

START 9713509.0989

LK3604 225
0045995 2



Lockheed Analytical Services

Ms. Joan Kessner
Bechtel Hanford, Inc.
345 Hill
Richland, WA 99352

ANALYTICAL DATA REPORT
FOR

METALS, ANIONS, TURBIDITY,
AND RADIOCHEMISTRY



LOG-IN NUMBER:	<u>L3604/L3628</u>
QUOTATION NUMBER:	<u>Q400000-B</u>
SAF:	<u>94-125</u>
DOCUMENT FILE NUMBER:	<u>0110596/</u> <u>0113596</u>
WHC DOCUMENT CONTROL NO.	<u>148</u>
SDG NUMBER:	<u>LK3604</u>

**Environmental Systems & Technologies Co.**

Lockheed Analytical Services
975 Kelly Johnson Drive
Las Vegas, Nevada 89119-3705

Phone: (702) 361-0220
Phone: (800) 582-7605
Fax: (702) 361-8146

February 13, 1995

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

RE:	Log-in No.:	L3604/L3628
	Quotation No.:	Q400000-B
	SAF:	94-125
	Document File No.:	0110596/0113596
	WHC Document Control No:	148
	SDG No.:	LK3604

L3604- The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on 10 January 1995. The temperature of the cooler upon receipt was 4°C. Sample containers received agree with the chain-of-custody documentation. Sample containers were received intact. Samples were received in time to meet the analytical holding time requirements.

L3628- The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on 13 January 1995. The temperature of the cooler upon receipt was 4°C. Sample containers received agree with the chain-of-custody documentation. Sample containers were received intact. Samples were received in time to meet the analytical holding time requirements.

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

A list of data qualifiers, chain-of-custody forms, sample receiving checklist, and log-in report are also enclosed representing the samples received within this group. If you have any questions concerning the analysis or the data please call Kathleen Hall at (509) 943-4423.

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,

for Kathleen M. Hall
Client Services Representative

cc: Client Services
Document Control

Lockheed Analytical Services

Log-in No.: L3604/L3628

Quotation No.: Q400000-B

SAF: 94-125

Document File No.: 0110596/0113596

WHC Document Control No.: 148

SDG No.: LK3604

**CASE NARRATIVE
INORGANIC NON-METALS ANALYSES
WATER**

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 sample(s), and duplicate sample(s).

Preparation and Analysis Requirements

- Two water samples were received for LK3604 and prepared as batches 110WH and 113WH and analyzed for selected analytes as requested on the chain of custody.

Batch 110:

Client ID	LAL #		Method
BODM25	L3604-4	DUP,MS	180.1 Turbidity
	L3604-3	DUP,MS	300.0 Anions, 300.0 Fluoride, 300.0 Phosphate

Batch 113:

Client ID	LAL #		Method
BODM27	L3628-4	DUP,MS	180.1 Turbidity
	L3628-3	DUP,MS	300.0 Anions, 300.0 Fluoride, 300.0 Phosphate

Holding Time Requirements

- Batch 110WH:** The samples for Method 180.1 Turbidity, and Method 300.0 Nitrate-Nitrite-Nitrogen, Nitrite and Phosphate were received from the client out of holding time. Analyses proceeded at the direction of the client and the applicable samples are flagged with an "H".

Batch 113WH: All samples were received within the specified holding times.

Lockheed Analytical Services

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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

January 25, 1995

Prepared By _____

Date _____

Lockheed Analytical Services

Log-in No.: L3604/L3628

Quotation No.: Q400000-B

SAF: 94-125

Document File No.: 0110596/0113596

WHC Document Control No.: 148

SDG No.: LK3604

**CASE NARRATIVE
INORGANIC METALS ANALYSES
WATER**

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

Preparation and Analysis Requirements

- Two water samples were received in good condition on January 10, 13, 1995 and logged in as L3604.
- The samples were prepared as LAS Batch 110WHT and analyzed for selected analytes as requested on the chain of custody. Sample BODM25 (L3604-2) was used for matrix spike and duplicate, post-digestion spike and serial dilution. All data flags due to the performance of the above-mentioned QC are associated with every sample digested with this batch.

