

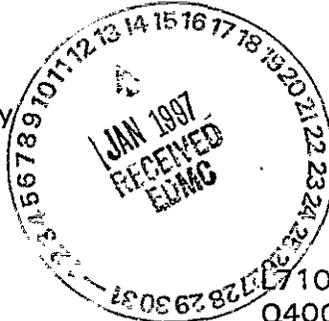
Lockheed Environmental Systems & Technologies Co.  
Lockheed Analytical Services  
975 Kelly Johnson Drive Las Vegas, Nevada 89119-3705  
Telephone 702-361-0220 800-582-7605 Facsimile 702-361-8146

0046399



July 9, 1996

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



RE: Log-in No.:	L7102
Quotation No.:	Q400000-B
SAF:	B96-109
Document File No.:	0524596
BHI Document File No.:	371
SDG No.:	LK7102



The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on 24 May 1996.

The temperature of the cooler upon receipt was 4°C. Sample containers received agree with the chain-of-custody documentation. Sample containers were received intact. Samples designated for nitrate analysis were not received in time to meet the analytical holding time requirements. The vials for volatile analyses did not contain headspace.

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) 375-4741.

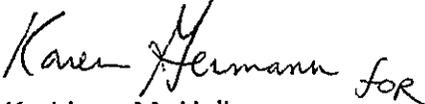
**Lockheed Analytical Services**

Log-in No.: L7102  
Quotation No.: Q400000-B  
SAF: B96-109  
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SDG No.: LK7102  
Page1

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

" I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manger or a designee, as verified by the following signature."

Sincerely,

  
Kathleen M. Hall  
Client Services Representative

cc: Client Services  
Document Control

**CASE NARRATIVE  
INORGANIC NON METALS ANALYSES**

The routine calibration and quality control analyses performed for this batch include as applicable: initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), matrix spike (predigestion) sample(s), duplicate sample(s).

**Preparation and Analysis Requirements**

- Two water samples were received for LK7102 and analyzed in batch 524 bh for selected analytes as requested on the chain of custody. Quality control analysis was performed on the following samples:

Client ID	LAL #		Method
BOHG54	L7102-18	MS, DUP	Nitrate as Nitrogen

**Holding Time Requirements**

- All samples were received and analyzed outside of the method-specific holding times. The 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 5, 1996  
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**

All samples were received on May 24, 1996. The samples were logged in as L7102 and were prepared and analyzed in batch 524 bh. The samples were analyzed by Method 6010A ICP Metals.

**Holding Time Requirements**

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

**Method Blanks**

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

**Internal Quality Control**

- All Internal Quality Control were within acceptance limits.

Shellee McGrath  
Prepared By

June 18, 1996  
Date

**CASE NARRATIVE  
ORGANIC ANALYSES**

**Analytical Method 8240 Volatile Organics**

The associated samples were analyzed in one analytical batch. All instrument tunes, initial and continuing calibrations were within QC criteria. The surrogate recoveries were within QC limits for all samples. All internal standard area counts and retention times were within QC limits.

*Analytical Batch 060296-8260-E-1 (water)*

**Note:** Sample BOHG54 (L7102-3) was the native sample used for the MS and MSD analyzed as part of this analytical batch.

The samples were analyzed within holding time on June 2, 1996. The target compounds Chloromethane(2.3 ug/L), 2-Butanone(4.5 ug/L) and 1,1,1-Trichloroethane(1.2 ug/L) were detected in the Method Blank at concentrations below the Practical Quantitation Limits. Also detected was an unknown Tentatively Identified Compound at a retention time of 8.51 minutes. If detected in any of the associated samples, these compounds will be flagged with a "B" qualifier. The spiked compound recoveries were within QC limits in the MS, MSD and LCS. The RPDs between the spiked compound recoveries in the MS and MSD were all within the QC limits.

Donald A. Hilke  
Prepared By

July 9, 1996  
Date

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

[Revised 08/28/92]

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

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

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

[Revised 02/09/1996]

<b>For Use On The Analytical Data Reporting Forms</b>	
A	<i>For CLP analyses Only</i> -- 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. <i>[pesticide/PCB analyses only]</i>
D	Constituent detected in the diluted sample. It also indicates that an accurate quantitation is not possible due to <u>surrogates</u> 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	<i>Estimated value</i> -- (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 ( <i>For CLP Reporting Only</i> ).
N	<i>For CLP Reporting Only</i> -- Tentatively identified constituents (TICs) identified based on mass spectral library search.
NQ	Analyte detected, but Not Quantified; see result from subsequent analysis
P	<i>For CLP Reporting Only</i> -- The percent difference between the concentrations detected on both GC columns was greater than 25 percent <i>[pesticide/PCB analyses only]</i> .
U	<i>For CLP Reporting Only</i> -- 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.
<b>For Use On The QC Data Reporting Forms</b>	
*	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 <sup>1</sup>	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 <sup>1</sup>	The RPD cannot be computed because the sample and/or duplicate concentration was below the RDL.

<sup>1</sup> Used as footnote designations on the QC Summary Form.

LOCKHEED ANALYTICAL SERVICES  
 LOGIN CHAIN OF CUSTODY REPORT (ln01)  
 May 24 1996, 11:44 am

Login Number: L7102  
 Account: 596 Bechtel Hanford, Inc. \* Richland, WA  
 Project: BECHTEL-HANFORD Bechtel Hanford Project

Laboratory Sample Number	Client Sample Number	Collect Date	Receive Date	Due PR Date
L7102-1 temp 4 Location: 157 Water 1 S SCREENING	BOHG54	22-MAY-96	24-MAY-96	28-JUN-96
				Hold:18-NOV-96
L7102-2 temp 4 Location: 157 Water 1 S SCREENING	BOHG55	22-MAY-96	24-MAY-96	28-JUN-96
				Hold:18-NOV-96
L7102-3 temp 4 Location: 157 Water 1 S 8240 VOLATILES	BOHG54	22-MAY-96	24-MAY-96	28-JUN-96
				Hold:05-JUN-96
L7102-4 temp 4 Location: 157	BOHG54	22-MAY-96	24-MAY-96	28-JUN-96
L7102-5 temp 4 Location: 157	BOHG54	22-MAY-96	24-MAY-96	28-JUN-96
L7102-6 temp 4 Location: 157	BOHG54	22-MAY-96	24-MAY-96	28-JUN-96
L7102-7 temp 4 Location: 157	BOHG54	22-MAY-96	24-MAY-96	28-JUN-96
L7102-8 temp 4 Location: 157 Water 1 S 8240 VOLATILES	BOHG55	22-MAY-96	24-MAY-96	28-JUN-96
				Hold:05-JUN-96
L7102-9 temp 4 Location: 157	BOHG55	22-MAY-96	24-MAY-96	28-JUN-96
L7102-10 temp 4 Location: 157	BOHG55	22-MAY-96	24-MAY-96	28-JUN-96

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LOCKHEED ANALYTICAL SERVICES  
 LOGIN CHAIN OF CUSTODY REPORT (ln01)  
 May 24 1996, 11:44 am

Login Number: L7102  
 Account: 596 Bechtel Hanford, Inc. \* Richland, WA  
 Project: BECHTEL-HANFORD Bechtel Hanford Project

Laboratory Sample Number	Client Sample Number	Collect Date	Receive Date	Due PR Date
L7102-11 temp 4 Location: 157	BOHG55	22-MAY-96	24-MAY-96	28-JUN-96
L7102-12 temp 4 Location: 157	BOHG55	22-MAY-96	24-MAY-96	28-JUN-96
L7102-13 temp 4 Location: 157 Water 1 S 8240 VOLATILES	BOHG61	22-MAY-96	24-MAY-96	28-JUN-96 Hold:05-JUN-96
L7102-14 temp 4 Location: 157	BOHG61	22-MAY-96	24-MAY-96	28-JUN-96
L7102-15 temp 4 Location: 157	BOHG61	22-MAY-96	24-MAY-96	28-JUN-96
L7102-16 temp 4 Location: 157	BOHG61	22-MAY-96	24-MAY-96	28-JUN-96
L7102-17 temp 4 Location: 157	BOHG61	22-MAY-96	24-MAY-96	28-JUN-96
L7102-18 temp 4 Location: 157 Water 1 S 300.0 NITRATE	BOHG54	22-MAY-96	24-MAY-96	28-JUN-96 Hold:24-MAY-96
L7102-19 temp 4 Location: 157 Water 1 S 300.0 NITRATE	BOHG55	22-MAY-96	24-MAY-96	28-JUN-96 Hold:24-MAY-96
L7102-20 temp 4; Cr ONLY Location: 157 Water 1 S 6010A ICP METALS	BOHG54	22-MAY-96	24-MAY-96	28-JUN-96 Hold:18-NOV-96

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LOCKHEED ANALYTICAL SERVICES  
LOGIN CHAIN OF CUSTODY REPORT (Ln01)  
May 24 1996, 11:44 am

Login Number: L7102  
Account: 596 Bechtel Hanford, Inc. \* Richland, WA  
Project: BECHTEL-HANFORD Bechtel Hanford Project

Laboratory Sample Number	Client Sample Number	Collect Date	Receive Date	Due PR Date
L7102-21 temp 4; Cr ONLY Location: 157 Water 1 S 6010A ICP METALS	BOHG55	22-MAY-96	24-MAY-96	28-JUN-96
		Hold:18-NOV-96		
L7102-22 Location: Water 1 S EDD - DISK DEL. Water 1 S GCMS2 Water 1 S INORG TYPE 2 RPT	REPORT TYPE	24-MAY-96	24-MAY-96	28-JUN-96

Page 3

Signature: *[Handwritten Signature]*

Date: 5-24-96

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Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

L7102

Data Turnaround  
 Priority  
 Normal

Collector <i>A. Rizzo / m. Mehler</i>	Company Contact C. J. Kemp	Telephone (509) 372-9692
Project Designation Horn Rapids Landfill Groundwater Sampling	Sampling Location Horn Rapids Landfill	SAF No. B96-109
Ice Chest No. <i>CL-08</i>	Field Logbook No. <i>EF-1096-2</i>	Method of Shipment Hand Delivered
Shipped To Lockheed	Offsite Property No. <i>W96-0-0640-46</i>	Bill of Lading/Air Bill No. <i>2904657104</i>

Possible Sample Hazards/Remarks	Preservation	HCl	HNO3	Cool 4°C	Cool 4°C
	Type of Container	aGs	P	P	P
	No. of Container(s)	5	1	1	1
Special Handling and/or Storage Maintain samples between 2°C and 6°C.	Volume	40mL	500mL	500mL	20mL

SAMPLE ANALYSIS	VOA - 8240A (TCL)	ICP Metals - 6010A (SW-846) - Chromium	IC Anions - 300.0 - Nitrate	Activity Scan
-----------------	-------------------	--	-----------------------------	---------------

Sample No.	Matrix*	Date Sampled	Time Sampled	VOA	ICP	IC Anions	Activity Scan
BOHG54	W	5-22-96	0906	X	X	X	X
BOHG61	W	5-22-96	0730	X			
BOHG55	W	5-22-96	1025	X	X	X	X

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS	Matrix*
Relinquished By <i>Grant</i> Date/Time <i>5-22-96</i>	Received By <i>K. Tipp</i> Date/Time <i>5/22/96</i>	The ERC Contractor acknowledges that the 48-hour holding time for nitrate is not likely achievable.  The Activity Scan is for all samples listed on this chain of custody.	S - Soil SE - Sediment SO - Solid SL - Sludge W - Water O - Oil A - Air DS - Drum Solids DL - Drum Liquids T - Tissue WI - Wipe L - Liquid V - Vegetation X - Other
Relinquished By <i>Marty Mehler</i> Date/Time <i>5/23/96</i>	Received By <i>Eric</i> Date/Time <i>0830</i>		
Relinquished By <i>K. Tipp</i> Date/Time <i>5/23/96</i>	Received By <i>Richard B. Batten</i> Date/Time <i>5-23-96</i>		
Relinquished By <i>Eric</i> Date/Time <i>0906</i>	Received By		
Relinquished By <i>Richard B. Batten</i> Date/Time <i>5-23-96</i>	Received By		

LABORATORY SECTION	Received By <i>M. M. M.</i>	Title <i>Sample Custodian</i>	Date/Time <i>5-24-96</i>
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time <i>0845</i>

M. M. M.

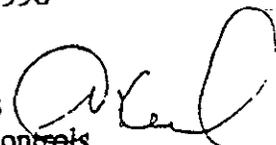
Environmental  
Restoration  
Contractor

**ERC Team**

*Interoffice Memorandum*

Job No. 22192  
Written Response Required: NO  
CCY: N/A  
OU: N/A  
TSD: N/A  
ERA: N/A  
Subject Code: 5830

TO: W. S. Thompson N1-28      DATE: February 29, 1996  
G. C. Henckel H4-80

COPIES: K. A. Smith X0-23      FROM: S. K. De Mers   
T. L. Lafreniere X0-23  
D. E. Gergely X0-23  
Radiological Controls  
T7-05/373-1913

SUBJECT: Total Activities for Off-Site Shipments of Groundwater Samples to NRC Licensed Laboratories

There is no need to perform total activities prior to offsite shipment to NRC licensed labs of samples taken from ground water wells located on the Hanford Site.

All wells reviewed to date for radiological content have shown no well with a total activity in excess of 2,000,000 pCi/l (2,000 pCi/gm), the Department Of Transportation limit for radioactive material. The highest activity in any known well is  $1.56 \times 10^6$  pCi/l H<sup>3</sup>.

