-2.3966

1/slope	y intercept
459.6980	0.0055

LATA INORGANIC (METALS)
DATA VALIDATION CHECKLIST

PERCENT RECOVERY (ICV/CCV)

SDG: LK4561-LAS Date: 31-Jul-95

LATA No.: VB403.78 Validator: BJ MORRIS

Analyte	ICV/CCV ID	Observed Value	True Value	%R
		O	A	
Aluminum	ICV	100372	100000	100.4%
Arsenic	CCV	100.2	100.0	100.2%
Barium	ICV	1001	1000	100.1%
Lead	CCV	102.8	100.0	102.8%

LATA INORGANIC (METALS)
DATA VALIDATION CHECKLIST

MATRIX SPIKE RECOVERY (MS)

SDG: LK4561-LAS

Date: 31-Jul-95

LATA No.: VB403.78

Validator: BJ MORRIS

Analyte	Sample ID	Spike Sample Result	Sample Result	Spike Added	%R
		SSR	SR	SA	
Barium	B0FKD1	2177.33	46.21	2000.00	106.6%
Arsenic	B0FKD1	55.40	11.70	40.00	109.3%
Vanadium	B0FKD2	508.98	14.25	500.00	98.9%
Lead	B0FKD2	20.30	0.00	20.00	101.5%

LATA INORGANIC (METALS)
DATA VALIDATION CHECKLIST

PERCENT RECOVERY (LCS)

SDG: LK4561-LAS Date: 31-Jul-95

LATA No.: VB403.78 Validator: BJ MORRIS

Analyte	Observed value	True value	%R
	OLCS	ALCS	
Aluminum	1975.65	2000.00	98.8%
Lead	20.20	20.00	101.0%
Beryllium	46.82	50.00	93.6%
Arsenic	34.30	40.00	85.8%

LATA INORGANIC (METALS)
DATA VALIDATION CHECKLIST

RELATIVE PERCENT DIFFERENCE

SDG: LK4561-LAS Date: 31-Jul-95

LATA No.: VB403.78 Validator: BJ MORRIS

Analyte	Sample ID	Original (Sample) concentration	Duplicate concentration	RPD
		OS	D	
Arsenic	B0FKD1	11.70	11.70	0.0%
Potassium	B0FKD1	7185.05	7340.21	2.1%
Lead	B0FKD2	2.00	2.00	0.0%
Barium	B0FKD2	44.31	43.99	0.7%

LATA INORGANIC (METALS)
DATA VALIDATION CHECKLIST

PERCENT DIFFERENCE (ICP SERIAL DILUTION)

SDG: LK4561-LAS Date: 31-Jul-95

LATA No.: VB403.78 Validator: BJ MORRIS

Analyte	Analyte Concentration before Dilution	Analyte Concentration after Serial Dilution	%D
	I	S	
Calcium (B0FKD1)	62839.78	62174.17	1.1%
Vanadium (B0FKD1)	18.34	21.79	18.8%
Magnesium (B0FKD2)	19928.13	20154.54	1.1%
Vanadium (B0FKD2)	14.25	16.53	16.0%

LATA INORGANIC (METALS)
DATA VALIDATION CHECKLIST

INORGANICS RESULTS CALCULATION, WATER

SDG: LK4561-LAS Date: 31-Jul-95

LATA No.: VB403.78 Validator: BJ MORRIS

Analyte	Concentration from curve		Dilution Factor	Concentration (µg/L)
	CONCW	units	DFW	
Calcium (B0FKD1)	62.84	mg/L	1	62800
Barium (B0FKD2)	0.0443	mg/L	1	44.3
Arsenic (B0FKD2)	11.1	µg/L	1	11.1
Arsenic (B0FKD1)	11.7	µg/L	1	11.7

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

- Two water samples for total metals analysis. The samples were prepared as LAS Batch 520BHT and analyzed for selected analytes as requested on the chain of custody. Sample B0FKD1 (L4561-8) was used for matrix spike and duplicate, post-digestion spike and serial dilution analysis. All data flags due to the performance of the above-mentioned QC sample are also associated with every sample digested with this batch.

Holding Time Requirements

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

Method Blanks

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

Internal Quality Control

- All internal quality control were within acceptance limits.

Sample Results

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

"P" ICP-AES
"F" GFAA

Nalini Prabhakar — Prepared By

06/24/95 — Date

8-1-95

Lockheed Analytical Services

Log-in No.: L4561/L4597
Quotation No.: Q400000-B
SAF: B95-052
Document File No.: 0520596/0525596
WHC Document File No.: 222
SDG No.: LK4561

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

- Two filtered water samples for dissolved metals analysis. As the measured turbidity of the samples was less than 1 NTU, they were batched as 520BHD for selected dissolved analytes as requested on the chain of custody. For this sample batch sample B0FKD2 (L4561-16) was used for matrix spike and matrix spike duplicate and serial dilution analyses. All data flags due to the performance of the above-mentioned QC sample are also associated with every sample analyzed with this batch.

Holding Time Requirements

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

Method Blanks

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

Internal Quality Control

- All internal quality control were within acceptance limits.

Sample Results

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

"P" ICP-AES
"F" GFAA

Nalini Prabhakar — **Prepared By**

06/21/95 — **Date**

6/21/95

- Antimony is reported by AA for two of the samples due to interferences on the ICP analysis.

BM 8.1.95

SA

Chain-of-Custody Information

Bechtel Hanford, Inc. L4561 **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**

Data Turnaround: ☐ Priority ■ Normal

Collector: K. Lee / A. Rizzo	Company Contact: Bob Raidl	Telephone: (509) 372-9641
Project Designation: 100-FR-3 Groundwater - Round 7	Sampling Location: 100 F	SAF No.: B95-052
Ice Chest No.: ER-5	Field Logbook No.: EFL 1054	Method of Shipment: Federal Express
Shipped To: Lockheed	Offsite Property No.: W95-0-0204-30	Bill of Lading/Air Bill No.: 2904624660

Possible Sample Hazards/Remarks:

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

			Preservation	HNO_3	Cool 4°C	HCl	HNO_3	Cool 4°C	Cool 4°C		HNO_3		HCl
			Type of Container	P/G	P/G	Gs	P/G	G	P/G		P/G		Gs
			No. of Container(s)	1	1	3	5	1	1		1		3
			Volume	1L	500mL	40mL	1L	1L	20mL		1L		40mL
			SAMPLE ANALYSIS	ICP Metals-TAL. AA Metals-As, Pb. (Unfiltered)	Anions (IC) - F, Cl, SO_4, PO_4, NO_2, NO_3	VOA-TCL	Gross Alpha, Gross Beta, Sr-90	Tritium, C-14	Activity Scan		ICP Metals-TAL. AA Metals-As, Pb. (Filtered)		VOA-TCL
Sample No.	Matrix*	Date Sampled	Time Sampled										
B0FKD1	W	5-18-95	1429	X	X	X	X	X	X				
B0FKD2	W	5-18-95	1429								X		
B0FKD5	W	5-18-95	1429										X

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
A. Rizzo ERC	5-19-95 0800	ERC Buck Htw	5-19-95 0800
ERC Buck Htw	5-19-95 0900		

SPECIAL INSTRUCTIONS
Sample analysis for PO_4, NO_2, and NO_3 by EPA 300.0 is being requested for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met.