Holding Time Requirements

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

Method Blanks

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

Internal Quality Control

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

- The matrix spike recovered outside the control limits for selenium. However, the acceptable recovery for the water LCS (prep blank spiked) for selenium indicated that the analytical system was operating correctly and that the out-of-control recovery may be attributed to matrix interferences.

Hongsheng LI

2/6/95

Prepared By

Date

Lockheed Analytical Services

Log-in No.: L3604/L3628

Quotation No.: Q400000-B

SAF: 94-125

Document File No.: 0110596/0113596

WHC Document Control No.: 148

SDG No.: LK3604

**CASE NARRATIVE
INORGANIC METALS ANALYSES
FILTERED WATER**

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

Preparation and Analysis Requirements

- Two water samples were received in good condition on January 10, 13, 1995 and logged in as L3604.
- The samples were prepared as LAS Batch 110WHD and analyzed for selected analytes as requested on the chain of custody. Sample BODM26 (L3604-10) was used for matrix spike and duplicate, post-digestion spike and serial dilution. All data flags due to the performance of the above-mentioned QC are associated with every sample digested with this batch.

Holding Time Requirements

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

Method Blanks

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

Internal Quality Control

All internal quality control were within acceptance limits.

Hongsheng LI

2/6/95

Prepared By

Date

Lockheed Analytical Services

Log-in No.: L3604/L3628
Quotation No.: Q400000-B
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CASE NARRATIVE RADIOCHEMICAL ANALYSES

The routine calibration and quality control analyses performed for this batch include as applicable: instrument calibration, initial and continuing calibration verification, quench monitoring standards, instrument background analysis, method blanks, yield tracer, laboratory control samples, matrix spike samples, duplicate samples.

Holding Time Requirements

All holding time requirements were met.

Initial Calibration Data: The initial calibration data for the alpha spec 1 counters, gross alpha beta (gas proportional counter) and tritium (liquid scintillation) were sent with report SDG# LK31 (LAS ID# L3551, Document Control No. 1222596), and are therefore not included in this report. The Carbon-14 (liquid scintillation) initial calibration is included in this report (SDG #LK3604).

Analytical Method

Carbon-14

The carbon-14 analysis was performed using LAL-91-SOP-0209. Sample #BODM27 (L3628-9) showed possible C-14 contamination on a direct analysis of the water; it was reanalyzed using a chemical evolution of CO₂ gas with the gas trapped for analysis. On the separated sample, the sample results agreed with the direct analysis, and was reported. The duplicate on the separated carbon-14 analysis (batch 18400) was low, indicating that the CO₂ was not trapped. All other QC criteria were met on both batches.

Gross Alpha Beta

The gross alpha beta analysis was performed using LAL-91-SOP-0060. No problems were encountered during analysis. All QC criteria were met.

Tritium

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

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Lockheed Analytical Services

Log-in No.: L3604/L3628
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SDG No.: LK3604

Uranium-Isotopic

The uranium isotopic analysis was performed using LAL-91-SOP-0108. The sample duplicate analysis was out of limits for U-235; however, because U-234 and -238 were within limits, the data is considered acceptable. All other QC criteria were met.