While this does not constitute any release from radiological controls for worker protection, it does allow samples to be shipped based on historical laboratory data and save the expense of doing radiochemical analysis.

A copy of the most recent analytical data should be provided to the NRC licensed laboratory with the samples being shipped or if no data is available for new wells, the most recent data from adjacent wells.

# LOCKHEED MARTIN



## Sample Login Login Review Checklist

Lot Number L7102

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

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

### SAMPLE SUMMARY REPORT

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

### LOGIN CHAIN OF CUSTODY

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

### SAMPLE RECEIVING CHECKLIST

	<u>YES</u>	<u>NO</u>	<u>N/A</u>	<u>Comment</u>
1. Are all discrepancies between the COC and the login noted (if applicable)?	—	—	<u>X</u>	_____

Amurillo      5-24-96  
primary review signature      date

Kamela Troyer      5-24-96  
secondary review signature      date

-052459  
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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
BOHG54 -	L7102-1 L7102-3 L7102-18 L7102-20		Water Water Water Water	SCREENING - 8240 VOLATILES - 300.0 NITRATE - 6010A ICP METAL
BOHG55 -	L7102-2 L7102-8 L7102-19 L7102-21		Water Water Water Water	SCREENING - 8240 VOLATILES - 300.0 NITRATE - 6010A ICP METAL
BOHG61 -	L7102-13		Water	8240 VOLATILES
REPORT TYPE ✓	L7102-22 L7102-22 L7102-22		Water Water Water	EDD - DISK DEL. GCMS2 INORG TYPE 2 RF

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0 2

LOCKHEED ANALYTICAL SERVICES

Sample Results

Client Sample ID: B0HG54	Date Collected: 22-MAY-96
Matrix: Water	Date Received: 24-MAY-96
Percent Solids: N/A	

Constituent	Units	Method	Result	Project Reporting Limit	Data Qualifier(s)	Date Analyzed	LAS Batch ID	LAS Sample ID
Nitrate-N	mg/L	300.0	41.	0.20	HD(1:10)	28-MAY-96	37484	L7102-18

LOCKHEED ANALYTICAL SERVICES

Sample Results

Client Sample ID: B0HG55	Date Collected: 22-MAY-96
Matrix: Water	Date Received: 24-MAY-96
Percent Solids: N/A	

Constituent	Units	Method	Result	Project Reporting Limit	Data Qualifier(s)	Date Analyzed	LAS Batch ID	LAS Sample ID
Nitrate-N	mg/L	300.0	43.	0.020	H	28-MAY-96	37484	L7102-19

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

LAL BATCH: 524-BH	CALIB. DATE: 5/28/96	INTERCEPT: 0.000
CALIB. CURVE: QUADRATIC	CALIB. TIME: 8:40	LINEAR COEFF.: 3.765E-08
	R SQUARED: 1.00000	QUADRATIC COEFF.: -3.787E-17

**STANDARD DATA**

MANUFACTURER: FISHER		LOT NUMBER: 916724
STANDARD ID	CONCENTRATION	RESPONSE
AUTOCAL1	0 mg/L	0
AUTOCAL3	0.005 mg/L	136488
AUTOCAL4	0.0125 mg/L	307960
AUTOCAL5	0.025 mg/L	615642
AUTOCAL6	0.25 mg/L	6678562
AUTOCAL7	1.25 mg/L	34376262
AUTOCAL2	0.005 mg/L	148170

**INITIAL CALIBRATION VERIFICATION STANDARD**

SAMPLE ID	TRUE VALUE	FOUND	RECOVERY
ICVL	0.25 mg/L	0.252 mg/L	101 %

**INITIAL CALIBRATION BLANK**

SAMPLE ID	FOUND	FLAG
ICB	<0.0030 mg/L	U

**CONTINUING CALIBRATION VERIFICATION STANDARDS**

SAMPLE ID	TRUE VALUE	FOUND	RECOVERY
CCVL	0.25 mg/L	0.245 mg/L	98 %
CCVL	0.25 mg/L	0.275 mg/L	110 %
CCVL	0.25 mg/L	0.248 mg/L	99 %

**CONTINUING CALIBRATION BLANKS**

SAMPLE ID	FOUND	FLAG
CCB	<0.0030 mg/L	U
CCB	<0.0030 mg/L	U
CCB	0.0044 mg/L	U



LOCKHEED ANALYTICAL SERVICES

Sample Results

Client Sample ID: BOHG54	Date Collected: 22-MAY-96
Matrix: Water	Date Received: 24-MAY-96
Percent Solids: N/A	

Constituent	Units	Method	Result	MDL	RDL	Data Qual	Dilution	Date Analyzed	LAS Batch ID	LAS Sample ID
CHROMIUM, TOTAL	mg/L	6010	0.0079	0.0030	0.010	B	1	11-JUN-96	37719	L7102-20

LOCKHEED ANALYTICAL SERVICES

Sample Results

Client Sample ID: B0HG55	Date Collected: 22-MAY-96
Matrix: Water	Date Received: 24-MAY-96
Percent Solids: N/A	

Constituent	Units	Method	Result	MDL	RDL	Data Qual	Dilution	Date Analyzed	LAS Batch ID	LAS Sample ID
CHROMIUM, TOTAL	mg/L	6010	0.0073	0.0030	0.010	B	1	11-JUN-96	37719	L7102-21

# LOCKHEED ANALYTICAL SERVICES

GC/MS FOR VOLATILE ORGANICS  
8240 VOLATILES

Client Sample ID:	B0HG54	LAL Sample ID:	L7102-3
Date Collected:	22-MAY-96	Date Received:	24-MAY-96
Date Analyzed:	02-JUN-96	Analytical Dilution:	1
Matrix:	Water	Analytical Batch ID:	060296-8260-E1
		Preparation Dilution:	1.00

SURROGATE	RECOVERY	QC Limits
1,2-Dichloroethane-d4	117%	84-122
Toluene-d8	116%	87-117
Bromofluorobenzene	115%	83-118

CONSTITUENT	CAS NO.	RESULT ug/L	PRACTICAL QUANTIFICATION LIMIT ug/L	DATA QUALIFIER(s)
Chloromethane	74-87-3	<5.0	5.0	
Vinyl Chloride	75-01-4	<5.0	5.0	
Bromomethane	74-83-9	<5.0	5.0	
Chloroethane	75-00-3	<5.0	5.0	
Trichlorofluoromethane	75-69-4	<5.0	5.0	
Acetone	67-64-1	<10.	10.	
1,1-Dichloroethene	75-35-4	<5.0	5.0	
Carbon Disulfide	75-15-0	<5.0	5.0	
Methylene Chloride	75-09-2	<5.0	5.0	
trans-1,2-Dichloroethene	156-60-5	<5.0	5.0	
Vinyl Acetate	108-05-4	<10.	10.	
1,1-Dichloroethane	75-34-3	<5.0	5.0	
2-Butanone	78-93-3	<10.	10.	
cis-1,2-Dichloroethene	156-59-2	<5.0	5.0	
Chloroform	67-66-3	<5.0	5.0	
1,1,1-Trichloroethane	71-55-6	1.3	5.0	BJ
Carbon tetrachloride	56-23-5	<5.0	5.0	
1,2-Dichloroethane	107-06-2	<5.0	5.0	
Benzene	71-43-2	<5.0	5.0	
Trichloroethene	79-01-6	7.7	5.0	
1,2-Dichloropropane	78-87-5	<5.0	5.0	
Bromodichloromethane	75-27-4	<5.0	5.0	
2-Chloroethylvinylether	110-75-8	<20.	20.	
4-Methyl-2-Pentanone	108-10-1	<10.	10.	
cis-1,3-Dichloropropene	10061-01-5	<5.0	5.0	
Toluene	108-88-3	<5.0	5.0	
trans-1,3-Dichloropropene	10061-02-6	<5.0	5.0	
2-Hexanone	591-78-6	<10.	10.	
1,1,2-Trichloroethane	79-00-5	<5.0	5.0	
Tetrachloroethene	127-18-4	<5.0	5.0	
Dibromochloromethane	124-48-1	<5.0	5.0	
Chlorobenzene	108-90-7	<5.0	5.0	
Ethylbenzene	100-41-4	<5.0	5.0	
m,p-Xylene	136777-61-2	<5.0	5.0	
o-Xylene	95-47-6	<5.0	5.0	
Styrene	100-42-5	<5.0	5.0	
Bromoform	75-25-2	<5.0	5.0	
1,1,2,2-Tetrachloroethane	79-34-5	<5.0	5.0	
1,3-Dichlorobenzene	541-73-1	<5.0	5.0	
1,4-Dichlorobenzene	106-46-7	<5.0	5.0	
1,2-Dichlorobenzene	95-50-1	<5.0	5.0	

# LOCKHEED ANALYTICAL SERVICES

GC/MS FOR VOLATILE ORGANICS  
TENTATIVELY IDENTIFIED COMPOUNDS  
8240 VOLATILES

Client Sample ID:	BOHG54	LAL Sample ID:	L7102-3
Date Collected:	22-MAY-96	Date Received:	24-MAY-96
Date Analyzed:	02-JUN-96	Analytical Dilution:	1
Matrix:	Water	Analytical Batch ID:	060296-8260-E1
		Preparation Dilution:	1.00

Number of TICs found: 0

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

	CAS NUMBER	COMPOUND NAME	RT	BST. CONC.	Q
1					
2					
3					
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# LOCKHEED ANALYTICAL SERVICES

GC/MS FOR VOLATILE ORGANICS  
8240 VOLATILES

Client Sample ID: B0HG55	LAL Sample ID: L7102-8
Date Collected: 22-MAY-96	Date Received: 24-MAY-96
Date Analyzed: 02-JUN-96	Analytical Dilution: 1
Matrix: Water	Analytical Batch ID: 060296-8260-E1
	Preparation Dilution: 1.00

SURROGATE	RECOVERY	QC Limits
1,2-Dichloroethane-d4	117%	84-122
Toluene-d8	114%	87-117
Bromofluorobenzene	113%	83-118

CONSTITUENT	CAS NO.	RESULT ug/L	PRACTICAL QUANTITATION LIMIT ug/L	DATA QUALIFIER(S)
Chloromethane	74-87-3	<5.0	5.0	
Vinyl Chloride	75-01-4	<5.0	5.0	
Bromomethane	74-83-9	<5.0	5.0	
Chloroethane	75-00-3	<5.0	5.0	
Trichlorofluoromethane	75-69-4	<5.0	5.0	
Acetone	67-64-1	6.2	10.	J
1,1-Dichloroethene	75-35-4	<5.0	5.0	
Carbon Disulfide	75-15-0	<5.0	5.0	
Methylene Chloride	75-09-2	<5.0	5.0	
trans-1,2-Dichloroethene	156-60-5	<5.0	5.0	
Vinyl Acetate	108-05-4	<10.	10.	
1,1-Dichloroethane	75-34-3	<5.0	5.0	
2-Butanone	78-93-3	<10.	10.	
cis-1,2-Dichloroethene	156-59-2	<5.0	5.0	
Chloroform	67-66-3	<5.0	5.0	
1,1,1-Trichloroethane	71-55-6	1.4	5.0	BJ
Carbon tetrachloride	56-23-5	<5.0	5.0	
1,2-Dichloroethane	107-06-2	<5.0	5.0	
Benzene	71-43-2	<5.0	5.0	
Trichloroethene	79-01-6	11.	5.0	
1,2-Dichloropropane	78-87-5	<5.0	5.0	
Bromodichloromethane	75-27-4	<5.0	5.0	
2-Chloroethylvinylether	110-75-8	<20.	20.	
4-Methyl-2-Pentanone	108-10-1	<10.	10.	
cis-1,3-Dichloropropene	10061-01-5	<5.0	5.0	
Toluene	108-88-3	<5.0	5.0	
trans-1,3-Dichloropropene	10061-02-6	<5.0	5.0	
2-Hexanone	591-78-6	<10.	10.	
1,1,2-Trichloroethane	79-00-5	<5.0	5.0	
Tetrachloroethene	127-18-4	<5.0	5.0	
Dibromochloromethane	124-48-1	<5.0	5.0	
Chlorobenzene	108-90-7	<5.0	5.0	
Ethylbenzene	100-41-4	<5.0	5.0	
m,p-Xylene	136777-61-2	<5.0	5.0	
o-Xylene	95-47-6	<5.0	5.0	
Styrene	100-42-5	<5.0	5.0	
Bromoform	75-25-2	<5.0	5.0	
1,1,2,2-Tetrachloroethane	79-34-5	<5.0	5.0	
1,3-Dichlorobenzene	541-73-1	<5.0	5.0	
1,4-Dichlorobenzene	106-46-7	<5.0	5.0	
1,2-Dichlorobenzene	95-50-1	<5.0	5.0	

# LOCKHEED ANALYTICAL SERVICES

GC/MS FOR VOLATILE ORGANICS  
TENTATIVELY IDENTIFIED COMPOUNDS  
8240 VOLATILES

Client Sample ID:	B0HG55	LAL Sample ID:	L7102-8
Date Collected:	22-MAY-96	Date Received:	24-MAY-96
Date Analyzed:	02-JUN-96	Analytical Dilution:	1
Matrix:	Water	Analytical Batch ID:	060296-8260-E1
		Preparation Dilution:	1.00

Number of TICs found: 0

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

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1					
2					
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# LOCKHEED ANALYTICAL SERVICES

GC/MS FOR VOLATILE ORGANICS  
8240 VOLATILES

Client Sample ID:	B0HG61	LAL Sample ID:	L7102-13
Date Collected:	22-MAY-96	Date Received:	24-MAY-96
Date Analyzed:	02-JUN-96	Analytical Dilution:	1
Matrix:	Water	Analytical Batch ID:	060296-8260-E1
		Preparation Dilution:	1.00