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

LABORATORY SECTION	Received By: Paula Davis	Title: Sample Custodian	Date/Time: 5-20-95 / 9:00 Am
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

9613462764

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8-9-95 ... 120

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST L4597

Page 1 of 1

Data Turnaround: ☐ Priority ■ Normal

Collector	Company Contact: Bob Raidl	Telephone: (509) 372-9641
Project Designation: 100-FR-3 Groundwater - Round 7	Sampling Location: 100 F	SAF No.: B95-052
Ice Chest No.: ~~1500-52977~~ ER-10	Field Logbook No.: [illegible]	Method of Shipment: Federal Express
Shipped To: Lockheed	Offsite Property No.: W95-0-0201-31	Bill of Lading/Air Bill No.: 3901462785941
Possible Sample Hazards/Remarks		

Preservation	HNO_3	Cool 4°C	HCl	HNO_3	Cool 4°C	Cool 4°C		HNO_3		HCl
Type of Container	P/G	P/G	Gs	P/G	G	P/G		P/G		Gs
No. of Container(s)	1	1	3	5	1	1		1		3
Volume	1L	500mL	40mL	1L	1L	20mL		1L		40mL
SAMPLE ANALYSIS	ICP Metals-TAL. AA Metals-As, Pb. (Unfiltered)	Anions (IC) - F, Cl, SO_4, PO_4, NO_2, NO_3.	VOA-TCL	Gross Alpha, Gross Beta, Sr-90	Tritium, C-14	Activity Scan		ICP Metals-TAL. AA Metals-As, Pb. (Filtered)		VOA TCL

Sample No.	Matrix*	Date Sampled	Time Sampled										
B0FKD3	W	5-23-95	1205	X	X	X	X	X	X				X
B0FKD4	W	5-23-95	1205								X		
B0FKD6	W	5-23-95	1205										X

CHAIN OF POSSESSION

	Sign/Print Names	Date/Time
Relinquished By	[illegible] (ERC)	5-23-95 1315
Received By	ERC Bechtel	1315 5-23-95
Relinquished By	ERC Bechtel	0810 5-24-95
Received By		Date/Time
Relinquished By		Date/Time
Received By		Date/Time
Relinquished By		Date/Time
Received By		Date/Time

SPECIAL INSTRUCTIONS

Sample analysis for PO_4, NO_2, and NO_3 by EPA 300.0 is being requested for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met.

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: [illegible]	Title: Sample Custodian	Date/Time: 5-25-95 0900
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

5-24-95 1311

END OF PACKAGE

DATA VALIDATION REPORT
for
100-FR-3 GROUNDWATER ROUND 7
Volatile Organic Analysis
SDG LK4561-LAS
LATA VB403.78

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

August 7, 1995

Table of Contents

100-FR-3 Groundwater Round 7
Data Validation Narrative

INTRODUCTION

All samples in Sample Delivery Group (SDG) LK4561-LAS (VB403.78) 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 *Remedial Investigation/Feasibility Study Work Plan for the 100-FR-3 Operable Unit*, DOE/RL 91-53, 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 #: VB403.78 SDG: LK4561-LAS

Sample Information							Analyses Requested
SAMPLE NO.	DATE COLLECTED	MATRIX	SAF	SAMPLING LOCATION	FIELD QC INFO	TEMP °C	1
B0FKD1	18-May-95	WATER	B95-052	199-F7-1	SPLIT W/B0FK87	2	X
B0FKD3	23-May-95	WATER	B95-052	199-F5-4	SPLIT W/B0FK65	2	X
B0FKD5	18-May-95	WATER	B95-052	199-F7-1	TRIP BLANK	2	X
B0FKD6	23-May-95	WATER	B95-052	199-F5-4	TRIP BLANK	2	X

Method References:

	Analysis	Method
1.	VOA (TCL)	CLP

REFERENCES

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

DOE 1992, *Remedial Investigation/Feasibility Study Work Plan for the 100-FR-3 Operable Unit*, DOE/RL 91-53, 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.

JN- Indicates a tentatively identified compound (TIC) that has been determined to be valid in terms of identification and quantitation.

UJN- Indicates a tentatively identified compound (TIC) that has been determined to be presumptive and valid (JN) in terms of identification and quantitation and has been qualified as undetected (U) due to associated blank contamination.

NJ- Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific application (i.e., usable for decision making purposes).

N- Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable 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 qualifiers:

U- Indicates the compound was analyzed for but not detected in the sample.

B- Indicates the compound was detected in the method blank.

J- Indicates the compound was detected at a concentration less than the contract required quantitation limit (CRDL).

Qualification Summary Table

Qualification Summary Table

Volatile Organic

ANALYTE	TYPE	QUALIFIER	SAMPLES AFFECTED	DQO	REASON
No qualifiers added by validator.					

Volatile Organic Field QC

ANALYTE	TYPE	QUALIFIER	FIELD QC SAMPLES	DQO	ASSESSMENT
ALL	Field Split	NONE	B0FK65/B0FKD3 B0FK87/B0FKD1	PRECISION	Field split precision is acceptable.
ALL	Field Split	NONE	B0FKD5 B0FKD6	BLANKS	Trip blank contamination noted.