Yvonne M. Jacoby
Prepared By

February 13, 1995
Date

9713509.0998

LOGIN CHAIN OF CUSTODY REPORT (ln01)
Jan 10 1995, 12:15 pm

Login Number: L3604
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
L3604-1 TEMP 4 Location: 156TMP-3 Water 1 S SCREENING	BODM25	06-JAN-95	10-JAN-95	14-FEB-95
		Hold:05-JUL-95		
L3604-2 TEMP 2 Location: 156TMP-3 Water 1 S CLP FURNACE Water 1 S CLP ICP	BODM25	06-JAN-95	10-JAN-95	14-FEB-95
		Hold:05-JUL-95		
		Hold:05-JUL-95		
L3604-3 TEMP 4 Location: 156TMP-3 Water 1 S 300.0 CHLORIDE Water 1 S 300.0 FLUORIDE Water 1 S 300.0 NITRATE Water 1 S 300.0 NITRITE Water 1 S 300.0 PHOSPHATE Water 1 S 300.0 SULFATE	BODM25	06-JAN-95	10-JAN-95	14-FEB-95
		Hold:03-FEB-95		
		Hold:03-FEB-95		
		Hold:08-JAN-95		
		Hold:08-JAN-95		
		Hold:08-JAN-95		
		Hold:03-FEB-95		
L3604-4 TEMP 4 Location: 156TMP-3 Water 1 S 180.1 TURBIDITY	BODM25	06-JAN-95	10-JAN-95	14-FEB-95
		Hold:08-JAN-95		
L3604-5 TEMP 2 Location: 156TMP-3 Water 1 S GR ALP/BETA LAL-0060	BODM25	06-JAN-95	10-JAN-95	14-FEB-95
		Hold:05-JUL-95		
L3604-6 TEMP 2 Location: 156TMP-3	BODM25	06-JAN-95	10-JAN-95	14-FEB-95
L3604-7 TEMP 4 Location: 156TMP-3 Water 1 S U-ISOTOPIC LAL-0108	BODM25	06-JAN-95	10-JAN-95	14-FEB-95
		Hold:05-JUL-95		
L3604-8 TEMP 2 Location: 156TMP-3	BODM25	06-JAN-95	10-JAN-95	14-FEB-95

01105

9713509.0999

LOGIN CHAIN OF CUSTODY REPORT (ln01)
Jan 10 1995, 12:15 pm

Login Number: L3604
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
L3604-9 TEMP 2 Location: 156TMP-3 Water 1 S C-14 LAL-0209 Water 1 S TRITIUM(H3) LAL-0066	BODM25	06-JAN-95 Hold:05-JUL-95 Hold:05-JUL-95	10-JAN-95	14-FEB-95
L3604-10 TEMP 2 Location: 156TMP-3 Filt H20 15 S CLP FURNACE Filt H20 15 S CLP ICP	BODM26	06-JAN-95 Hold:05-JUL-95 Hold:05-JUL-95	10-JAN-95	14-FEB-95
L3604-11 Location: Water 1 S EDD - DISK DEL. Water 1 S INORG TYPE 4A RPT	REPORT TYPE	10-JAN-95	10-JAN-95	14-FEB-95

Signature:

Paul Davis

Date:

1-10-95

14

011052

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST L3604

Page 1 of 1

Date Turnaround

Priority
 Normal

Collector SIMPSON	Company Contact R.E. Peterson	Telephone No. (509) 372-9638
Project Designation 100-KR-4 Groundwater Sampling-Round 7	Sampling Location 100 K	SAF No. B94-125
Ice Chest No. 6WS-046	Field Logbook No. EFL-1160	Method of Shipment Federal Express
Shipped To Lockheed	Offsite Property No. W95-0-161-9	Bill of Lading/Air Bill No. 2904615971

Possible Sample Hazards/Remarks	Preservative	HNO3	COOL 4C	COOL 4C	HNO3	COOL 4C	COOL 4C	HNO3							
		Type of Container	G	G	P	G	G	P	G						
	No. of Container(s)	1	1	1	4	1	1	1							
Special Handling and/or Storage Maintain between 2 C and 4 C.	Volume	1L	500ml	250ml	1L	1L	20ml	1L							
SAMPLE ANALYSIS	METALS-TAL														
	UNFIL-TERED														
			ANTONS-F, Cl, SO4, PO4, NO2, NO3	TURBID-ITY	GROSS ALPHA, GROSS BETA, U-234, 235/238	C-14, TRITIUM	ACTIVI-SCAN								

Sample No.	Matrix*	Date Sampled	Time Sampled												
BODM25	W	1/6/95	1104	X	X	X	X	X	X						
BODM26	W	1/6/95	1104							X					