SURROGATE	RECOVERY	QC Limits
1,2-Dichloroethane-d4	119%	84-122
Toluene-d8	117%	87-117
Bromofluorobenzene	116%	83-118

CONSTITUENT	CAS NO.	RESULT ug/L	PRACTICAL QUANTITATION LIMIT ug/L	DATA QUALIFIER(S)
Chloromethane	74-87-3	<5.0	5.0	
Vinyl Chloride	75-01-4	<5.0	5.0	
Bromomethane	74-83-9	<5.0	5.0	
Chloroethane	75-00-3	<5.0	5.0	
Trichlorofluoromethane	75-69-4	<5.0	5.0	
Acetone	67-64-1	16.	10.	
1,1-Dichloroethene	75-35-4	<5.0	5.0	
Carbon Disulfide	75-15-0	<5.0	5.0	
Methylene Chloride	75-09-2	<5.0	5.0	
trans-1,2-Dichloroethene	156-60-5	<5.0	5.0	
Vinyl Acetate	108-05-4	<10.	10.	
1,1-Dichloroethane	75-34-3	<5.0	5.0	
2-Butanone	78-93-3	5.4	10.	BJ
cis-1,2-Dichloroethene	156-59-2	<5.0	5.0	
Chloroform	67-66-3	<5.0	5.0	
1,1,1-Trichloroethane	71-55-6	<5.0	5.0	
Carbon tetrachloride	56-23-5	<5.0	5.0	
1,2-Dichloroethane	107-06-2	<5.0	5.0	
Benzene	71-43-2	<5.0	5.0	
Trichloroethene	79-01-6	<5.0	5.0	
1,2-Dichloropropane	78-87-5	<5.0	5.0	
Bromodichloromethane	75-27-4	<5.0	5.0	
2-Chloroethylvinylether	110-75-8	<20.	20.	
4-Methyl-2-Pentanone	108-10-1	<10.	10.	
cis-1,3-Dichloropropene	10061-01-5	<5.0	5.0	
Toluene	108-88-3	<5.0	5.0	
trans-1,3-Dichloropropene	10061-02-6	<5.0	5.0	
2-Hexanone	591-78-6	<10.	10.	
1,1,2-Trichloroethane	79-00-5	<5.0	5.0	
Tetrachloroethene	127-18-4	<5.0	5.0	
Dibromochloromethane	124-48-1	<5.0	5.0	
Chlorobenzene	108-90-7	<5.0	5.0	
Ethylbenzene	100-41-4	<5.0	5.0	
m,p-Xylene	136777-61-2	<5.0	5.0	
o-Xylene	95-47-6	<5.0	5.0	
Styrene	100-42-5	<5.0	5.0	
Bromoform	75-25-2	<5.0	5.0	
1,1,2,2-Tetrachloroethane	79-34-5	<5.0	5.0	
1,3-Dichlorobenzene	541-73-1	<5.0	5.0	
1,4-Dichlorobenzene	106-46-7	<5.0	5.0	
1,2-Dichlorobenzene	95-50-1	<5.0	5.0	

# LOCKHEED ANALYTICAL SERVICES

GC/MS FOR VOLATILE ORGANICS  
TENTATIVELY IDENTIFIED COMPOUNDS  
8240 VOLATILES

Client Sample ID:	B0HG61	LAL Sample ID:	L7102-13
Date Collected:	22-MAY-96	Date Received:	24-MAY-96
Date Analyzed:	02-JUN-96	Analytical Dilution:	1
Matrix:	Water	Analytical Batch ID:	060296-8260-E1
		Preparation Dilution:	1.00

Number of TICs found: 0

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

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1					
2					
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# LOCKHEED ANALYTICAL SERVICES

SPIKED SAMPLE RESULT  
GC/MS FOR VOLATILE ORGANICS

Client Sample ID:	BOHG54	LAL Sample ID:	37663MS
Date Collected:	22-MAY-96	Date Received:	24-MAY-96
Date Analyzed:	02-JUN-96	Analytical Dilution:	1
		Analytical Batch ID:	060296-8260-E1
		Preparation Dilution:	1.00

SURROGATE	RECOVERY	QC Limits
1,2-Dichloroethane-d4	118%	84-122
Toluene-d8	116%	87-117
Bromofluorobenzene	116%	83-118

CONSTITUENT	CAS NO.	RESULT ug/L	PRACTICAL QUANTITATION LIMIT ug/L	DATA QUALIFIER (s)
Chloromethane	74-87-3	39.	5.0	B
Vinyl Chloride	75-01-4	45.	5.0	B
Bromomethane	74-83-9	75.	5.0	
Chloroethane	75-00-3	54.	5.0	
Trichlorofluoromethane	75-69-4	51.	5.0	
Acetone	67-64-1	11.	10.	
1,1-Dichloroethene	75-35-4	48.	5.0	
Carbon Disulfide	75-15-0	<5.0	5.0	
Methylene Chloride	75-09-2	47.	5.0	
trans-1,2-Dichloroethene	156-60-5	47.	5.0	
Vinyl Acetate	108-05-4	<10.	10.	
1,1-Dichloroethane	75-34-3	49.	5.0	
2-Butanone	78-93-3	2.5	10.	BJ
cis-1,2-Dichloroethene	156-59-2	50.	5.0	
Chloroform	67-66-3	48.	5.0	
1,1,1-Trichloroethane	71-55-6	47.	5.0	B
Carbon tetrachloride	56-23-5	45.	5.0	
1,2-Dichloroethane	107-06-2	47.	5.0	
Benzene	71-43-2	46.	5.0	
Trichloroethene	79-01-6	51.	5.0	
1,2-Dichloropropane	78-87-5	47.	5.0	
Bromodichloromethane	75-27-4	46.	5.0	
2-Chloroethylvinylether	110-75-8	<20.	20.	
4-Methyl-2-Pentanone	108-10-1	<10.	10.	
cis-1,3-Dichloropropene	10061-01-5	45.	5.0	
Toluene	108-88-3	46.	5.0	
trans-1,3-Dichloropropene	10061-02-6	44.	5.0	
2-Hexanone	591-78-6	2.9	10.	J
1,1,2-Trichloroethane	79-00-5	46.	5.0	
Tetrachloroethene	127-18-4	44.	5.0	
Dibromochloromethane	124-48-1	43.	5.0	
Chlorobenzene	108-90-7	45.	5.0	
Ethylbenzene	100-41-4	46.	5.0	
m,p-Xylene	136777-61-2	91.	5.0	
o-Xylene	95-47-6	46.	5.0	
Styrene	100-42-5	44.	5.0	
Bromoform	75-25-2	41.	5.0	
1,1,2,2-Tetrachloroethane	79-34-5	47.	5.0	
1,3-Dichlorobenzene	541-73-1	43.	5.0	
1,4-Dichlorobenzene	106-46-7	43.	5.0	
1,2-Dichlorobenzene	95-50-1	42.	5.0	

# LOCKHEED ANALYTICAL SERVICES

SPIKED SAMPLE RESULT  
GC/MS FOR VOLATILE ORGANICS

Client Sample ID: BOHG54	LAL Sample ID: 37663MSD
Date Collected: 22-MAY-96	Date Received: 24-MAY-96
Date Analyzed: 02-JUN-96	Analytical Dilution: 1
	Analytical Batch ID: 060296-8260-E1
	Preparation Dilution: 1.00

SURROGATE	RECOVERY	QC Limits
1,2-Dichloroethane-d4	116%	84-122
Toluene-d8	113%	87-117
Bromofluorobenzene	114%	83-118

CONSTITUENT	CAS NO.	RESULT ug/L	PRACTICAL QUANTITATION LIMIT ug/L	DATA QUALIFIER(s)
Chloromethane	74-87-3	45.	5.0	B
Vinyl Chloride	75-01-4	46.	5.0	B
Bromomethane	74-83-9	64.	5.0	
Chloroethane	75-00-3	55.	5.0	
Trichlorofluoromethane	75-69-4	53.	5.0	
Acetone	67-64-1	11.	10.	
1,1-Dichloroethene	75-35-4	52.	5.0	
Carbon Disulfide	75-15-0	<5.0	5.0	
Methylene Chloride	75-09-2	50.	5.0	
trans-1,2-Dichloroethene	156-60-5	50.	5.0	
Vinyl Acetate	108-05-4	<10.	10.	
1,1-Dichloroethane	75-34-3	51.	5.0	
2-Butanone	78-93-3	<10.	10.	
cis-1,2-Dichloroethene	156-59-2	52.	5.0	
Chloroform	67-66-3	49.	5.0	
1,1,1-Trichloroethane	71-55-6	52.	5.0	B
Carbon tetrachloride	56-23-5	47.	5.0	
1,2-Dichloroethane	107-06-2	48.	5.0	
Benzene	71-43-2	48.	5.0	
Trichloroethene	79-01-6	52.	5.0	
1,2-Dichloropropane	78-87-5	49.	5.0	
Bromodichloromethane	75-27-4	48.	5.0	
2-Chloroethylvinylether	110-75-8	<20.	20.	
4-Methyl-2-Pentanone	108-10-1	<10.	10.	
cis-1,3-Dichloropropene	10061-01-5	47.	5.0	
Toluene	108-88-3	48.	5.0	
trans-1,3-Dichloropropene	10061-02-6	47.	5.0	
2-Hexanone	591-78-6	3.3	10.	J
1,1,2-Trichloroethane	79-00-5	48.	5.0	
Tetrachloroethene	127-18-4	46.	5.0	
Dibromochloromethane	124-48-1	45.	5.0	
Chlorobenzene	108-90-7	47.	5.0	
Ethylbenzene	100-41-4	48.	5.0	
m,p-Xylene	136777-61-2	96.	5.0	
o-Xylene	95-47-6	48.	5.0	
Styrene	100-42-5	47.	5.0	
Bromoform	75-25-2	45.	5.0	
1,1,2,2-Tetrachloroethane	79-34-5	50.	5.0	
1,3-Dichlorobenzene	541-73-1	45.	5.0	
1,4-Dichlorobenzene	106-46-7	45.	5.0	
1,2-Dichlorobenzene	95-50-1	44.	5.0	

# LOCKHEED ANALYTICAL SERVICES

SPIKED SAMPLE RESULT  
GC/MS FOR VOLATILE ORGANICS

Client Sample ID:	Lab Ctrl Sample	LAL Sample ID:	37663LCS
Date Collected:	N/A	Date Received:	N/A
Date Analyzed:	02-JUN-96	Analytical Dilution:	1
		Analytical Batch ID:	060296-8260-E1
		Preparation Dilution:	1.00

SURROGATE	RECOVERY	QC Limits
1,2-Dichloroethane-d4	116%	84-122
Toluene-d8	115%	87-117
Bromofluorobenzene	116%	83-118

CONSTITUENT	CAS NO.	RESULT ug/L	PRACTICAL	DATA
			QUANTITATION LIMIT ug/L	
Chloromethane	74-87-3	52.	5.0	B
Vinyl Chloride	75-01-4	<5.0	5.0	
Bromomethane	74-83-9	70.	5.0	
Chloroethane	75-00-3	52.	5.0	
Trichlorofluoromethane	75-69-4	48.	5.0	
Acetone	67-64-1	12.	10.	
1,1-Dichloroethene	75-35-4	45.	5.0	
Carbon Disulfide	75-15-0	<5.0	5.0	
Methylene Chloride	75-09-2	45.	5.0	
trans-1,2-Dichloroethene	156-60-5	45.	5.0	
Vinyl Acetate	108-05-4	<10.	10.	
1,1-Dichloroethane	75-34-3	46.	5.0	
2-Butanone	78-93-3	<10.	10.	
cis-1,2-Dichloroethene	156-59-2	47.	5.0	
Chloroform	67-66-3	44.	5.0	
1,1,1-Trichloroethane	71-55-6	45.	5.0	B
Carbon tetrachloride	56-23-5	43.	5.0	
1,2-Dichloroethane	107-06-2	44.	5.0	
Benzene	71-43-2	44.	5.0	
Trichloroethene	79-01-6	43.	5.0	
1,2-Dichloropropane	78-87-5	45.	5.0	
Bromodichloromethane	75-27-4	44.	5.0	
2-Chloroethylvinylether	110-75-8	<20.	20.	
4-Methyl-2-Pentanone	108-10-1	<10.	10.	
cis-1,3-Dichloropropene	10061-01-5	43.	5.0	
Toluene	108-88-3	44.	5.0	
trans-1,3-Dichloropropene	10061-02-6	44.	5.0	
2-Hexanone	591-78-6	3.4	10.	J
1,1,2-Trichloroethane	79-00-5	45.	5.0	
Tetrachloroethene	127-18-4	42.	5.0	
Dibromochloromethane	124-48-1	41.	5.0	
Chlorobenzene	108-90-7	43.	5.0	
Ethylbenzene	100-41-4	44.	5.0	
m,p-Xylene	136777-61-2	88.	5.0	
o-Xylene	95-47-6	44.	5.0	
Styrene	100-42-5	44.	5.0	
Bromoform	75-25-2	41.	5.0	
1,1,2,2-Tetrachloroethane	79-34-5	44.	5.0	
1,3-Dichlorobenzene	541-73-1	41.	5.0	
1,4-Dichlorobenzene	106-46-7	41.	5.0	
1,2-Dichlorobenzene	95-50-1	41.	5.0	