Comments:

1. Data qualification is not required based on field blanks, however field blank results are noted here to alert the data user to uncertainties in the data set during decision making processes.
2. B0FK65, and B0FK87 were validated in SDG W0560-QES (VB403.75)

Data Summary Table

VOLATILE ORGANIC DATA SUMMARY TABLE

LATA ID#: VB403.78		HEIS #:	B0FKD1		B0FKD3		B0FKD5		B0FKD6	
		Date:	18-May-95		23-May-95		18-May-95		23-May-95	
		Matrix:	WATER		WATER		WATER		WATER	
Constituent	CAS #	Units	Results	Q	Results	Q	Results	Q	Results	Q
Chloromethane	74-87-3	µg/L	10	U	10	U	10	U	10	U
Bromomethane	74-83-9	µg/L	10	U	10	U	10	U	10	U
Vinyl chloride	75-01-4	µg/L	10	U	10	U	10	U	10	U
Chloroethane	75-00-3	µg/L	10	U	10	U	10	U	10	U
Methylene chloride	75-09-2	µg/L	10	U	10	U	10	U	10	U
Acetone	67-64-1	µg/L	10	U	10	U	7	J	6	J
Carbon disulfide	75-15-0	µg/L	10	U	10	U	10	U	10	U
1,1-Dichloroethene	75-35-4	µg/L	10	U	10	U	10	U	10	U
1,1-Dichloroethane	75-34-3	µg/L	10	U	10	U	10	U	10	U
1,2-Dichloroethene (total)	540-59-0	µg/L	10	U	10	U	10	U	10	U
Chloroform	67-66-3	µg/L	10	U	10	U	10	U	10	U
1,2-Dichloroethane	107-06-2	µg/L	10	U	10	U	10	U	10	U
2-Butanone	78-93-3	µg/L	10	U	10	U	10	U	10	U
1,1,1-Trichloroethane	71-55-6	µg/L	10	U	10	U	10	U	10	U
Carbon tetrachloride	56-23-5	µg/L	10	U	10	U	10	U	10	U
Bromodichloromethane	75-27-4	µg/L	10	U	10	U	10	U	10	U
1,2-Dichloropropane	78-87-5	µg/L	10	U	10	U	10	U	10	U
cis-1,3-Dichloropropene	10061-01-5	µg/L	10	U	10	U	10	U	10	U
Trichloroethene	79-01-6	µg/L	22		10	U	10	U	10	U
Dibromochloromethane	124-48-1	µg/L	10	U	10	U	10	U	10	U
1,1,2-Trichloroethane	79-00-5	µg/L	10	U	10	U	10	U	10	U
Benzene	71-43-2	µg/L	10	U	10	U	10	U	10	U
trans-1,3-Dichloropropene	10061-02-6	µg/L	10	U	10	U	10	U	10	U
Bromoform	75-25-2	µg/L	10	U	10	U	10	U	10	U
4-Methyl-2-pentanone	108-10-1	µg/L	10	U	10	U	10	U	10	U
2-Hexanone	591-78-6	µg/L	10	U	10	U	10	U	10	U
Tetrachloroethene	127-18-4	µg/L	10	U	10	U	10	U	10	U
1,1,2,2-Tetrachloroethane	79-34-5	µg/L	10	U	10	U	10	U	10	U
Toluene	108-88-3	µg/L	10	U	10	U	10	U	10	U
Chlorobenzene	108-90-7	µg/L	10	U	10	U	10	U	10	U
Ethylbenzene	100-41-4	µg/L	10	U	10	U	10	U	10	U
Styrene	100-42-5	µg/L	10	U	10	U	10	U	10	U
Xylenes (Total)	1330-20-7	µg/L	10	U	10	U	10	U	10	U

Sample Results (Form I's)

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LOCKHEED ANALYTICAL LABORATORY
VOLATILE ORGANICS ANALYSIS DATA SHEET

CUSTOMER SAMPLE NO.

BODKD1

Lab Job Name:BECHTEL-HANFORD Contract:_

Lab Code:LAS Case No.: SAS No.: SDG No.:L4561

Matrix: (soil/water) WATER Lab Sample ID:L4561-5

Sample wt/vol: 5.00 (g/ml) ML Lab File ID: D4331

Level: (low/med) LOW Date Received: 5/20/95

% Moisture: not dec. 0 Date Analyzed: 5/24/95

GC Column:RTX502.2 ID: 0.53(mm) Dilution Factor: 1.00

Soil Extract Volume: 1.00 (ML) Soil Aliquot Volume: 1.00(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L_	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	10.	U
67-64-1	Acetone	10.	U
75-15-0	Carbon Disulfide	10.	U
75-35-4	1,1-Dichloroethene	10.	U
75-34-3	1,1-Dichloroethane	10.	U
540-59-0	1,2-Dichloroethene (total)	10.	U
67-66-3	Chloroform	10.	U
107-06-2	1,2-Dichloroethane	10.	U
78-93-3	2-Butanone	10.	U
71-55-6	1,1,1-Trichloroethane	10.	U
56-23-5	Carbon Tetrachloride	10.	U
75-27-4	Bromodichloromethane	10.	U
78-87-5	1,2-Dichloropropane	10.	U
10061-01-5	cis-1,3-Dichloropropene	10.	U
79-01-6	Trichloroethene	22.	
124-48-1	Dibromochloromethane	10.	U
79-00-5	1,1,2-Trichloroethane	10.	U
71-43-2	Benzene	10.	U
10061-02-6	trans-1,3-Dichloropropene	10.	U
75-25-2	Bromoform	10.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	10.	U
79-34-5	1,1,2,2-Tetrachloroethane	10.	U
108-88-3	Toluene	10.	U
108-90-7	Chlorobenzene	10.	U
100-41-4	Ethylbenzene	10.	U
100-42-5	Styrene	10.	U
1330-20-7	Xylenes (total)	10.	U

BM 7-31-95

9613446.2780

LOCKHEED ANALYTICAL LABORATORY
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

CUSTOMER SAMPLE NO.

BODKD1

Lab Job Name:BECHTEL-HANFORD Contract:_

Lab Code:LAS Case No.: SAS No.: SDG No.:L4561

Matrix: (soil/water) WATER Lab Sample ID:L4561-5

Sample wt/vol: 5.00 (g/ml) ML Lab File ID: D4331

Level: (low/med) LOW Date Received: 5/20/95

% Moisture: not dec. 0 Date Analyzed: 5/24/95

GC Column:RTX502.2 ID: 0.53(mm) Dilution Factor: 1.00

Soil Extract Volume: 1.00 (uL) Soil Aliquot Volume: 1.00(uL)

Number TICs Found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L_

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
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14.					
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25.					
26.					
27.					
28.					
29.					
30.					

FORM I - CLP VOA-TIC 3/90

BM 7-31-95

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LOCKHEED ANALYTICAL LABORATORY
VOLATILE ORGANICS ANALYSIS DATA SHEET

CUSTOMER SAMPLE NO.