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS	Matrix*		
Relinquished By <i>AJ Simpson</i>	Date/Time 1/6/95	Received By <i>ERC</i>	Date/Time 1400	Standalone Data Deliverable Sample analysis for NO2, NO3, and PO4 by EPA 300.0 and turbidity by EPA 180.1 are being requested for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met. The Activity Scan is for both sample numbers. Stored in FR-6 #3	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>AJ Simpson</i>	Date/Time 1/6/95	Received By <i>Eric Peterson</i>	Date/Time 1-6-95		
Relinquished By <i>ERC</i>	Date/Time 0845	Received By <i>Eric Peterson</i>	Date/Time 1-9-95		
Relinquished By <i>Eric Peterson</i>	Date/Time 1-9-95	Received By	Date/Time		
Relinquished By <i>ERC</i>	Date/Time	Received By	Date/Time		
LABORATORY SECTION	Received By <i>Al Miller</i>	Title <i>Sample Custodian</i>	Date/Time 1-10-95 / 0830		
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time		

02/25/99 1000

11010

9713509.1001

AMPLE STATUS REPORT FOR N 4255. RAD SCREEN 69970-68 TIME: 1/ 9/95 7:
DISPATCHED: 12/28/94 13:15 SAMPLE HAS NOT BEEN SLURPED PAGE
RECEIVED: 1/ 9/95 7:50

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARG CODE
****	*****	*****	***	***	*****
4271	TOT-ACT	< 5.00000E 01 pci/G	N	Y	XR544

END OF REPORT

PRESS ANY KEY TO CONTINUE

*BODM25
BODM26*

9713509.1002

MESSAGE CONFIRMATION

SESSION NO. = 391

01/10/95 09:31
ID=LOCKHEED LAB SAMPLE RECEIVING

DATE	TIME	S,R-TIME	DISTANT STATION ID	MODE	PAGES	RESULT
01/10	09:30	01'10"	5099434218	G3 -S	01	OK 0000

Figure 1

SAMPLE CHECK-IN LIST

(1 Per Shipping Container)

Date/Time Received 1-10-95 / 0830 Client Name Westinghouse/Hanford
 Project/Client # SAF # B94-125 Batch or Case # N/A
 Cooler ID (if noted on outside of cooler) N/A

1. Condition of shipping container? good
2. Custody Seals on cooler intact? Yes No []
3. Custody Seals dated and signed? Yes No []
4. Chain of Custody record is taped on inside of cooler lid? Yes No []
5. Vermiculite/packing material is: Wet [] Dry
6. Each sample is in a plastic bag? Yes No []
7. Number of sample containers in cooler: 10
8. Samples have:

<input type="checkbox"/> tape	<input type="checkbox"/> hazard labels
<input checked="" type="checkbox"/> custody seals	<input type="checkbox"/> appropriate sample labels
9. Samples are:

<input checked="" type="checkbox"/> in good condition	<input type="checkbox"/> leaking
<input type="checkbox"/> broken	<input type="checkbox"/> have air bubbles
<input type="checkbox"/> other	
10. Coolant Present? Yes No [] Sample Temperature 4°C
11. The following paperwork should be accounted for (N/A if not applicable):

Chain of Custody #(s) N/A

Request for Analysis #(s) N/A

Airbill # 290 4615 971 Carrier FedEx
12. Have any anomalies been identified above? Yes [] No [] N/A
13. Memos have been initiated for all anomalies identified above? Yes [] N/A

Printed Name/Signature PAUL C DAVIS Paul Davis Date/Time 1-10-95 8:30 AM

Sample Login

Login Review Checklist

Lot Number L3604

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

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

Sample Summary Report

Yes No

N/A

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

Login Chain of Custody Report

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

Sample Receiving Checklist

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

Paul Davis

1-10-95

M. M. M. M.

1-10-95

Primary review signature

Date

Secondary review signature

Date

Lockheed Analytical Services
Sample Receiving Checklist

Client Name: *Westinghouse - Hartford*

Job No. *L3604*

Cooler ID: *4/A*

COOLER CONDITION UPON RECEIPT

Temperature of cooler upon receipt: *4°C*
temperature of temp. blank upon receipt: *—*

	Yes	No	* Comments/Discrepancies
custody seals intact	X		
chain of custody present	X		
blue ice (or equiv.) present/frozen	X		
rad survey completed	X		
	X		<i>RD 1-10-95</i>