# LOCKHEED ANALYTICAL SERVICES

MATRIX SPIKE DATA SUMMARY  
GC/MS FOR VOLATILE ORGANICS

Client Sample ID:	BOHG54	LAL Sample ID:	37663MS
Date Collected:	22-MAY-96	Date Received:	24-MAY-96
Date Analyzed:	02-JUN-96	Analytical Dilution:	1
		Analytical Batch ID:	060296-8260-E1
		Preparation Dilution:	1.00

SURROGATE	RECOVERY	QC Limits
1,2-Dichloroethane-d4	118%	84-122
Toluene-d8	116%	87-117
Bromofluorobenzene	116%	83-118

Constituent	Spike Added ug/L	Sample Concentration ug/L	MS Concentration ug/L	% Recovery	QC Limits
					% Recovery
1,1-Dichloroethene	50.0	0.000	48.5	97	0-231
Benzene	50.0	0.000	46.4	93	44-150
Trichloroethene	50.0	7.74	50.9	86	74-144
Toluene	50.0	0.000	46.4	93	56-148
Chlorobenzene	50.0	0.000	45.4	91	46-158

# LOCKHEED ANALYTICAL SERVICES

MATRIX SPIKE DUPLICATE DATA SUMMARY  
GC/MS FOR VOLATILE ORGANICS

Client Sample ID: BOHG54	LAL Sample ID: 37663MSD
Date Collected: 22-MAY-96	Date Received: 24-MAY-96
Date Analyzed: 02-JUN-96	Analytical Dilution: 1
	Analytical Batch ID: 060296-8260-E1
	Preparation Dilution: 1.00

SURROGATE	RECOVERY	QC Limits
1,2-Dichloroethane-d4	116%	84-122
Toluene-d8	113%	87-117
Bromofluorobenzene	114%	83-118

Constituent	Spike Added ug/L	MSD Concentration ug/L	% Recovery	RPD	QC Limits	
					RPD	% Recovery
1,1-Dichloroethene	50.0	51.6	103	6	14	0-231
Benzene	50.0	47.9	96	3	11	44-150
Trichloroethene	50.0	51.7	88	2	14	74-144
Toluene	50.0	48.2	96	4	13	56-148
Chlorobenzene	50.0	47.2	94	4	13	46-158

# LOCKHEED ANALYTICAL SERVICES

LCS DATA SUMMARY  
GC/MS FOR VOLATILE ORGANICS

Client Sample ID:	Lab Ctrl Sample	LAL Sample ID:	37663LCS
Date Collected:	N/A	Date Received:	N/A
Date Analyzed:	02-JUN-96	Analytical Dilution:	1
		Analytical Batch ID:	060296-8260-E1
		Preparation Dilution:	1.00

SURROGATE	RECOVERY	QC Limits
1,2-Dichloroethane-d4	116%	84-122
Toluene-d8	115%	87-117
Bromofluorobenzene	116%	83-118

Constituent	Spike Added ug/L	LCS Concentration ug/L	LCS % Recovery	QC Limits
1,1-Dichloroethene	50.0	45.4	91	0-231
Benzene	50.0	44.4	89	44-150
Trichloroethene	50.0	43.2	86	74-144
Toluene	50.0	44.2	88	56-148
Chlorobenzene	50.0	42.8	86	46-158

# LOCKHEED ANALYTICAL SERVICES

## VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Instrument ID: GC/MS-E

Date/Time Analyzed: 02-JUN-96 16:02  
LAL Batch ID: 060296-8260-E1

		IS1 (PFB) Area	RT	IS2 (DFB) Area	RT	IS3 (CBZ) Area	RT	IS4 (DCB) Area	RT
12 HOUR STD		609239	11.15	1030548	12.30	929493	16.43	875242	20.47
UPPER LIMIT		1218478	11.65	2061096	12.80	1858986	16.93	1750484	20.97
LOWER LIMIT		304619	10.65	515274	11.80	464746	15.93	437621	19.97
Client Sample ID	LAL Sample ID								
Method Blank	37663MB	518914	11.16	904575	12.31	813087	16.44	664101	20.48
BOHG54	37663MS	539174	11.17	941944	12.32	849365	16.45	769289	20.49
BOHG54	L7102-3	487784	11.18	858673	12.33	789878	16.45	624870	20.48
BOHG55	L7102-8	540316	11.17	944126	12.32	844305	16.45	689273	20.48
Lab Ctrl Sample	37663LCS	549372	11.17	950805	12.32	864689	16.44	777004	20.48
BOHG54	37663MSD	529196	11.18	931329	12.33	837252	16.45	754520	20.48
32748	L7092-18	564040	11.17	970998	12.32	877372	16.45	723110	20.48
BOHG61	L7102-13	516909	11.18	900761	12.33	831089	16.45	662863	20.48

AREA UPPER LIMIT = +100% of internal standard area  
 AREA LOWER LIMIT = -50% of internal standard area  
 RT UPPER LIMIT = +0.50 minutes of internal standard RT  
 RT LOWER LIMIT = -0.50 minutes of internal standard RT

IS1 (PFB) = Pentafluorobenzene  
 IS2 (DFB) = 1,4-Difluorobenzene  
 IS3 (CBZ) = Chlorobenzene-d5  
 IS4 (DCB) = 1,4-Dichlorobenzene-d4

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

Management  
Consultants



**ATKEARNEY**

12 August 1996

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

Dear Ms. Kessner:

Enclosed are the organic, wet chemistry and inorganic data validation reports for sample data group LK7102-LAS.

Sincerely,

  
R. Bruce Christian, CIH  
Associate

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

Date: 12 August 1996  
To: Bechtel Hanford Inc. (technical representative)  
From: A.T. Kearney, Inc.  
Project: Horn Rapids Landfill Groundwater Sampling  
Subject: Wet Chemistry - Data Package No. LK7102-LAS (SDG No. LK7102)



## INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. LK7102-LAS prepared by Quanterra Environmental Services (QES). A list of the samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analysis
B0HG54	05/22/96	Water	C	See Note 1 & 2
B0HG55	05/22/96	Water	C	See Note 1 & 2

Note 1. Requested Method: IC Anions - 300.0 Nitrate

Note 2. Analysis requested for 'information only'

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

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

## DATA QUALITY OBJECTIVES

- **Holding Times**

Analytical holding times are assessed to ascertain whether the holding time requirements have been met by the laboratory. The holding time requirement is as follows: two days for nitrate.

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

000001

times the limit, all associated detectable sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

Due to holding times being exceeded for nitrate by greater than twice the limit, all nitrate results (all detects) were qualified as estimates and flagged "J".

- **Instrument Calibration**

Instrument calibration is performed to establish that the instrument is capable of producing acceptable and reliable analytical data over a range of concentrations. The initial and continuing calibrations are performed according to the EPA method requirements and all results must meet validation requirements set by Westinghouse-Hanford (WHC 1992a). At least one blank and three standards are used to establish the instrument calibrations with a correlation of greater than or equal to 0.995 prior to sample analysis. Continuing calibration checks are performed to verify that instrument performance is stable and reproducible on a day-to-day basis.

Instrument calibration is not reviewed under Level C validation.

- **Blanks**

Method blank analyses are performed to determine the extent of laboratory contamination introduced through sampling, sample preparation and analysis. At least one acceptable method blank analysis must be conducted for every 20 samples of a given matrix. No contaminants should be present in the method blank. All blank results must fall below the CRQL to be acceptable.

All method blank results were acceptable.

- **Accuracy**

Matrix Spike

Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must fall within the range of 75% to 125%. Samples with a spike recovery of less than 30% and a sample value below the IDL are rejected and flagged "UR". Samples with a spike recovery of 30% to 74% and a sample result less than the IDL are qualified "UJ". Samples with a spike recovery of greater than 125% or less than 75% and a sample result greater than the IDL are qualified "J". Finally, for samples with a spike

recovery greater than 125% and a sample result less than the IDL, no qualification is required.

All matrix spike recovery results were acceptable.

#### Laboratory Control Sample

The LCS monitors the overall performance of the analysis, including the sample preparation. An LCS should be prepared (e.g., digested or distilled) and analyzed with every group of samples which have been prepared together.

Performance criteria for solid LCS samples are established through interlaboratory studies coordinated by a certifying agency (e.g., EPA or an independent commercial supplier). If the LCS recoveries are outside the control limit and the sample result is greater than the IDL, all sample results must be qualified as estimates and flagged "J". If the LCS recoveries are less than the control limit and the sample result is less than the IDL, all sample results must be flagged "UJ". If the LCS recoveries are greater than the control limits and the sample result is less than the IDL, then no qualification is necessary.

The performance criteria for aqueous LCS samples are percent recoveries between 80% and 120%. Samples with LCS recoveries of less than 50% are rejected and flagged "UR/R". Samples with LCS recoveries between 50% and 79% and a sample value below the IDL are qualified as estimates and flagged "UJ". If the LCS recovery is greater than 120% or between 50% and 79% and the sample value above the IDL, the result is qualified as an estimate and flagged "J". For LCS recoveries greater than 120% and a sample value below IDL, no qualification is necessary.

LCS results are not reviewed under Level C validation.

- **Precision**

#### Laboratory Duplicate Samples

Laboratory duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Results must be within RPD limits of plus or minus 35% for solid samples. If RPD values are out of specification and the sample concentration is greater than five times the CRQL, all associated sample results are qualified as estimated and flagged "J". If RPD values are plus or minus two times the CRQL and the sample concentration is less than five times the CRQL, all associated sample results are qualified as estimated and flagged "J/UJ". The performance criteria for aqueous laboratory duplicates are an RPD less than 20% for positive sample results greater than five times the CRQL or plus or minus the

CRQL for positive sample results less than five times the CRQL. Sample results outside the criteria are qualified as estimates and flagged "J/UJ".

All laboratory duplicate results fell within the required control limits.

#### Field Split Samples

Two pairs of field duplicate samples were submitted to QES for analysis as shown below:

<u>Sample No.</u>	<u>Split Sample No.</u>	<u>Well No.</u>
BOHG45 (QES)	BOHG54 (LAS)	699-S30-E10A
BOHG46 (QES)	BOHG55 (LAS)	699-S30-E10B

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

- **Analytical Detection Levels**

Reported analytical detection levels are compared against CRQLs to ensure that laboratory detection levels meet the required criteria. All reported laboratory detection levels were below those specified in DOE/RL-95-50.

- **Completeness**

Data Package No. LK7102-LAS (SDG No. LK7102) was submitted for validation and verified for completeness. The completion rate was 100%.

#### MAJOR DEFICIENCIES

None found.

#### MINOR DEFICIENCIES

Due to holding times being exceeded for nitrate at greater than twice the limit, all nitrate results (all detects) were qualified as estimates and flagged "J". Data flagged "J" indicates that the associated concentration is an estimate, but under WHC guidelines, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

## REFERENCES

- EPA, 1987, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, Third Edition, Environmental Protection Agency, Washington, D.C.
- EPA, 1988a, *EPA Contract Laboratory Program Statement of Work for Organics Analyses, Multi-Media, Multi-Concentration*, U.S. Environmental Protection Agency, Washington, D.C.
- EPA, 1988b, *Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses*, U.S. Environmental Protection Agency, Washington, D.C.
- EPA, 1988c, *EPA Contract Laboratory Program Statement of Work for Inorganics Analyses, Multi-Media, Multi-Concentration*, U.S. Environmental Protection Agency, Washington, D.C.
- EPA, 1988d, *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses*, U.S. Environmental Protection Agency, Washington, D.C.
- EPA, 1990, *EPA Contract Laboratory Program Statement of Work for Inorganic Analyses, Multi-media, Multi-Concentration*, U.S. Environmental Protection Agency, Washington, D.C.
- EPA, 1991, *EPA Contract Laboratory Program Statement of Work for Organics Analyses, Multi-Media, Multi-Concentration*, Environmental Protection Agency, Washington, D.C.
- WHC, 1992a, *Data Validation Procedures for Chemical Analyses*, WHC-SD-EN-SPP-002, Rev. 2, Westinghouse Hanford Company, October 1993.
- WHC, 1992b, *Data Validation Procedure for Radiological Analyses*, WHC-SD-EN-SPP-001, Rev. 2, Westinghouse Hanford Company, 1993.
- EPA, 1994, *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, U.S. Environmental Protection Agency, Washington,
- WHC, 1994, *Validation Statement of Work*, Rev.1, Westinghouse Hanford Company, 1994.  
D.C.

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

000006

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

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

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

000008

DATA QUALIFICATION SUMMARY

SDG: LK7102	REVIEWER: RBC	DATE: 08/09/96	PAGE <u>1</u> OF <u>1</u>
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Nitrate	J	All	Holding time exceeded.

000009

**Appendix 3**

**Qualified Data Summary and Annotated Laboratory Reports**



LOCKHEED ANALYTICAL SERVICES

Sample Results

Client Sample ID: BOHG54	Date Collected: 22-MAY-96
Matrix: Water	Date Received: 24-MAY-96
Percent Solids: N/A	

Constituent	Units	Method	Result	Project Reporting Limit	Data Qualifier(s)	Date Analyzed	LAS Batch ID	LAS Sample ID
Nitrate-N	mg/L	300.0	41.	0.20	HD(1:10)	28-MAY-96	37484	L7102-18

*RBC*  
8/5/96

000012

0-2

LOCKHEED ANALYTICAL SERVICES

Sample Results

Client Sample ID: BOHG55	Date Collected: 22-MAY-96
Matrix: Water	Date Received: 24-MAY-96
Percent Solids: N/A	

Constituent	Units	Method	Result	Project Reporting Limit	Data Qualifier(s)	Date Analyzed	LAS Batch ID	LAS Sample ID
Nitrate-N	mg/L	300.0	43.	0.020	H	28-MAY-96	37484	L7102-19

000013

*Handwritten:*  
 J  
 8/5/96  
 [Signature]

**Appendix 4**

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

000014



July 9, 1996

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

RE: Log-in No.: L7102  
Quotation No.: Q400000-B  
SAF: B96-109  
Document File No.: 0524596  
BHI Document File No.: 371  
SDG No.: LK7102



The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on 24 May 1996.