BODKD3

Lab Job Name:BECHTEL-HANFORD Contract:_

Lab Code:LAS Case No.: SAS No.: SDG No.:L4561

Matrix: (soil/water) WATER Lab Sample ID:L4597-5

Sample wt/vol: 5.00 (g/ml) ML Lab File ID: D4342

Level: (low/med) LOW Date Received: 5/25/95

% Moisture: not dec. 0 Date Analyzed: 5/26/95

GC Column:RTX502.2 ID: 0.53(mm) Dilution Factor: 1.00

Soil Extract Volume: 1.00 (ML) Soil Aliquot Volume: 1.00(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L_	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	10.	U
67-64-1	Acetone	10.	U
75-15-0	Carbon Disulfide	10.	U
75-35-4	1,1-Dichloroethene	10.	U
75-34-3	1,1-Dichloroethane	10.	U
540-59-0	1,2-Dichloroethene (total)	10.	U
67-66-3	Chloroform	10.	U
107-06-2	1,2-Dichloroethane	10.	U
78-93-3	2-Butanone	10.	U
71-55-6	1,1,1-Trichloroethane	10.	U
56-23-5	Carbon Tetrachloride	10.	U
75-27-4	Bromodichloromethane	10.	U
78-87-5	1,2-Dichloropropane	10.	U
10061-01-5	cis-1,3-Dichloropropene	10.	U
79-01-6	Trichloroethene	10.	U
124-48-1	Dibromochloromethane	10.	U
79-00-5	1,1,2-Trichloroethane	10.	U
71-43-2	Benzene	10.	U
10061-02-6	trans-1,3-Dichloropropene	10.	U
75-25-2	Bromoform	10.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	10.	U
79-34-5	1,1,2,2-Tetrachloroethane	10.	U
108-88-3	Toluene	10.	U
108-90-7	Chlorobenzene	10.	U
100-41-4	Ethylbenzene	10.	U
100-42-5	Styrene	10.	U
1330-20-7	Xylenes (total)	10.	U

BM 7-31-95

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9613446.2782

LOCKHEED ANALYTICAL LABORATORY
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

CUSTOMER SAMPLE NO.-

BODKD3

Lab Job Name:BECHTEL-HANFORD - Contract:_

Lab Code:LAS Case No.: SAS No.: SDG No.:L4561

Matrix: (soil/water) WATER Lab Sample ID:L4597-5

Sample wt/vol: 5.00 (g/ml) ML Lab File ID: D4342

Level: (low/med) LOW Date Received: 5/25/95

% Moisture: not dec. 0 Date Analyzed: 5/26/95

GC Column:RTX502.2 ID: 0.53(mm) Dilution Factor: 1.00

Soil Extract Volume: 1.00 (uL) Soil Aliquot Volume: 1.00(uL)

Number TICs Found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L_

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
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29.					
30.					

FORM I - CLP VOA-TIC 3/90

7-31-95

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LOCKHEED ANALYTICAL LABORATORY
VOLATILE ORGANICS ANALYSIS DATA SHEET

CUSTOMER SAMPLE NO.

BODKD5

Lab Job Name:BECHTEL-HANFORD Contract:_

Lab Code:LAS Case No.: SAS No.: SDG No.:L4561

Matrix: (soil/water) WATER Lab Sample ID:L4561-1

Sample wt/vol: 5.00 (g/ml) ML Lab File ID: D4330

Level: (low/med) LOW Date Received: 5/20/95

% Moisture: not dec. 0 Date Analyzed: 5/24/95

GC Column:RTX502.2 ID: 0.53(mm) Dilution Factor: 1.00

Soil Extract Volume: 1.00 (ML) Soil Aliquot Volume: 1.00(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L_	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	10.	U
67-64-1	Acetone	7.	J
75-15-0	Carbon Disulfide	10.	U
75-35-4	1,1-Dichloroethene	10.	U
75-34-3	1,1-Dichloroethane	10.	U
540-59-0	1,2-Dichloroethene (total)	10.	U
67-66-3	Chloroform	10.	U
107-06-2	1,2-Dichloroethane	10.	U
78-93-3	2-Butanone	10.	U
71-55-6	1,1,1-Trichloroethane	10.	U
56-23-5	Carbon Tetrachloride	10.	U
75-27-4	Bromodichloromethane	10.	U
78-87-5	1,2-Dichloropropane	10.	U
10061-01-5	cis-1,3-Dichloropropene	10.	U
79-01-6	Trichloroethene	10.	U
124-48-1	Dibromochloromethane	10.	U
79-00-5	1,1,2-Trichloroethane	10.	U
71-43-2	Benzene	10.	U
10061-02-6	trans-1,3-Dichloropropene	10.	U
75-25-2	Bromoform	10.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	10.	U
79-34-5	1,1,2,2-Tetrachloroethane	10.	U
108-88-3	Toluene	10.	U
108-90-7	Chlorobenzene	10.	U
100-41-4	Ethylbenzene	10.	U
100-42-5	Styrene	10.	U
1330-20-7	Xylenes (total)	10.	U

9613446.2784

LOCKHEED ANALYTICAL LABORATORY
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

CUSTOMER SAMPLE NO. -

BODKD5

Lab Job Name:BECHTEL-HANFORD -Contract:_

Lab Code:LAS Case No.: SAS No.: SDG No.:L4561

Matrix: (soil/water) WATER Lab Sample ID:L4561-1

Sample wt/vol: 5.00 (g/ml) ML Lab File ID: D4330

Level: (low/med) LOW Date Received: 5/20/95

% Moisture: not dec. 0 Date Analyzed: 5/24/95

GC Column:RTX502.2 ID: 0.53(mm) Dilution Factor: 1.00

Soil Extract Volume: 1.00 (uL) Soil Aliquot Volume: 1.00(uL)

Number TICs Found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L_

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
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23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

7-31-95

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LOCKHEED ANALYTICAL LABORATORY
VOLATILE ORGANICS ANALYSIS DATA SHEET

CUSTOMER SAMPLE NO.

BODKD6

Lab Job Name:BECHTEL-HANFORD Contract:_

Lab Code:LAS Case No.: SAS No.: SDG No.:L4561

Matrix: (soil/water) WATER Lab Sample ID:L4597-2

Sample wt/vol: 5.00 (g/ml) ML Lab File ID: D4341

Level: (low/med) LOW Date Received: 5/25/95

% Moisture: not dec. 0 Date Analyzed: 5/26/95

GC Column:RTX502.2 ID: 0.53(mm) Dilution Factor: 1.00

Soil Extract Volume: 1.00 (ML) Soil Aliquot Volume: 1.00(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L_	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	10.	U
67-64-1	Acetone	6.	J
75-15-0	Carbon Disulfide	10.	U
75-35-4	1,1-Dichloroethene	10.	U
75-34-3	1,1-Dichloroethane	10.	U
540-59-0	1,2-Dichloroethene (total)	10.	U
67-66-3	Chloroform	10.	U
107-06-2	1,2-Dichloroethane	10.	U
78-93-3	2-Butanone	10.	U
71-55-6	1,1,1-Trichloroethane	10.	U
56-23-5	Carbon Tetrachloride	10.	U
75-27-4	Bromodichloromethane	10.	U
78-87-5	1,2-Dichloropropane	10.	U
10061-01-5	cis-1,3-Dichloropropene	10.	U
79-01-6	Trichloroethene	10.	U
124-48-1	Dibromochloromethane	10.	U
79-00-5	1,1,2-Trichloroethane	10.	U
71-43-2	Benzene	10.	U
10061-02-6	trans-1,3-Dichloropropene	10.	U
75-25-2	Bromoform	10.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	10.	U
79-34-5	1,1,2,2-Tetrachloroethane	10.	U
108-88-3	Toluene	10.	U
108-90-7	Chlorobenzene	10.	U
100-41-4	Ethylbenzene	10.	U
100-42-5	Styrene	10.	U
1330-20-7	Xylenes (total)	10.	U