SAMPLE CONDITION UPON RECEIPT

	Yes	No	* Comments/Discrepancies
all bottles labeled	X		
samples intact	X		
proper container used for sample type	X		
sample volume sufficient for analysis	X		
proper pres. indicated on the COC	X		
VOA's contain headspace			<i>N/A</i>
are samples bi-phasic (if so, indicate sample ID'S):			<i>N/A</i>

MISCELLANEOUS ITEMS

	Yes	No	* Comments/Discrepancies
samples with short holding times	X		
samples to subcontract		X	<i>nitrate/nitrite (Passed Holding Time)</i>

ADDITIONAL COMMENTS/DISCREPANCIES

Completed by / date: *Paul C Davis 1-10-95*
Sent to the client (date/initials):
** Client's signature upon receipt:

Notes: * = contact the appropriate CSR of any discrepancies immediately upon receipt
** = please review this information and return via facsimile to the appropriate CSR (702) 361-8146

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9713509.1006

LOGIN CHAIN OF CUSTODY REPORT (ln01)
 Jan 13 1995, 02:18 pm

Login Number: L3628
 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
L3628-1 temp 4 Location: 157 Water 1	BODM27	11-JAN-95	13-JAN-95	17-FEB-95
	S SCREENING	Hold:10-JUL-95		
L3628-2 temp 4 Location: 157 Water 1	BODM27	11-JAN-95	13-JAN-95	17-FEB-95
Water 1	S CLP FURNACE	Hold:10-JUL-95		
	S CLP ICP	Hold:10-JUL-95		
L3628-3 temp 4 Location: 157 Water 1	BODM27	11-JAN-95	13-JAN-95	17-FEB-95
Water 1	S 300.0 CHLORIDE	Hold:08-FEB-95		
Water 1	S 300.0 FLUORIDE	Hold:08-FEB-95		
Water 1	S 300.0 NITRATE	Hold:13-JAN-95		
Water 1	S 300.0 NITRITE	Hold:13-JAN-95		
Water 1	S 300.0 PHOSPHATE	Hold:13-JAN-95		
Water 1	S 300.0 SULFATE	Hold:08-FEB-95		
L3628-4 temp 4 Location: 157 Water 1	BODM27	11-JAN-95	13-JAN-95	17-FEB-95
	S 180.1 TURBIDITY	Hold:13-JAN-95		
L3628-5 temp 4 Location: 157 Water 1	BODM27	11-JAN-95	13-JAN-95	17-FEB-95
Water 1	S GR ALP/BETA LAL-0060	Hold:10-JUL-95		
	S U-ISOTOPIC LAL-0108	Hold:10-JUL-95		
L3628-6 temp 4 Location: 157	BODM27	11-JAN-95	13-JAN-95	17-FEB-95
L3628-7 temp 4 Location: 157	BODM27	11-JAN-95	13-JAN-95	17-FEB-95
L3628-8 temp 4 Location: 157	BODM27	11-JAN-95	13-JAN-95	17-FEB-95

0113596

9713509.1007

LOGIN CHAIN OF CUSTODY REPORT (ln01)
Jan 13 1995, 02:18 pm

Login Number: L3628
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
L3628-9 temp 4 Location: 157	BODM27	11-JAN-95	13-JAN-95	17-FEB-9
Water 1	S C-14 LAL-0209	Hold:10-JUL-95		
Water 1	S TRITIUM(H3) LAL-0066	Hold:10-JUL-95		
L3628-10 temp 4 Location: 157	BODM28	11-JAN-95	13-JAN-95	17-FEB-9
Filt H2O 15	S CLP FURNACE	Hold:10-JUL-95		
Filt H2O 15	S CLP ICP	Hold:10-JUL-95		
L3628-11 Location:	REPORT TYPE	13-JAN-95	13-JAN-95	17-FEB-9
Water 1	S EDD - DISK DEL.			
Water 1	S INORG TYPE 4A RPT			

Signature: *M. Miller* 23
Date: 1-13-95

0113590

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Date Turnaround

Priority
 Normal

Collector *K.O. Lee*

Company Contact *R.E. Peterson*

Telephone No. (509) 372-9638

Project Designation 100-KR-4 Groundwater Sampling-Round 7

Sampling Location 100 K

SAF No. 894-125

Ice Chest No. *ER-20*

Field Logbook No. *FFL-1154*

Method of Shipment Federal Express

L3628

Shipped To Lockheed

Offsite Property No. *W95-0-161-26*

Bill of Lading/Air Bill No. *2904616373*

Possible Sample Hazards/Remarks

Preservative	HNO3	COOL 4C	COOL 4C	HNO3	COOL 4C	COOL 4C	HNO3							
Type of Container	G	G	P	G	G	P	G							
No. of Container(s)	1	1	1	4	1	1	1							

Special Handling and/or Storage Maintain between 2 C and 4 C.