The temperature of the cooler upon receipt was 4°C. Sample containers received agree with the chain-of-custody documentation. Sample containers were received intact. Samples designated for nitrate analysis were not received in time to meet the analytical holding time requirements. The vials for volatile analyses did not contain headspace.

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) 375-4741.

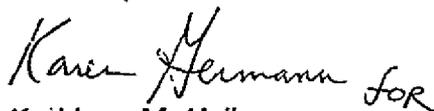
000015

A handwritten signature or initials in the bottom right corner of the page.

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

" I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manger or a designee, as verified by the following signature."

Sincerely,

  
Kathleen M. Hall  
Client Services Representative

cc: Client Services  
Document Control

**CASE NARRATIVE  
INORGANIC NON METALS ANALYSES**

The routine calibration and quality control analyses performed for this batch include as applicable: initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), matrix spike (predigestion) sample(s), duplicate sample(s).

**Preparation and Analysis Requirements**

- Two water samples were received for LK7102 and analyzed in batch 524 bh for selected analytes as requested on the chain of custody. Quality control analysis was performed on the following samples:

Client ID	LAL #		Method
BOHG54	L7102-18	MS, DUP	Nitrate as Nitrogen

**Holding Time Requirements**

- All samples were received and analyzed outside of the method-specific holding times. The 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 5, 1996  
Date

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

**L7102**

Data Turnaround  
 Priority  
 Normal

Collector <i>A. Rizzo / m. mehlman</i>	Company Contact C. J. Kemp	Telephone (509) 372-9692
Project Designation Horn Rapids Landfill Groundwater Sampling	Sampling Location Horn Rapids Landfill	SAF No. B98-109
Ice Chest No. <i>CR-08</i>	Field Logbook No. <i>ERL-1096-2</i>	Method of Shipment Hand Delivered
Shipped To Lookhead	Offsite Property No. <i>W96-0-0640-46</i>	Bill of Lading/Air Bill No. <i>2904657104</i>

Possible Sample Hazards/Remarks	Preservation	HCl	HNO3	Cool 4°C	Cool 4°C
	Type of Container	gGs	P	P	P
	No. of Container(s)	5	1	1	1
Special Handling and/or Storage Maintain samples between 2°C and 8°C.	Volume	40mL	500mL	500mL	20mL
SAMPLE ANALYSIS	VOA - 8240A (TCL)	ICP Metals - 6010A (SW-846) - Chromium	IC Anions - 300.0 - Nitrate	Activity Scan	

Sample No.	Matrix*	Date Sampled	Time Sampled				
B0HG54	W	5-22-96	0906	X	X	X	X
B0HG61	W	5-22-96	0730	X			
B0HG55	W	5-22-96	1025	X	X	X	X

CHAIN OF POSSESSION	Sign/Print Names
Relinquished By <i>Grant</i> Date/Time <i>5-22-96</i>	Received By <i>K. J. Kemp</i> Date/Time <i>5/22/96</i>
Relinquished By <i>M. Mehlman</i> Date/Time <i>0430</i>	Received By <i>ERC</i> Date/Time <i>0830</i>
Relinquished By <i>K. J. Kemp</i> Date/Time <i>0906</i>	Received By <i>K. J. Kemp</i> Date/Time <i>5-23-96</i>
Relinquished By <i>K. J. Kemp</i> Date/Time <i>5-23-96</i>	Received By <i>K. J. Kemp</i> Date/Time

**SPECIAL INSTRUCTIONS**  
 The ERC Contractor acknowledges that the 48-hour holding time for nitrate is not likely achievable.  
 The Activity Scan is for all samples listed on this chain of custody.

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

LABORATORY SECTION	Received By <i>K. J. Kemp</i>	Title <i>Sample Custodian</i>	Date/Time <i>5-24-96 / 0945</i>
FINAL SAMPLE	Disposal Method	Disposed By	Date/Time

**Appendix 5**  
**Data Validation Supporting Documentation**

GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	<b>C</b>	D	E
PROJECT: Horn Rapids Landfill			DATA PACKAGE: LK7102-LAS		
VALIDATOR: RBC		LAB: LAS		DATE: 27 July 96	
CASE:			SDG: LK7102-LAS		
ANALYSES PERFORMED					
<input checked="" type="checkbox"/> Anions/IC	<input type="checkbox"/> TOC	<input type="checkbox"/> TOX	<input type="checkbox"/> TPH-418.1	Oil and Grease	Alkalinity
<input type="checkbox"/> Ammonia	<input type="checkbox"/> BOD/COD	<input type="checkbox"/> Chloride	<input type="checkbox"/> Chromium-VI	<input type="checkbox"/> pH	<input type="checkbox"/> NO <sub>2</sub> /NO <sub>3</sub>
<input type="checkbox"/> Sulfate	<input type="checkbox"/> TDS	<input type="checkbox"/> TKN	<input type="checkbox"/> Phosphate	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SAMPLES/MATRIX <i>Water</i>					
<i>BOHGS4 BOHGS5</i>					

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

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

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

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

\_\_\_\_\_

\_\_\_\_\_

2. HOLDING TIMES

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

Comments: *All greater than 2X holding time of 2 days and detected*

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*A-23/7*

GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

3. INSTRUMENT CALIBRATION

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

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

4. BLANKS

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

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

5. ACCURACY

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

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

6. PRECISION

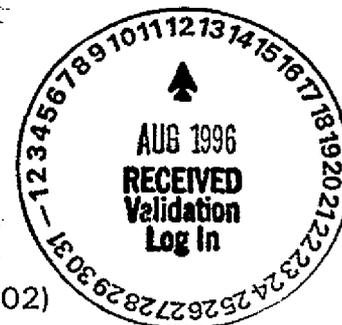
Were laboratory duplicate samples analyzed  
 at the required frequency? . . . . . Yes No N/A  
 Are laboratory duplicate sample RPD values acceptable? . . . . . Yes No N/A  
 Are field duplicate RPD values acceptable? . . . . . Yes No N/A  
 Are field split RPD values acceptable? . . . . . Yes No N/A

A-24 *pc*





Date: 12 August 1996  
To: Bechtel Hanford Inc. (technical representative)  
From: A.T. Kearney, Inc.  
Project: Horn Rapids Landfill Groundwater Sampling  
Subject: Inorganics - Data Package No. LK7102-LAS (SDG No. LK7102)



## INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. LK7102-LAS prepared by Lockheed Analytical Services (LAS). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analysis
B0HG54	05/22/96	Water	C	SW846 6010A - Chromium
B0HG55	05/22/96	Water	C	SW846 6010A - Chromium

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

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

## DATA QUALITY OBJECTIVES

- **Holding Times**

Analytical holding times for ICP metals (Ca and Mg) are assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements is as follows: Samples must be analyzed within six months.

Holding time requirements were met for all analytes.

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- **Blanks**

Calibration Blanks

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

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

Level C validation does not include the review of data based on calibration blank results.

Preparation Blanks

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

In the case of negative blank results, if the absolute value exceeds the Contract Required Detection Limit (CRDL), all non-detects are rejected and flagged "UR" and all detects that are less than ten times the absolute value of the associated preparation blank result are qualified as estimates and flagged "J". If the absolute value of the negative preparation blank is greater than the IDL and less than or equal to the CRDL, all non-detects are qualified as estimates and flagged "UJ" and all detects less than ten times the absolute value of the blank are qualified as estimates and flagged "J". If the sample results are greater than ten times the absolute value of the preparation blank, no qualification is necessary.

All preparation blank results were acceptable.

000002

- **Accuracy**

Matrix Spike

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

All matrix spike recovery results were acceptable.

Laboratory Control Sample Recovery

The LCS monitors the overall performance of the analysis, including the sample preparation. An LCS should be digested or distilled and analyzed with every group of samples which have been prepared together. The performance criteria for solid LCS samples are established through interlaboratory studies coordinated by a certifying agency (e.g., EPA or an independent commercial supplier). One liquid LCS is digested and analyzed for each sample batch that contains water samples. The results are compared against the control limit of 80-120% as required by the WHC data validation guidelines (WHC 1992a).

Level C validation does not include the review of data based on laboratory control sample results.

- **Precision**

Laboratory Duplicate Samples

Laboratory duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Results must be within RPD limits of plus or minus 35% for solid samples. If RPD values are out of specification and the sample concentration is greater than five times the CRDL, all associated sample results are qualified as estimated and flagged "J". If RPD values are plus or minus two times the CRDL and the sample concentration is less than five times the CRDL, all associated sample results are qualified as estimated and flagged "J/UJ". The performance criteria for aqueous laboratory duplicates are an RPD less than 20% for positive sample results greater than five times the CRDL or plus or minus the CRDL for positive sample results less than five times the CRDL. Sample results

outside the criteria are qualified as estimates and flagged "J/UJ".

All laboratory duplicate recovery results were acceptable.

#### ICP Serial Dilution

The ICP serial dilution is used to determine whether significant physical or chemical interferences exist due to the sample matrix. If the sample concentration is greater than or equal to 50 times the IDL for an analyte and the %D is greater than 10%, the associated data are qualified as estimates and flagged "J".

Level C validation does not include the review of data based on serial dilution results.

#### Field Split Samples

Two sets of field split samples were submitted to QES/LAS as shown below:

<u>Sample Number</u>	<u>Duplicate Sample No.</u>	<u>Well Location</u>
BOHG45 (QES)	BOHG54 (LAS)	699-S30-E10A
BOHG46 (QES)	BOHG55 (LAS)	699-S30-E10B

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

- **Detection Levels**

Reported detection levels are compared against CRDLs to ensure that laboratory detection levels meet the required criteria. All reported laboratory detection levels were below those specified in DOE/RL-95-50.

- **Completeness**

Data Package No. LK7102-LAS (SDG No. LK7102) was submitted for validation and verified for completeness. The completion rate was 100%.

#### **MAJOR DEFICIENCIES**

None found.

000004

## MINOR DEFICIENCIES

None found.

## REFERENCES

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

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

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

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

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

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

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

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

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

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

000005

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

000006

Qualifiers which may be applied by data validators in compliance with WHC guidelines are as follows:

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

000067

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

000008

DATA QUALIFICATION SUMMARY

SDG: LK7102	REVIEWER: RBC	DATE: 08/12/96	PAGE <u>1</u> OF <u>1</u>
COMMENTS: No qualifiers assigned.			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON

000009

**Appendix 3**

**Qualified Data Summary and Annotated Laboratory Reports**



LOCKHEED ANALYTICAL SERVICES

Sample Results

Client Sample ID: BOHG54	Date Collected: 22-MAY-96
Matrix: Water	Date Received: 24-MAY-96
Percent Solids: N/A	

Constituent	Units	Method	Result	MDL	RDL	Data Qual	Dilution	Date Analyzed	LAS Batch ID	LAS Sample ID
CHROMIUM, TOTAL	mg/L	6010	0.0079	0.0030	0.010	8	1	11-JUN-96	37719	L7102-20

000012

*jsk*  
 8/5/96  
0.31

LOCKHEED ANALYTICAL SERVICES

Sample Results

Client Sample ID: BOHG55	Date Collected: 22-MAY-96
Matrix: Water	Date Received: 24-MAY-96
Percent Solids: N/A	

Constituent	Units	Method	Result	MDL	RDL	Data Qual	Dilution	Date Analyzed	LAS Batch ID	LAS Sample ID
CHROMIUM, TOTAL	mg/L	6010	0.0073	0.0030	0.010	B	1	11-JUN-96	37719	L7102-21

000013

*Rhe*  
*8/5/96*  
*df*

**Appendix 4**

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

LOCKHEED MARTIN 

July 9, 1996

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

RE: Log-in No.: L7102  
Quotation No.: Q400000-B  
SAF: B96-109  
Document File No.: 0524596  
BHI Document File No.: 371  
SDG No.: LK7102



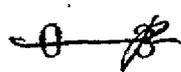
The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on 24 May 1996.

The temperature of the cooler upon receipt was 4°C. Sample containers received agree with the chain-of-custody documentation. Sample containers were received intact. Samples designated for nitrate analysis were not received in time to meet the analytical holding time requirements. The vials for volatile analyses did not contain headspace.

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.

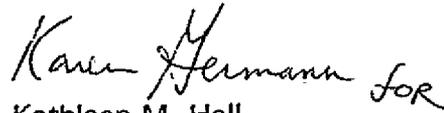
If you have any questions concerning the analysis or the data please call Kathleen Hall at (509) 375-4741.

000015 

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

" I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manger or a designee, as verified by the following signature."

Sincerely,



Kathleen M. Hall  
Client Services Representative

cc: Client Services  
Document Control

## CASE NARRATIVE INORGANIC 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

All samples were received on May 24, 1996. The samples were logged in as L7102 and were prepared and analyzed in batch 524 bh. The samples were analyzed by Method 6010A ICP Metals.

### Holding Time Requirements

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

### Method Blanks

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

### Internal Quality Control

- All Internal Quality Control were within acceptance limits.