LOCKHEED ANALYTICAL LABORATORY
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

CUSTOMER SAMPLE NO.: BODKD6

Lab Job Name:BECHTEL-HANFORD Contract:_

Lab Code:LAS Case No.: SAS No.: SDG No.:L4561

Matrix: (soil/water) WATER Lab Sample ID:L4597-2

Sample wt/vol: 5.00 (g/ml) ML Lab File ID: D4341

Level: (low/med) LOW Date Received: 5/25/95

% Moisture: not dec. 0 Date Analyzed: 5/26/95

GC Column:RTX502.2 ID: 0.53(mm) Dilution Factor: 1.00

Soil Extract Volume: 1.00 (uL) Soil Aliquot Volume: 1.00(uL)

Number TICs Found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L_

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
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29.					
30.					

Checklist

LATA GC/MS ORGANICS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E

VALIDATION PROCEDURE: ☐ WHC-CM-5-3, Rev. 0 ☒ WHC-SD-EN-SPP-002, Rev. 2

PROJECT:	100-FR-3 ROUND 7		SDG:	LK4561-LAS	
VALIDATOR:	BJ MORRIS BJM 7-31-95	LATA NO:	VB403.78	DATE:	31-Jul-95
REVIEWER:	MC WEBB MCW 8-6-95	LAB:	LAS	CASE:	N/A
SAF NO:	B95-052	QAPP NO:	DOE/RL 91-53, R0	SAP NO:	N/A

ANALYSES REQUESTED

☒ Volatiles CLP

SAMPLE NO.	MATRIX
B0FKD1 B0FKD3 B0FKD5 B0FKD6	WATER

COMMENTS:

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 TUNING/PERFORMANCE AND CALIBRATIONS

	YES	NO	N/A
Is the GC/MS tuning/performance check acceptable?	☒	☐	☐
Were initial calibrations performed on all instruments at the proper frequency?	☒	☐	☐
Are initial calibrations acceptable?	☒	☐	☐
Were continuing calibrations performed on all instruments at the proper frequency?	☒	☐	☐
Are continuing calibrations acceptable?	☒	☐	☐
Validation calculation checks were performed and are acceptable.	☒	☐	☐

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

LATA GC/MS ORGANICS
DATA VALIDATION CHECKLIST

4. BLANKS	YES	NO	N/A
Were laboratory blanks analyzed?	X		
Are laboratory blank results acceptable?	X		

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

5. ACCURACY	YES	NO	N/A
Were surrogates/System Monitoring Compounds analyzed at the proper frequency?	X		
Are all surrogate/System Monitoring Compound recoveries acceptable?	X		
Were spike samples (MS/MSD) analyzed at the proper frequency?	X		
Are all spike sample (MS/MSD) recoveries acceptable?	X		
Validation calculation checks were performed and are acceptable.	X		

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

6. PRECISION	YES	NO	N/A
Were MS/MSDs analyzed?	X		
Are all MS/MSD RPD values acceptable?	X		
Validation calculation checks were performed and are acceptable.	X		

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

7. FIELD QC SAMPLES	YES	NO	N/A
Were field QC samples (trip blanks, splits) identified?	X		
Are trip blank results acceptable? (see Blank Data Summary form)		X	
Are field duplicate RPD values acceptable? (see Field QC calculations)			X
Are field split RPD values acceptable? (see Field QC calculations)	X		
Are performance audit sample results acceptable?			X

Comments: B0FKD5 and B0FKD6 were identified as Trip Blanks.

The following field splits were identified: B0FK65/B0FKD3; B0FK87/B0FKD1

Samples B0FK65 and B0FK87 were validated in SDG W0560-QES (VB403.75).

LATA GC/MS ORGANICS
DATA VALIDATION CHECKLIST

8. SYSTEM PERFORMANCE	YES	NO	N/A
Were internal standards analyzed?	X		
Are all internal standard areas acceptable?	X		
Are all internal standard retention times acceptable?	X		

9. COMPOUND IDENTIFICATION AND QUANTITATION	YES	NO	N/A
Is compound identification acceptable?	X		
Is compound quantitation acceptable?	X		
Are all TICs properly identified and coded?			X

10. REPORTED RESULTS AND QUANTITATION LIMITS	YES	NO	N/A
Are results reported for all requested analyses?	X		
Are all results supported in the raw data?	X		
Do results meet the CRQLs?	X		
Validation calculation checks were performed and are acceptable.	X		

Comments:

VALIDATION SUMMARY

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

LATA GC/MS ORGANICS
DATA VALIDATION CHECKLIST

HOLDING TIME SUMMARY

SDG: LK4561-LAS			VALIDATOR: BJ MORRIS						DATE: 31-Jul-95	
PROJECT: 100-FR-3 ROUND 7			REVIEWER: MC WEBB						LATA NO.: VB403.78	
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
B0FKD1	WATER	Volatiles	18-May-95	N/A	24-May-95	N/A	*N/A*	6	*14*	NONE
B0FKD3	WATER	Volatiles	23-May-95	N/A	26-May-95	N/A	*N/A*	3	*14*	NONE
B0FKD5	WATER	Volatiles	18-May-95	N/A	24-May-95	N/A	*N/A*	6	*14*	NONE
B0FKD6	WATER	Volatiles	23-May-95	N/A	26-May-95	N/A	*N/A*	3	*14*	NONE

LATA GC/MS ORGANICS
DATA VALIDATION CHECKLIST

BLANK DATA SUMMARY

SDG:	LK4561-LAS		VALIDATOR:	BJ MORRIS				DATE:	31-Jul-95
PROJECT:	100-FR-3 ROUND 7		REVIEWER:	MC WEBB				LATA NO.:	VB403.78
BLANK ID	ANALYTE	RESULT	LAB Q	RT	UNITS	5X RESULT	10X RESULT	SAMPLES AFFECTED	VAL Q
B0FKD5 Trip Blank	Acetone	7	J		µg/L			NONE	NONE
B0FKD6 Trip Blank	Acetone	6	J		µg/L			NONE	NONE