Shellee McGrath  
Prepared By

June 18, 1996  
Date

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

L7102

Data Turnaround  
 Priority  
 Normal

Collector <i>A. Rizzo / m. mehler</i>	Company Contact C. J. Kemp	Telephone (509) 372-9692
Project Designation Horn Rapids Landfill Groundwater Sampling	Sampling Location Horn Rapids Landfill	SAF No. B98-109
Ice Chest No. <i>CR-08</i>	Field Logbook No. <i>EFL 10962</i>	Method of Shipment Hand Delivered
Shipped To Lockheed	Offsite Property No. <i>W96-00640-46</i>	Bill of Lading/Air Bill No. <i>2904657104</i>

Possible Sample Hazards/Remarks	Preservation	HCl	HNO3	Cool 4°C	Cool 4°C
	Type of Container	aGs	P	P	P
	No. of Container(s)	5	1	1	1
Special Handling and/or Storage Maintain samples between 2°C and 6°C.	Volume	40mL	500mL	500mL	20mL
SAMPLE ANALYSIS	VOA - 8240A (TCL)	ICP Metals - 6010A (SW-846) - Chromium	IC Anions - 300.0 - Nitrate	Activity Scan	

000002

Sample No.	Matrix*	Date Sampled	Time Sampled	VOA	ICP Metals	IC Anions	Activity Scan
BOHG54	W	5-22-96	0906	X	X	X	X
BOHG61	W	5-22-96	0730	X			
BOHG55	W	5-22-96	1025	X	X	X	X

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By <i>Marty Mehler</i>	Date/Time 5-22-96	Received By <i>K. Tripp</i>	Date/Time 5/22/96
Relinquished By <i>Marty Mehler</i>	Date/Time 0430	Received By <i>E.C.</i>	Date/Time 0830
Relinquished By <i>K. Tripp</i>	Date/Time 5/23/96	Received By <i>Michelle B. Bitten</i>	Date/Time 5-23-96
Relinquished By <i>Michelle B. Bitten</i>	Date/Time 5-23-96	Received By	Date/Time

**SPECIAL INSTRUCTIONS**  
 The ERC Contractor acknowledges that the 48-hour holding time for nitrate is not likely achievable.  
 The Activity Scan is for all samples listed on this chain of custody.

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

LABORATORY SECTION	Received By <i>Mehler</i>	Title Samples Custodian	Date/Time 5-24-96
FINAL SAMPLE	Disposal Method	Disposed By	Date/Time 0840

Mehler

**Appendix 5**  
**Data Validation Supporting Documentation**

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	<u>C</u>	D	E
PROJECT: <i>Horn Rapids Landfill</i>			DATA PACKAGE: <i>LK7102-LAS</i>		
VALIDATOR: <i>RUS</i>		LAB: <i>LAS</i>		DATE: <i>26 July</i>	
CASE:			SDG: <i>LK7102-LAS</i>		
ANALYSES PERFORMED					
<input checked="" type="checkbox"/> CLP/ICP	<input type="checkbox"/> CLP/GFAA	<input type="checkbox"/> CLP/Hg	<input type="checkbox"/> CLP/Cyanide	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> SW-846/ICP	<input type="checkbox"/> SW-846/GFAA	<input type="checkbox"/> SW-846/Hg	<input type="checkbox"/> SW-846 Cyanide	<input type="checkbox"/>	<input type="checkbox"/>
SAMPLES/MATRIX <i>Water</i>					
<i>BOHGS4 BOHGS5</i>					

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

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

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

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

2. HOLDING TIMES

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

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

*A-19*

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

- Were initial calibrations performed on all instruments? . . . . Yes No  N/A
- Are initial calibrations acceptable? . . . . . Yes No  N/A
- Are ICP interference checks acceptable? . . . . . Yes No  N/A
- Were ICV and CCV checks performed on all instruments? . . . . . Yes No  N/A
- Are ICV and CCV checks acceptable? . . . . . Yes No  N/A

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

4. BLANKS

- Were ICB and CCB checks performed for all applicable analyses? Yes No  N/A
- Are ICB and CCB results acceptable? . . . . . Yes No  N/A
- Were preparation blanks analyzed? . . . . .  Yes No  N/A
- Are preparation blank results acceptable? . . . . .  Yes No  N/A
- Were field/trip blanks analyzed? . . . . . Yes  No  N/A
- Are field/trip blank results acceptable? . . . . . Yes No  N/A

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

5. ACCURACY

- Were spike samples analyzed? . . . . .  Yes No  N/A
- Are spike sample recoveries acceptable? . . . . .  Yes No  N/A
- Were laboratory control samples (LCS) analyzed? . . . . . Yes No  N/A
- Are LCS recoveries acceptable? . . . . . Yes No  N/A

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

*Am20/5*

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

6. PRECISION

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

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

7. FURNACE AA QUALITY CONTROL

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

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

8. REPORTED RESULTS AND DETECTION LIMITS

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

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

A-21/s



Date: 12 August 1996  
To: Bechtel Hanford Inc. (technical representative)  
From: A.T. Kearney, Inc.  
Project: Horn Rapids Landfill Groundwater Sampling  
Subject: Volatiles - Data Package No. LK7102-LAS (SDG No. LK7102)



## INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. LK7102-LAS prepared by Lockheed Analytical Services (LAS). A list of the samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analysis
BOGG54	05/22/96	Water	C	SW-846 Method 8240A (TCL)
BOHG55	05/22/96	Water	C	SW-846 Method 8240A (TCL)
BOHG61	05/22/96	Water	C	SW-846 Method 8240A (TCL)

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

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

## DATA QUALITY OBJECTIVES

- **Holding Times**

Analytical holding times are assessed to ascertain whether the holding time requirements were met by the laboratory. Preserved water samples must be analyzed within 14 days of the date of sample collection.

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

times the limit, all associated detectable sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

Holding times were met for all samples.

- **Instrument Calibration and Tuning**

Instrument calibration is performed to establish that the GC/MS instrument is capable of producing acceptable and reliable analytical data over a range of concentrations. The initial and continuing calibrations are performed according to SW-846 methods and all results must meet validation requirements set by Westinghouse-Hanford (WHC 1992a). An initial multipoint calibration is performed prior to sample analysis to establish the linear range of the GC/MS instrument. Continuing calibration checks are performed to verify that instrument performance is stable and reproducible on a day-to-day basis.

Instrument calibration and tuning are not evaluated under Level C validation.

- **Blanks**

Method blank analyses are conducted to determine the extent of laboratory contamination introduced through sampling, sample preparation and analysis. At least one acceptable method blank analysis must be conducted for every 20 samples of a given matrix. No contaminants should be present in the method blank. Analytical results for analytes present in any sample at less than five times the concentration of that analyte found in the associated blank are qualified as non-detects and flagged "U". Common laboratory contaminants present in samples at less than ten times the concentration of that analyte found in the associated blank are qualified as non-detects. If a sample result is less than the CRQL and is less than five times (or less than ten times for lab contaminants) the highest associated blank result, the sample result value is raised to the CRQL, qualified as undetected and flagged "U".

Tentatively identified compounds (TICs) present in the samples and blanks that are within plus or minus 0.06 relative retention time units (RRT) of each other are qualified as undetected and flagged "U" if the sample concentration is less than five times (or less than ten times for common laboratory contaminants) the highest blank concentration.

Chloromethane, 2-butanone and 1,1,1-trichloroethane were detected in the method blank. 1,1,1-Trichloroethane was detected in sample numbers BOHG54 and BOHG55 at less than five times the concentration detected in the method blank. The 1,1,1-trichloroethane results in both samples were raised to the detection limit, qualified as a non-detect and flagged "U".

000002

All other method blank target compound results were acceptable.

TIC identifications were not reviewed since spectral match comparisons could not be made without the raw data, which is not provided in a summary data package.

#### Trip Blanks

One trip blank was identified in this data package. The trip blank sample number, location and associated field sample numbers are as follows:

Trip Blank Sample Number	Well Number	Associated Field Sample Number
BOHG61	699-S30-E10A 699-S30-E10B	BOHG54, BOHG55

Acetone and 2-butanone were detected in the trip blank. Acetone was also detected in associated sample number BOHG55 at a concentration less than ten times the trip blank result. Based on the WHC guidelines (WHC 1992a), no qualification is required.

- **Accuracy**

#### Matrix Spike/Matrix Spike Duplicate Recoveries

Matrix spike/matrix spike duplicate analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike/matrix spike duplicate analyses are performed in duplicate using five compounds for which percent recoveries must be within established laboratory quality control limits. If spike recoveries are outside control limits, detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Undetected sample results with spike recoveries outside control limits are qualified as estimates and flagged "UJ". Sample results greater than five times the spike concentration require no qualification.

All matrix spike/matrix spike duplicate recovery results were acceptable.

#### Surrogate Recovery

The analysis of surrogate compounds provides a measure of system performance for individual samples. Matrix-specific surrogate compound recovery control windows have been established by the EPA CLP program. When a surrogate

compound recovery is out of the control window, all positively identified target compounds associated with the unacceptable surrogate recoveries are qualified as estimates and flagged "J". Undetected compounds with surrogate recoveries less than the lower control limit are qualified as having an estimated detection limit and flagged "UJ". Samples with surrogate recoveries less than ten percent are qualified as estimates and flagged "J" for detects, and rejected and flagged "UR" for nondetects. Undetected compounds with surrogate recoveries greater than the upper control limit require no qualification.

The 1,2-dichloroethane-d4 recovery was slightly above the QC limit for sample numbers BOHG54, BOHG55 and BOHG61. Therefore, all associated positive results in the three samples were qualified as estimates and flagged "J". The toluene-d8 and bromofluorobenzene recoveries were also slightly above the WHC criteria (WHC 1992a) in the three samples. Since there were no associated detects, no action was required.

- **Precision**

Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike/matrix spike duplicate results provide matrix-specific information on the precision of the method for specific target compound classes. Precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. For water samples analyzed using SW-846 protocol, results must be within RPD limits of plus or minus 20 percent. If RPD values are out of specification and the sample concentration is less than five times the spike concentration, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If RPD values are out of specification and the sample concentration is greater than five times the spike concentration, no qualification is required.

All matrix spike/matrix spike duplicate RPD results were acceptable.

Field Split Samples

Two sets of field split samples were submitted for analysis as shown below:

<u>Sample Number</u>	<u>Split Sample No.</u>	<u>Well Location</u>
BOHG45 (QES)	BOHG54 (LAS)	699-S30-E10A
BOHG46 (QES)	BOHG55 (LAS)	699-S30-E10B

The split sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. All results were found to be acceptable.

- **System Performance**

Internal Standards Performance

The evaluation of internal standards results provides a means to assess the stability and sensitivity of the GC/MS system on every analysis. Internal standard area counts must be within the limits of -50% to +100% of the most recent standard. The retention time of the internal standard must not vary by more than +/-30 seconds of the most recent calibration. If area counts for a particular internal standard are outside the control limits or the relative retention time shift is greater than +/- 30 seconds, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If area counts and retention times are both outside control limits, all non-detect sample results associated with that internal standard are rejected and flagged "UR".

Internal standard performance is not reviewed under Level C validation.

Compound Identification

The identifications of detected compounds are confirmed to investigate the possibility of false positives or false negatives. If a compound was incorrectly reported as undetected, the associated result is qualified as detected (no qualifier) or as an estimate and flagged "J". If retention time and mass spectral criteria are not met, all associated results are qualified as unusable and flagged "R". If it is determined that incorrect identifications were made as a result of cross-contamination or carryover between analyses, then the affected data are qualified as unusable and flagged "UR/R".

Compound identifications are not reviewed under Level C data validation.

- **Analytical Detection Levels**

Reported analytical detection levels are compared to CRQLs to ensure that laboratory detection levels meet the required criteria. All laboratory reported analytical detection levels were at or below the analyte specific CRQLs with the exception of 2-chloroethylvinylether. In accordance with WHC procedures, no qualification is required.

- **Completeness**

Data Package No. LK7102-LAS (SDG No. LK7102) was submitted for validation and verified for completeness. The completion percentage was 100%.

## MAJOR DEFICIENCIES

None found.

## MINOR DEFICIENCIES

Chloromethane, 2-butanone and 1,1,1-trichloroethane were detected in the method blank. 1,1,1-Trichloroethane was detected in sample numbers BOHG54 and BOHG55 at less than five times the concentration detected in the method blank. The 1,1,1-trichloroethane results in both samples were raised to the detection limit, qualified as a non-detect and flagged "U". The 1,2-dichloroethane-d4 recovery was slightly above the QC limit for sample numbers BOHG54, BOHG55 and BOHG61. Therefore, all associated positive results in the three samples were qualified as estimates and flagged "J". Data flagged "J" indicates that the associated concentration is an estimate, but under WHC guidelines, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

## REFERENCES

- EPA, 1987, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, Third Edition, Environmental Protection Agency, Washington, D.C.
- EPA, 1988a, *EPA Contract Laboratory Program Statement of Work for Organics Analyses, Multi-Media, Multi-Concentration*, U.S. Environmental Protection Agency, Washington, D.C.
- EPA, 1988b, *Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses*, U.S. Environmental Protection Agency, Washington, D.C.
- EPA, 1988c, *EPA Contract Laboratory Program Statement of Work for Inorganics Analyses, Multi-Media, Multi-Concentration*, U.S. Environmental Protection Agency, Washington, D.C.
- EPA, 1988d, *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses*, U.S. Environmental Protection Agency, Washington, D.C.
- EPA, 1990, *EPA Contract Laboratory Program Statement of Work for Inorganic Analyses, Multi-media, Multi-Concentration*, U.S. Environmental Protection Agency, Washington, D.C.