VOLATILES FIELD SPLIT EVALUATION

LATA ID#: VB403.78		HEIS #:	B0FK65		B0FKD3		RPD	DIF	DL
		Date:	23-May-95		23-May-95				
		Matrix:	WATER		WATER				µg/L
			ORIGINAL		SPLIT				
Constituent	CAS #	Units	Results	Q	Results	Q			
Chloromethane	74-87-3	µg/L	10	U	10	U			
Bromomethane	74-83-9	µg/L	10	U	10	U			
Vinyl chloride	75-01-4	µg/L	10	U	10	U			
Chloroethane	75-00-3	µg/L	10	U	10	U			
Methylene chloride	75-09-2	µg/L	***10***	***U***	10	U			
Acetone	67-64-1	µg/L	10	U	10	U			
Carbon disulfide	75-15-0	µg/L	10	U	10	U			
1,1-Dichloroethene	75-35-4	µg/L	10	U	10	U			
1,1-Dichloroethane	75-34-3	µg/L	10	U	10	U			
1,2-Dichloroethene (total)	540-59-0	µg/L	10	U	10	U			
Chloroform	67-66-3	µg/L	10	U	10	U			
1,2-Dichloroethane	107-06-2	µg/L	10	U	10	U			
2-Butanone	78-93-3	µg/L	10	U	10	U			
1,1,1-Trichloroethane	71-55-6	µg/L	10	U	10	U			
Carbon tetrachloride	56-23-5	µg/L	10	U	10	U			
Bromodichloromethane	75-27-4	µg/L	10	U	10	U			
1,2-Dichloropropane	78-87-5	µg/L	10	U	10	U			
cis-1,3-Dichloropropene	10061-01-5	µg/L	10	U	10	U			
Trichloroethene	79-01-6	µg/L	10	U	10	U			
Dibromochloromethane	124-48-1	µg/L	10	U	10	U			
1,1,2-Trichloroethane	79-00-5	µg/L	10	U	10	U			
Benzene	71-43-2	µg/L	10	U	10	U			
trans-1,3-Dichloropropene	10061-02-6	µg/L	10	U	10	U			
Bromoform	75-25-2	µg/L	10	U	10	U			
4-Methyl-2-pentanone	108-10-1	µg/L	10	U	10	U			
2-Hexanone	591-78-6	µg/L	10	U	10	U			
Tetrachloroethene	127-18-4	µg/L	10	U	10	U			
1,1,2,2-Tetrachloroethane	79-34-5	µg/L	10	U	10	U			
Toluene	108-88-3	µg/L	10	U	10	U			
Chlorobenzene	108-90-7	µg/L	10	U	10	U			
Ethylbenzene	100-41-4	µg/L	10	U	10	U			
Styrene	100-42-5	µg/L	10	U	10	U			
Xylenes (Total)	1330-20-7	µg/L	10	U	10	U			

EVALUATION:

1. Field splits are not evaluated for precision if both results are non-detect.

Shaded areas indicate changes by the validator.

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VOLATILES FIELD SPLIT EVALUATION

LATA ID#: VB403.78		HEIS #:	B0FK87		B0FKD1		RPD	DIF	DL
		Date:	18-May-95		18-May-95				
		Matrix:	WATER		WATER				µg/L
			ORIGINAL		SPLIT				
Constituent	CAS #	Units	Results	Q	Results	Q			
Chloromethane	74-87-3	µg/L	10	U	10	U			
Bromomethane	74-83-9	µg/L	10	U	10	U			
Vinyl chloride	75-01-4	µg/L	10	U	10	U			
Chloroethane	75-00-3	µg/L	10	U	10	U			
Methylene chloride	75-09-2	µg/L	10	U	10	U			
Acetone	67-64-1	µg/L	10	U	10	U			
Carbon disulfide	75-15-0	µg/L	10	U	10	U			
1,1-Dichloroethene	75-35-4	µg/L	10	U	10	U			
1,1-Dichloroethane	75-34-3	µg/L	10	U	10	U			
1,2-Dichloroethene (total)	540-59-0	µg/L	10	U	10	U			
Chloroform	67-66-3	µg/L	10	U	10	U			
1,2-Dichloroethane	107-06-2	µg/L	10	U	10	U			
2-Butanone	78-93-3	µg/L	10	U	10	U			
1,1,1-Trichloroethane	71-55-6	µg/L	10	U	10	U			
Carbon tetrachloride	56-23-5	µg/L	10	U	10	U			
Bromodichloromethane	75-27-4	µg/L	10	U	10	U			
1,2-Dichloropropane	78-87-5	µg/L	10	U	10	U			
cis-1,3-Dichloropropene	10061-01-5	µg/L	10	U	10	U			
Trichloroethene	79-01-6	µg/L	22		22			0	10
Dibromochloromethane	124-48-1	µg/L	10	U	10	U			
1,1,2-Trichloroethane	79-00-5	µg/L	10	U	10	U			
Benzene	71-43-2	µg/L	10	U	10	U			
trans-1,3-Dichloropropene	10061-02-6	µg/L	10	U	10	U			
Bromoform	75-25-2	µg/L	10	U	10	U			
4-Methyl-2-pentanone	108-10-1	µg/L	10	U	10	U			
2-Hexanone	591-78-6	µg/L	10	U	10	U			
Tetrachloroethene	127-18-4	µg/L	10	U	10	U			
1,1,2,2-Tetrachloroethane	79-34-5	µg/L	10	U	10	U			
Toluene	108-88-3	µg/L	10	U	10	U			
Chlorobenzene	108-90-7	µg/L	10	U	10	U			
Ethylbenzene	100-41-4	µg/L	10	U	10	U			
Styrene	100-42-5	µg/L	10	U	10	U			
Xylenes (Total)	1330-20-7	µg/L	10	U	10	U			

EVALUATION:

1. Field splits are not evaluated for precision if both results are non-detect.
2. If both sample results are >5*DL the RPD is used for evaluation.
3. If either sample result is <5*DL the DIF is used for evaluation.
4. All positive results have exhibited acceptable precision.

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Shaded areas indicate changes by the validator.