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

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

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

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

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

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

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

Qualifiers which may be applied by data validator in compliance with WHC 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 dilution and moisture content by the laboratory.
- UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- J - Indicates the compound or analyte was analyzed for and detected. The associated concentration is an estimate, but the data are usable for decision-making purposes.
- R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.
- UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.
- NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).
- N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications ( i.e., usable for decision-making purposes).

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

DATA QUALIFICATION SUMMARY

SDG: LK7102	REVIEWER: RBC	DATE: 08/12/96	PAGE <u>1</u> OF <u>1</u>
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Trichloroethene	J	BOHG54, BOHG55	Surrogate recovery above QC limits.
Acetone	J	BOHG55, BOHG61	Surrogate recovery above QC limits.
1,1,1-Trichloroethane	U	BOHG54, BOHG55	Method blank contamination.
2-Butanone	J	BOHG61	Surrogate recovery above QC limits.

000011

**Appendix 3**

**Qualified Data Summary and Annotated Laboratory Reports**

VOLATILE ORGANIC ANALYSIS, WATER MATRIX, (ug/L)

Project: BECHTEL-HANFORD		SDG: JK7102		B0H:G55		B0H:G61															
Laboratory Lockbox		SDG: JK7102		B0H:G54		B0H:G55		B0H:G61													
Sample Number	Location	699-S30-E10A	699-S30-E10A	699-S30-E10B																	
Remarks	Sample	Soil																			
Analysis Date	06/02/96	06/02/96	06/02/96	06/02/96	06/02/96	06/02/96	06/02/96	06/02/96	06/02/96	06/02/96	06/02/96	06/02/96	06/02/96	06/02/96	06/02/96	06/02/96	06/02/96	06/02/96	06/02/96	06/02/96	06/02/96
Sample Date	05/22/96	05/22/96	05/22/96	05/22/96	05/22/96	05/22/96	05/22/96	05/22/96	05/22/96	05/22/96	05/22/96	05/22/96	05/22/96	05/22/96	05/22/96	05/22/96	05/22/96	05/22/96	05/22/96	05/22/96	05/22/96
Volatiles Organics	CRDL	Result	Q																		
Chloromethane	10	5.0 U		5.0 U		5.0 U		5.0 U													
Vinyl Chloride	10	5.0 U		5.0 U		5.0 U		5.0 U													
Bromomethane	10	5.0 U		5.0 U		5.0 U		5.0 U													
Chloroethane	10	5.0 U		5.0 U		5.0 U		5.0 U													
Tetrahydrofuran	10	5.0 U		5.0 U		5.0 U		5.0 U													
Acetone	10	10 U		6.2 J		16 J															
1,1-Dichloroethene	10	5.0 U		5.0 U		5.0 U		5.0 U													
Carbon Disulfide	10	5.0 U		5.0 U		5.0 U		5.0 U													
Methylene Chloride	10	5.0 U		5.0 U		5.0 U		5.0 U													
trans-1,2-Dichloroethene	10	5.0 U		5.0 U		5.0 U		5.0 U													
Vinyl Acetate	10	10 U		10 U		10 U		10 U													
1,1-Dichloroethane	10	5.0 U		5.0 U		5.0 U		5.0 U													
2-Butanone	10	10 U		10 U		5.4 J															
cis-1,2-Dichloroethene	10	5.0 U		5.0 U		5.0 U		5.0 U													
Chloroform	10	5.0 U		5.0 U		5.0 U		5.0 U													
1,1,1-Trichloroethane	10	5.0 U		5.0 U		5.0 U		5.0 U													
Carbon Tetrachloride	10	5.0 U		5.0 U		5.0 U		5.0 U													
1,2-Dichloroethane	10	5.0 U		5.0 U		5.0 U		5.0 U													
Benzene	10	5.0 U		5.0 U		5.0 U		5.0 U													
Toluene	10	7.7 J		11 J		5.0 U															
1,2-Dichloropropane	10	5.0 U		5.0 U		5.0 U		5.0 U													
Bromochloroethane	10	5.0 U		5.0 U		5.0 U		5.0 U													
2-Chloroethoxyethyl ether	10	20 U		20 U		20 U		20 U													
4-Methyl-2-pentanone	10	10 U		10 U		10 U		10 U													
cis-1,3-Dichloropropene	10	5.0 U		5.0 U		5.0 U		5.0 U													
Toluene	10	5.0 U		5.0 U		5.0 U		5.0 U													
trans-1,3-Dichloropropene	10	10 U		10 U		10 U		10 U													
2-Hexanone	10	10 U		10 U		10 U		10 U													
1,1,2-Trichloroethane	10	5.0 U		5.0 U		5.0 U		5.0 U													
Tetrachloroethane	10	5.0 U		5.0 U		5.0 U		5.0 U													
Dibromochloroethane	10	5.0 U		5.0 U		5.0 U		5.0 U													
Chlorobenzene	10	5.0 U		5.0 U		5.0 U		5.0 U													
Bibenzene	10	5.0 U		5.0 U		5.0 U		5.0 U													
m,p-Xylene	10	5.0 U		5.0 U		5.0 U		5.0 U													
o-Xylene	10	5.0 U		5.0 U		5.0 U		5.0 U													
Styrene	10	5.0 U		5.0 U		5.0 U		5.0 U													
Bromoforn	10	5.0 U		5.0 U		5.0 U		5.0 U													
1,1,2-Trichloroethane	10	5.0 U		5.0 U		5.0 U		5.0 U													
1,3-Dichlorobenzene	10	5.0 U		5.0 U		5.0 U		5.0 U													
1,4-Dichlorobenzene	10	5.0 U		5.0 U		5.0 U		5.0 U													
1,2-Dichlorobenzene	10	5.0 U		5.0 U		5.0 U		5.0 U													

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# LOCKHEED ANALYTICAL SERVICES

GC/MS FOR VOLATILE ORGANICS  
8240 VOLATILES

Client Sample ID:	BOHG54	LAL Sample ID:	L7102-3
Date Collected:	22-MAY-96	Date Received:	24-MAY-96
Date Analyzed:	02-JUN-96	Analytical Dilution:	1
Matrix:	Water	Analytical Batch ID:	060296-8260-E1
		Preparation Dilution:	1.00

SURROGATE	RECOVERY	QC LIMITS
1,2-Dichloroethane-d4	117%	84-122
Toluene-d8	116%	87-117
Bromofluorobenzene	115%	83-118

CONSTITUENT	CAS NO.	RESULT ug/L	PRACTICAL QUANTITATION LIMIT ug/L	DATA QUALIFIER(S)
Chloromethane	74-87-3	<5.0	5.0	
Vinyl Chloride	75-01-4	<5.0	5.0	
Bromomethane	74-83-9	<5.0	5.0	
Chloroethane	75-00-3	<5.0	5.0	
Trichlorofluoromethane	75-69-4	<5.0	5.0	
Acetone	67-64-1	<10.	10.	
1,1-Dichloroethene	75-35-4	<5.0	5.0	
Carbon Disulfide	75-15-0	<5.0	5.0	
Methylene Chloride	75-09-2	<5.0	5.0	
trans-1,2-Dichloroethene	156-60-5	<5.0	5.0	
Vinyl Acetate	108-05-4	<10.	10.	
1,1-Dichloroethane	75-34-3	<5.0	5.0	
2-Butanone	78-93-3	<10.	10.	
cis-1,2-Dichloroethene	156-59-2	<5.0	5.0	
Chloroform	67-66-3	<5.0	5.0	
1,1,1-Trichloroethane	71-55-6	<i>1.3</i> <del>5.0</del>	5.0	BJ
Carbon tetrachloride	56-23-5	<5.0	5.0	
1,2-Dichloroethane	107-06-2	<5.0	5.0	
Benzene	71-43-2	<5.0	5.0	
Trichloroethene	79-01-6	7.7	5.0	J
1,2-Dichloropropane	78-87-5	<5.0	5.0	
Bromodichloromethane	75-27-4	<5.0	5.0	
2-Chloroethylvinylether	110-75-8	<20.	20.	
4-Methyl-2-Pentanone	108-10-1	<10.	10.	
cis-1,3-Dichloropropene	10061-01-5	<5.0	5.0	
Toluene	108-88-3	<5.0	5.0	
trans-1,3-Dichloropropene	10061-02-6	<5.0	5.0	
2-Hexanone	591-78-6	<10.	10.	
1,1,2-Trichloroethane	79-00-5	<5.0	5.0	
Tetrachloroethene	127-18-4	<5.0	5.0	
Dibromochloromethane	124-48-1	<5.0	5.0	
Chlorobenzene	108-90-7	<5.0	5.0	
Ethylbenzene	100-41-4	<5.0	5.0	
m,p-Xylene	136777-61-2	<5.0	5.0	
o-Xylene	95-47-6	<5.0	5.0	
Styrene	100-42-5	<5.0	5.0	
Bromoform	75-25-2	<5.0	5.0	
1,1,2,2-Tetrachloroethane	79-34-5	<5.0	5.0	
1,3-Dichlorobenzene	541-73-1	<5.0	5.0	
1,4-Dichlorobenzene	106-46-7	<5.0	5.0	
1,2-Dichlorobenzene	95-50-1	<5.0	5.0	

*DMC*  
*8/5/96*  
*0.47%*

# LOCKHEED ANALYTICAL SERVICES

GC/MS FOR VOLATILE ORGANICS  
TENTATIVELY IDENTIFIED COMPOUNDS  
8240 VOLATILES

Client Sample ID: B0HG54  
Date Collected: 22-MAY-96  
Date Analyzed: 02-JUN-96  
Matrix: Water

LAL Sample ID: L7102-3  
Date Received: 24-MAY-96  
Analytical Dilution: 1  
Analytical Batch ID: 060296-8260-E1  
Preparation Dilution: 1.00

CONCENTRATION UNITS:

Number of TICs found: 0

(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					
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28					
29					

*OK 8/5/96*  
*044*

# LOCKHEED ANALYTICAL SERVICES

GC/MS FOR VOLATILE ORGANICS  
8240 VOLATILES

Client Sample ID: B0HG55	LAL Sample ID: L7102-8
Date Collected: 22-MAY-96	Date Received: 24-MAY-96
Date Analyzed: 02-JUN-96	Analytical Dilution: 1
Matrix: Water	Analytical Batch ID: 060296-8260-E1
	Preparation Dilution: 1.00

SURROGATE	RECOVERY	QC Limits
1,2-Dichloroethane-d4	117%	84-122
Toluene-d8	114%	87-117
Bromofluorobenzene	113%	83-118

CONSTITUENT	CAS NO.	RESULT	PRACTICAL QUANTIFICATION LIMIT	DATA QUALIFIER(S)
		ug/L	ug/L	
Chloromethane	74-87-3	<5.0	5.0	
Vinyl Chloride	75-01-4	<5.0	5.0	
Bromomethane	74-83-9	<5.0	5.0	
Chloroethane	75-00-3	<5.0	5.0	
Trichlorofluoromethane	75-69-4	<5.0	5.0	
Acetone	67-64-1	6.2	10.	J-off
1,1-Dichloroethene	75-35-4	<5.0	5.0	
Carbon Disulfide	75-15-0	<5.0	5.0	
Methylene Chloride	75-09-2	<5.0	5.0	
trans-1,2-Dichloroethene	156-60-5	<5.0	5.0	
Vinyl Acetate	108-05-4	<10.	10.	
1,1-Dichloroethane	75-34-3	<5.0	5.0	
2-Butanone	78-93-3	<10.	10.	
cis-1,2-Dichloroethene	156-59-2	<5.0	5.0	
Chloroform	67-66-3	<5.0	5.0	
1,1,1-Trichloroethane	71-55-6	1.4* <5.0	5.0	BJ
Carbon tetrachloride	56-23-5	<5.0	5.0	
1,2-Dichloroethane	107-06-2	<5.0	5.0	
Benzene	71-43-2	<5.0	5.0	J
Trichloroethene	79-01-6	11.	5.0	
1,2-Dichloropropane	78-87-5	<5.0	5.0	
Bromodichloromethane	75-27-4	<5.0	5.0	
2-Chloroethylvinylether	110-75-8	<20.	20.	
4-Methyl-2-Pentanone	108-10-1	<10.	10.	
cis-1,3-Dichloropropene	10061-01-5	<5.0	5.0	
Toluene	108-88-3	<5.0	5.0	
trans-1,3-Dichloropropene	10061-02-6	<5.0	5.0	
2-Hexanone	591-78-6	<10.	10.	
1,1,2-Trichloroethane	79-00-5	<5.0	5.0	
Tetrachloroethene	127-18-4	<5.0	5.0	
Dibromochloromethane	124-48-1	<5.0	5.0	
Chlorobenzene	108-90-7	<5.0	5.0	
Ethylbenzene	100-41-4	<5.0	5.0	
m,p-Xylene	136777-61-2	<5.0	5.0	
o-Xylene	95-47-6	<5.0	5.0	
Styrene	100-42-5	<5.0	5.0	
Bromoform	75-25-2	<5.0	5.0	
1,1,2,2-Tetrachloroethane	79-34-5	<5.0	5.0	
1,3-Dichlorobenzene	541-73-1	<5.0	5.0	
1,4-Dichlorobenzene	106-46-7	<5.0	5.0	
1,2-Dichlorobenzene	95-50-1	<5.0	5.0	