LATA GC/MS ORGANICS
DATA VALIDATION CALCULATION SPREADSHEET

SDG: LK4561-LAS

Date: 31-Jul-95

LATA No.: VB403.78

Validator: BJ MORRIS

VOA RELATIVE RESPONSE FACTOR

Analyte	Response for Analyte of Interest	Conc. of Internal Standard	Area of Internal Standard	Conc. of Analyte of Interest	RRF
Acetone rrf20	9707	50.00	48709	20.00	0.498
Benzene rrf50	217132	50.00	205083	50.00	1.059
Toluene rrf200	1128234	50.00	200342	200.00	1.408

LATA GC/MS ORGANICS
DATA VALIDATION CALCULATION SPREADSHEET

SDG: LK4561-LAS

Date: 31-Jul-95

LATA No.: VB403.78

Validator: BJ MORRIS

RELATIVE STANDARD DEVIATION

RRF1

Analyte: Chloromethane

RRF1
1.7
1.85
1.925
1.844
1.984

MEAN	STDEV	RSD
1.861	0.1067	5.7

RELATIVE STANDARD DEVIATION

RRF2

Analyte: Acetone

RRF2
0.558
0.498
0.673
0.426
0.737

MEAN	STDEV	RSD
0.578	0.1267	21.9

RELATIVE STANDARD DEVIATION

RRF3

Analyte: Chloroform

RRF3
3.119
3.155
3.25
3.15
3.141

MEAN	STDEV	RSD
3.163	0.0506	1.6

RELATIVE STANDARD DEVIATION

RRF4

Analyte: Styrene

RRF4
0.876
0.894
0.964
0.905
0.9

MEAN	STDEV	RSD
0.908	0.0333	3.7

LATA GC/MS ORGANICS
DATA VALIDATION CALCULATION SPREADSHEET

SDG: LK4561-LAS Date: 31-Jul-95

LATA No.: VB403.78 Validator: BJ MORRIS

VOA PERCENT DIFFERENCE

Analyte	Initial Calibration Average RRF	Continuing Calibration Average RRF	%D
Vinyl Chloride	1.874	1.950	4.1%
Bromoform	0.408	0.444	8.8%
Carbon Tetrachloride	0.501	0.454	9.4%
Chlorobenzene	1.011	0.902	10.8%

LATA GC/MS ORGANICS
DATA VALIDATION CALCULATION SPREADSHEET

SDG: LK4561-LAS Date: 31-Jul-95

LATA No.: VB403.78 Validator: BJ MORRIS

VOA SURROGATE RECOVERY

Analyte	surrogate result	surrogate added	%R
Toluene-d8	50.62	50.00	101.2%
Bromofluorobenzene	45.40	50.00	90.8%

LATA GC/MS ORGANICS
DATA VALIDATION CALCULATION SPREADSHEET

MATRIX SPIKE RECOVERY (MS/MSD)

SDG: LK4561-LAS

Date: 31-Jul-95

LATA No.: VB403.78

Validator: BJ MORRIS

Analyte	Sample ID	MS Result	MSD Result	Sample Result	Spike Added	MS%R	MSD%R
Trichloroethene	B0FKD1	76.00	72.00	22.00	50.00	108.0%	100.0%
Benzene	B0FKD1	50.00	48.00	0.00	50.00	100.0%	96.0%

LATA GC/MS ORGANICS
DATA VALIDATION CALCULATION SPREADSHEET

RELATIVE PERCENT DIFFERENCE

SDG: LK4561-LAS

Date: 31-Jul-95

LATA No.: VB403.78

Validator: BJ MORRIS

Analyte	Sample ID	MS %R	MSD %R	RPD
Trichloroethene	B0FKD1	108.0%	100.0%	7.7%
Benzene	B0FKD1	100.0%	96.0%	4.1%

LATA GC/MS ORGANICS
DATA VALIDATION CALCULATION SPREADSHEET

RESULTS CALCULATIONS FOR VOA WATER SAMPLES

SDG: LK4561-LAS Date: 31-Jul-95

LATA No.: VB403.78 Validator: BJ MORRIS

Analyte	Area of the Quant Ion for the Analyte of Interest	Area of the Quant Ion for the Internal Standard	Amount of Internal Standard added (ng)	Relative Response Factor	Volume of Water Purged (ml)	Dilution Factor	Conc (µg/L)
Trichloroethene (-KD1)	32910	178234	250.00	0.424	5.00	1.00	21.77
Acetone (-KD6)	3892	50821	250.00	0.677	5.00	1.00	5.66

Laboratory Case Narrative

CASE NARRATIVE
ORGANIC ANALYSES

Analytical Method CLP 3/90 Volatiles

This data package contains the volatile organic constituents results for the sample collected on May 18 and 23, 1995 and received at Lockheed Analytical Services on May 20 and 25, 1995. The samples and the corresponding laboratory control number can be found on the Method Blank Summary Form IV.

SDG No.: L4561

Login No.: L4561/L4597

The associated samples were analyzed in two analytical batches. The instrument tunes, initial and continuing calibrations were within QC criteria.

Analytical Batch 052495-8260-D1

Holding Times

The samples were analyzed within the required holding time on May 24, 1995.

Surrogate Recoveries

Surrogate recoveries were within QC limits.

Matrix Spike (Ms)/Matrix Spike Duplicate (MSD)

Sample BODKD1 (L4561-5) was the native sample for L4561-5 MS/MSD. Compound recoveries were within QC limits in the Matrix Spike (MS) and Matrix Spike Duplicate (MSD). The Relative Percent Differences (RPDs) between the MS and MSD were within QC limits. Target compound Acetone was detected in the MS along with the spiked compounds.

Method Blank

There were no target compounds and Tentatively Identified Compounds (TICs) detected in the Method Blank (MB).

Internal Standard

All internal standard area counts and retention times were within QC limits for all associated samples analyzed.

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Sample Results

Target compounds were detected in the associated client sample analyzed but no TICs were detected.

Analytical Batch 052695-8260-D1

Holding Times

The samples were analyzed within the required holding time on May 26, 1995.

Surrogate Recoveries

Surrogate recoveries were within QC limits.

Matrix Spike (Ms)/Matrix Spike Duplicate (MSD)

Refer to analytical batch 052495-8260-D1 for the associated Matrix Spike (MS) and Matrix Spike Duplicate (MSD) results.

Method Blank

There were no target compounds and Tentatively Identified Compounds (TICs) detected in the Method Blank (MB).

Internal Standard

The internal standard area counts and retention times were within QC limits for all associated samples analyzed.

Sample Results

Target compound Acetone was detected in sample BODKD6 (L4597-2). There were no TICs detected in the associated client samples analyzed.

Prepared By
Patricia Lonergan

June 26, 1995

8/1.95

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Chain-of-Custody Information

Bechtel Hanford, Inc. L4561 **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**

Data Turnaround: ☐ Priority ■ Normal

Collector: K. Lee / A. Rizzo	Company Contact: Bob Raidl	Telephone: (509) 372-9641
Project Designation: 100-FR-3 Groundwater - Round 7	Sampling Location: 100 F	SAF No.: B95-052
Ice Chest No.: DR-7 ER-5	Field Logbook No.: EFL 1050	Method of Shipment: Federal Express
Shipped To: Lockheed	Offsite Property No.: W95-0-0209-30	Bill of Lading/Air Bill No.: 2904628666

Possible Sample Hazards/Remarks

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

Preservation	HNO_3	Cool 4°C	HCl	HNO_3	Cool 4°C	Cool 4°C		HNO_3		HCl
Type of Container	P/G	P/G	Gs	P/G	G	P/G		P/G		Gs
No. of Container(s)	1	1	3	5	1	1		1		3
Volume	1L	500mL	40mL	1L	1L	20mL		1L		40mL
SAMPLE ANALYSIS	ICP Metals-TAL. AA Metals-As, Pb. (Unfiltered)	Anions (IC) - F, Cl, SO_4, PO_4, NO_2, NO_3.	VOA-TCL	Gross Alpha, Gross Beta, Sr-90	Tritium, C-14	Activity Scan		ICP Metals-TAL. AA Metals-As, Pb. (Filtered)		VOA-TCL

Sample No.	Matrix*	Date Sampled	Time Sampled										
B0FKD1	W	5-18-95	1429	X	X	X	X	X	X				
B0FKD2	W	5-18-95	1429								X		
B0FKD5	W	5-18-95	1429										X

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
A. Rizzo ERC	5-19-95 0800	Bert Whitten ERC Bech Han	5-19-95 0800
Bert Whitten ERC Bech Han	5-19-95 0900		

SPECIAL INSTRUCTIONS
Sample analysis for PO_4, NO_2, and NO_3 by EPA 300.0 is being requested for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met.

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

LABORATORY SECTION	Received By: Paula Davis	Title: Sample Custodian	Date/Time: 5-20-95 / 9:00 Am
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

9613446.2806

830000381

Mus 5-19-95

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST L4597

Page 1 of 1

Data Turnaround: ☐ Priority ■ Normal

Collector	Company Contact: Bob Raidl	Telephone: (509) 372-9641
Project Designation: 100-FR-3 Groundwater - Round 7	Sampling Location: 100 F	SAF No.: B95-052
Ice Chest No.: ~~136~~ 5297 ER-10	Field Logbook No.: [illegible]	Method of Shipment: Federal Express
Shipped To: Lockheed	Offsite Property No.: W95-0-0201-31	Bill of Lading/Air Bill No.: 3904628[illegible]
Possible Sample Hazards/Remarks		

Preservation	HNO_3	Cool 4°C	HCl	HNO_3	Cool 4°C	Cool 4°C		HNO_3		HCl
Type of Container	P/G	P/G	Gs	P/G	G	P/G		P/G		G
No. of Container(s)	1	1	3	5	1	1		1		3
Volume	1L	500mL	40mL	1L	1L	20mL		1L		40mL
SAMPLE ANALYSIS	ICP Metals-TAL. AA Metals-As, Pb. (Unfiltered)	Anions (IC) - F, Cl, SO_4, PO_4, NO_2, NO_3.	VOA-TCL	Gross Alpha, Gross Beta, Sr-90	Tritium, C-14	Activity Scan		ICP Metals-TAL. AA Metals-As, Pb. (Filtered)		VOA TCL

Sample No.	Matrix*	Date Sampled	Time Sampled										
B0FKD3	W	5-23-95	1200	X	X	X	X	X	X				
B0FKD4	W	5-23-95	1200								X		
B0FKD6	W	5-23-95	1200										X

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
[illegible]	5-23-95 1315	Lee White ERC Bechtel	1315 5-23-95
Lee White ERC Bechtel	0810 5-24-95		

SPECIAL INSTRUCTIONS
Sample analysis for PO_4, NO_2, and NO_3 by EPA 300.0 is being requested for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met.

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: [illegible]	Title: Sample Custodian	Date/Time: 5-25-95 0900
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

0039

Mw 5-25-95 0931

Supplemental Information

LATA GC/MS ORGANICS
DATA VALIDATION CHECKLIST

INFORMATION REQUEST FORM (IRF)

To: Jeanette Duncan, WHC/BHI **Date:** 31-Jul-95

Primary FAX: 372-2106 **Secondary FAX: 372-1616**

PROJECT NAME:	100-FR-3 ROUND 7
SDG NUMBER:	LK4561-LAS
LATA NO.:	VB403.78
LABORATORY:	LAS
CASE NUMBER:	N/A
ANALYSIS METHOD:	Volatile Organic
ANALYSIS DATE:	5/24 & 5/26
ITEM(S) MISSING:	

Comments: The laboratory has used the wrong sample number in the volatile organic section. All sample numbers begin with "BOD---" instead of "B0F---". This problem effects all aspects of this section from the lab case narrative to the matrix spike summary. Please provide corrected pages from the lab.

RETURN TO LATA

Attention: BJ MORRIS

INFORMATION RECEIVED FROM WHC (INITIALS/DATE): BM 8-1-95

INFORMATION ACCEPTABLE?: YES ☑ NO ☐

If NO is checked, send a new LIRF to request additional information.

Bechtel Hanford, Incorporated
Data Management and Validation

Commercial FAX # (509) 372-2106

Company Name: Los Alamos Technical Associates	
Contact Name: Marsha Webb	
FAX Number: 943-6740	**Telephone Number: 943-0244**
Sender: Jeanette Duncan	

Comments:

Marsha,

Please see the attached letter of correction from Lockheed and your associated information request. ERC considers this method of correction acceptable. If you have any questions, please contact me immediately upon receipt of this fax.

Thanks,

Jeanette

Number of Pages (Including Coversheet): 3

Date Sent: 8/01/95

If there are any problems with this transmission, please call sending party on (509) 372-3395.

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 1, 1995

Bechtel Hanford, Inc.
345 Hills Street
P.O. Box 969
Richland, WA 99352

ATTENTION: Ms. Doris Ayres

SUBJECT: SDG LK4561, SAF No. B95052, sample identification error

Dear Ms. Ayres:

This is in reference to our conversation today concerning the incorrect sample identifications indicated in the volatile section of the final report; the correct sample identifications are as follows:

B0DKD1 should be indicated as B0FKD1
B0DKD3 should be indicated as B0FKD3
B0DKD5 should be indicated as B0FKD5
B0DKD6 should be indicated as B0FKD6

If you should have any questions concerning this information, please do not hesitate to call Karen Germann at (702) 361-3955 at extension 326. In the event that Karen is not available, please contact me at extension 326.

Sincerely,

Mary B. Ford
Client Services Manager

cc: Kathleen Hall
Karen Germann
CSR File

END OF PACKAGE