JRB  
8/5/96  
0-476

# LOCKHEED ANALYTICAL SERVICES

GC/MS FOR VOLATILE ORGANICS  
TENTATIVELY IDENTIFIED COMPOUNDS  
8240 VOLATILES

Client Sample ID:	B0HG55	LAL Sample ID:	L7102-8
Date Collected:	22-MAY-96	Date Received:	24-MAY-96
Date Analyzed:	02-JUN-96	Analytical Dilution:	1
Matrix:	Water	Analytical Batch ID:	060296-8260-E1
		Preparation Dilution:	1.00

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

Number of TICs found: 0

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
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29					

# LOCKHEED ANALYTICAL SERVICES

GC/MS FOR VOLATILE ORGANICS  
8240 VOLATILES

Client Sample ID: B0HG61	LAL Sample ID: L7102-13
Date Collected: 22-MAY-96	Date Received: 24-MAY-96
Date Analyzed: 02-JUN-96	Analytical Dilution: 1
Matrix: Water	Analytical Batch ID: 060296-8260-E1
	Preparation Dilution: 1.00

SURROGATE	RECOVERY	QC Limits
1,2-Dichloroethane-d4	119%	84-122
Toluene-d8	117%	87-117
Bromofluorobenzene	116%	83-118

CONSTITUENT	CAS NO	RESULT ug/L	PRACTICAL QUANTITATION LIMIT ug/L	DATA QUALIFIER(S)
Chloromethane	74-87-3	<5.0	5.0	
Vinyl Chloride	75-01-4	<5.0	5.0	
Bromomethane	74-83-9	<5.0	5.0	
Chloroethane	75-00-3	<5.0	5.0	
Trichlorofluoromethane	75-69-4	<5.0	5.0	
Acetone	67-64-1	16.	10.	J
1,1-Dichloroethene	75-35-4	<5.0	5.0	
Carbon Disulfide	75-15-0	<5.0	5.0	
Methylene Chloride	75-09-2	<5.0	5.0	
trans-1,2-Dichloroethene	156-60-5	<5.0	5.0	
Vinyl Acetate	108-05-4	<10.	10.	
1,1-Dichloroethane	75-34-3	<5.0	5.0	
2-Butanone	78-93-3	5.4	10.	J BOP
cis-1,2-Dichloroethene	156-59-2	<5.0	5.0	
Chloroform	67-66-3	<5.0	5.0	
1,1,1-Trichloroethane	71-55-6	<5.0	5.0	
Carbon tetrachloride	56-23-5	<5.0	5.0	
1,2-Dichloroethane	107-06-2	<5.0	5.0	
Benzene	71-43-2	<5.0	5.0	
Trichloroethene	79-01-6	<5.0	5.0	
1,2-Dichloropropane	78-87-5	<5.0	5.0	
Bromodichloromethane	75-27-4	<5.0	5.0	
2-Chloroethylvinylether	110-75-8	<20.	20.	
4-Methyl-2-Pentanone	108-10-1	<10.	10.	
cis-1,3-Dichloropropene	10061-01-5	<5.0	5.0	
Toluene	108-88-3	<5.0	5.0	
trans-1,3-Dichloropropene	10061-02-6	<5.0	5.0	
2-Hexanone	591-78-6	<10.	10.	
1,1,2-Trichloroethane	79-00-5	<5.0	5.0	
Tetrachloroethene	127-18-4	<5.0	5.0	
Dibromochloromethane	124-48-1	<5.0	5.0	
Chlorobenzene	108-90-7	<5.0	5.0	
Ethylbenzene	100-41-4	<5.0	5.0	
m,p-Xylene	136777-61-2	<5.0	5.0	
o-Xylene	95-47-6	<5.0	5.0	
Styrene	100-42-5	<5.0	5.0	
Bromoform	75-25-2	<5.0	5.0	
1,1,2,2-Tetrachloroethane	79-34-5	<5.0	5.0	
1,3-Dichlorobenzene	541-73-1	<5.0	5.0	
1,4-Dichlorobenzene	106-46-7	<5.0	5.0	
1,2-Dichlorobenzene	95-50-1	<5.0	5.0	

8/3/96

07

# LOCKHEED ANALYTICAL SERVICES

GC/MS FOR VOLATILE ORGANICS  
TENTATIVELY IDENTIFIED COMPOUNDS  
8240 VOLATILES

Client Sample ID: B0HG61  
Date Collected: 22-MAY-96  
Date Analyzed: 02-JUN-96  
Matrix: Water

LAL Sample ID: L7102-13  
Date Received: 24-MAY-96  
Analytical Dilution: 1  
Analytical Batch ID: 060296-8260-E1  
Preparation Dilution: 1.00

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

Number of TICs found: 0

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1					
2					
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29					

*pkc*  
8/5/96

**Appendix 4**

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

LOCKHEED MARTIN 

July 9, 1996

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

RE: Log-in No.: L7102  
Quotation No.: Q400000-B  
SAF: B96-109  
Document File No.: 0524596  
BHI Document File No.: 371  
SDG No.: LK7102



The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on 24 May 1996.

The temperature of the cooler upon receipt was 4°C. Sample containers received agree with the chain-of-custody documentation. Sample containers were received intact. Samples designated for nitrate analysis were not received in time to meet the analytical holding time requirements. The vials for volatile analyses did not contain headspace.

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) 375-4741.

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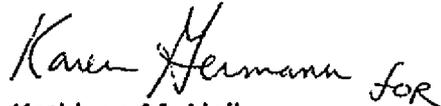
**Lockheed Analytical Services**

Log-in No.: L7102  
Quotation No.: Q400000-B  
SAF: B96-109  
Document File No.: 0524596  
BHI Document File No.:371  
SDG No.: LK7102  
Page1

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

" I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manger or a designee, as verified by the following signature."

Sincerely,



Kathleen M. Hall  
Client Services Representative

cc: Client Services  
Document Control

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04

**CASE NARRATIVE  
INORGANIC NON METALS ANALYSES**

The routine calibration and quality control analyses performed for this batch include as applicable: initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), matrix spike (predigestion) sample(s), duplicate sample(s).

**Preparation and Analysis Requirements**

- Two water samples were received for LK7102 and analyzed in batch 524 bh for selected analytes as requested on the chain of custody. Quality control analysis was performed on the following samples:

Client ID	LAL #		Method
BOHG54	L7102-18	MS, DUP	Nitrate as Nitrogen

**Holding Time Requirements**

- All samples were received and analyzed outside of the method-specific holding times. The 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 5, 1996  
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**

All samples were received on May 24, 1996. The samples were logged in as L7102 and were prepared and analyzed in batch 524 bh. The samples were analyzed by Method 6010A ICP Metals.

**Holding Time Requirements**

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

**Method Blanks**

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

**Internal Quality Control**

- All Internal Quality Control were within acceptance limits.

Shellee McGrath  
Prepared By

June 18, 1996  
Date

**CASE NARRATIVE  
ORGANIC ANALYSES**

**Analytical Method 8240 Volatile Organics**

The associated samples were analyzed in one analytical batch. All instrument tunes, initial and continuing calibrations were within QC criteria. The surrogate recoveries were within QC limits for all samples. All internal standard area counts and retention times were within QC limits.

*Analytical Batch 060296-8260-E-1 (water)*

**Note:** Sample BOHG54 (L7102-3) was the native sample used for the MS and MSD analyzed as part of this analytical batch.

The samples were analyzed within holding time on June 2, 1996. The target compounds Chloromethane(2.3 ug/L), 2-Butanone(4.5 ug/L) and 1,1,1-Trichloroethane(1.2 ug/L) were detected in the Method Blank at concentrations below the Practical Quantitation Limits. Also detected was an unknown Tentatively Identified Compound at a retention time of 8.51 minutes. If detected in any of the associated samples, these compounds will be flagged with a "B" qualifier. The spiked compound recoveries were within QC limits in the MS, MSD and LCS. The RPDs between the spiked compound recoveries in the MS and MSD were all within the QC limits.

Donald A. Hilke  
Prepared By

July 9, 1996  
Date

Bechtel Hanford, Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

**L7102**

Data Turnaround  
 Priority  
 Normal

Collector <i>A. Rizzo / M. Mehler</i>	Company Contact C. J. Kemp	Telephone (509) 372-9692
Project Designation Horn Rapids Landfill Groundwater Sampling	Sampling Location Horn Rapids Landfill	SAF No. B96-109
Ice Chest No. <i>CL-08</i>	Field Logbook No. <i>ERL 1096-2</i>	Method of Shipment Hand Delivered
Shipped To Lockhead	Offsite Property No. <i>W96-0-0640-46</i>	Bill of Lading/Air Bill No. <i>2904657109</i>

Possible Sample Hazards/Remarks	Preservation	HCl	HNO3	Cool 4°C	Cool 4°C
	Type of Container	aGs	P	P	P
	No. of Container(s)	5	1	1	1
Special Handling and/or Storage Maintain samples between 2°C and 8°C.	Volume	40mL	500mL	500mL	20mL
SAMPLE ANALYSIS	VOA - 8240A (TCL)	ICP Metals - 8010A (SW-846) - Chromium	IC Anions - 300.0 - Nitrate	Activity Scan	

Sample No.	Matrix*	Date Sampled	Time Sampled				
BOHG54	W	5-22-96	0906	X	X	X	X
BOHG61	W	5-22-96	0730	X			
BOHG55	W	5-22-96	1025	X	X	X	X

CHAIN OF POSSESSION	Sign/Print Names
Relinquished By <i>Grant</i> Date/Time <i>5-22-96</i>	Received By <i>K. T. [Signature]</i> Date/Time <i>5/22/96</i>
Relinquished By <i>Marty Mehler</i> Date/Time <i>0830</i>	Received By <i>[Signature]</i> Date/Time <i>0830</i>
Relinquished By <i>K. T. [Signature]</i> Date/Time <i>5/23/96</i>	Received By <i>[Signature]</i> Date/Time <i>5-23-96</i>
Relinquished By <i>[Signature]</i> Date/Time <i>0906</i>	Received By <i>[Signature]</i> Date/Time
Relinquished By <i>[Signature]</i> Date/Time <i>5-23-96</i>	Received By <i>[Signature]</i> Date/Time

**SPECIAL INSTRUCTIONS**  
 The ERC Contractor acknowledges that the 48-hour holding time for nitrate is not likely achievable.  
 The Activity Scan is for all samples listed on this chain of custody.

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

LABORATORY SECTION	Received By <i>[Signature]</i>	Title <i>Sample Custodian</i>	Date/Time <i>5-24-96</i>
FINAL SAMPLE	Disposal Method	Disposed By	Date/Time <i>0845</i>

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**Appendix 5**  
**Data Validation Supporting Documentation**

GC/MS ORGANIC DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	<b>C</b>	D	E
PROJECT: Horn Rapids landfill	DATA PACKAGE: LK 7102 - LAS				
VALIDATOR: <i>me</i>	LAB: LAS		DATE: 29 July 96		
CASE:			SDG: LK 7102 - LAS		
ANALYSES PERFORMED					
<input type="checkbox"/> CLP Volatiles	<input checked="" type="checkbox"/> SW-846 8240 (cap column)	<input type="checkbox"/> SW-846 8260 (packed column)	<input type="checkbox"/> CLP Semivolatiles	<input type="checkbox"/> SW-846 8270 (cap column)	<input type="checkbox"/> SW-846 (packed column)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SAMPLES/MATRIX <i>Water</i>					
<i>BOHGS4, BOHGS5 BOHGU1</i>					

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

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

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

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

\_\_\_\_\_

\_\_\_\_\_

2. HOLDING TIMES

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

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

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*A-1/e*

GC/MS ORGANIC DATA VALIDATION CHECKLIST

3. INSTRUMENT TUNING AND CALIBRATION

Is the GC/MS tuning/performance check acceptable? . . . . . Yes No N/A

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

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

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

\_\_\_\_\_

\_\_\_\_\_

4. BLANKS

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

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

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

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

Comments: 1,1,1-trichloroethane in MB 1) - G54 + G55

\_\_\_\_\_

\_\_\_\_\_

5. ACCURACY

Were surrogates/System Monitoring Compounds analyzed? . . . . . Yes No N/A

Are surrogate/System Monitoring Compound recoveries acceptable? Yes No N/A

Were MS/MSD samples analyzed? . . . . . Yes No N/A

Are MS/MSD results acceptable? . . . . . Yes No N/A

Comments: TCE - Surrogate above QC limit J - G54 + G55

Acetone " " " " J - 55, 61

2 Butanes " " " " J - 61

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*[Handwritten signature]*

GC/MS ORGANIC DATA VALIDATION CHECKLIST

6. PRECISION

Are MS/MSD RPD values acceptable? . . . . .  Yes No  N/A  
Are field duplicate RPD values acceptable? . . . . .  Yes No  N/A  
Are field split RPD values acceptable? . . . . .  Yes No  N/A

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

7. SYSTEM PERFORMANCE

Were internal standards analyzed? . . . . .  Yes  No  N/A  
Are internal standard areas acceptable? . . . . .  Yes  No  N/A  
Are internal standard retention times acceptable? . . . . .  Yes  No  N/A

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

8. COMPOUND IDENTIFICATION AND QUANTITATION

Is compound identification acceptable? . . . . .  Yes  No  N/A  
Is compound quantitation acceptable? . . . . .  Yes  No  N/A

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

9. REPORTED RESULTS AND QUANTITATION LIMITS

Are results reported for all requested analyses? . . . . .  Yes  No  N/A  
Are all results supported in the raw data? . . . . .  Yes  No  N/A  
Do results meet the CRQLs? . . . . .  Yes  No  N/A  
Has the laboratory properly identified and coded all TIC? . . . Yes  No  N/A

Comments: ~~CR~~ 2 chloroethyl ether over  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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