Volume	1L	500ml	250ml	1L	1L	20ml	1L							

Sample Analysis	METALS-TAL	ANIONS-F, CL, SO4, PO4, NO2, NO3	TURBIDITY	GROSS ALPHA, GROSS BETA, U-234, 235/238	C-14, TRITIUM	ACTIVITY SCAN	METALS-TAL							

Sample No.	Matrix*	Date Sampled	Time Sampled											
B00M27	W	01/11/95	1803	X	X	X	X	X	X					
B00M28	W	01/11/95	1803							X				

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By <i>K.O. Lee</i>	Date/Time <i>11/11/95 1310</i>	Received By <i>[Signature]</i>	Date/Time <i>1310</i>
Relinquished By <i>[Signature]</i>	Date/Time <i>0815</i>	Received By <i>[Signature]</i>	Date/Time <i>1-11-95</i>
Relinquished By <i>[Signature]</i>	Date/Time <i>1-12-95</i>	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS
Standalone Data Deliverable
Sample analysis for NO2, NO3, and PO4 by EPA 300.0 and turbidity by EPA 180.1 are being requested for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met.
The Activity Scan is for both sample numbers.
Stored in Unit #3

- 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 *[Signature]* Title *Sample Custodian* Date/Time *1-13-95/0915*

FINAL SAMPLE DISPOSITION Disposal Method *2* Disposed By Date/Time

011355

0713509-1008

9713509.1009

SAMPLE STATUS REPORT FOR N 4237. RAD SCREEN 199-K-11 TIME: 1/12/95 7:46
 DISPATCHED: 12/28/94 13:13 SAMPLE HAS NOT BEEN SLURPED
 RECEIVED: 1/11/95 13:57

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	*****	*****	***	***	*****
4271	TOT-ACT	< 5.00000E 01 pci/G	N	Y	XR5440

END OF REPORT

BOD m27
BOD m28
1-12-95
BW

Sample Login

Login Review Checklist

Lot Number L3628

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

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

Sample Summary Report

Yes No

N/A

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

Login Chain of Custody Report

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

Sample Receiving Checklist

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

M. Miller1-13-95[Signature]

Primary review signature

Date

Secondary review signature

Date

Figure 1

SAMPLE CHECK-IN LIST

(1 Per Shipping Container)

Date/Time Received 1-13-95 / 0915 Client Name Westinghouse
 Project/Client # B94-125 Batch or Case # _____
 Cooler ID (if noted on outside of cooler) N/A

1. Condition of shipping container? good

2. Custody Seals on cooler intact? Yes No

3. Custody Seals dated and signed? Yes No

4. Chain of Custody record is taped on inside of cooler lid? Yes No

5. Vermiculite/packing material is: Wet Dry

6. Each sample is in a plastic bag? Yes No

7. Number of sample containers in cooler: 10

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

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

10. Coolant Present? Yes No Sample Temperature 4°C

11. The following paperwork should be accounted for (N/A if not applicable):
 Chain of Custody #(s) N/A
 Request for Analysis #(s) N/A
 Airbill # 2904616373 Carrier Fed X

12. Have any anomalies been identified above? Yes No N/A

13. Memos have been initiated for all anomalies identified above? Yes N/A

Printed Name/Signature Anthony Miller MM Date/Time 1-13-95 / 0915

**Lockheed Analytical Services
Sample Receiving Checklist**

Client Name: Westinghouse

Job No. L3628

Cooler ID:

COOLER CONDITION UPON RECEIPT

Temperature of cooler upon receipt:

4°C

temperature of temp. blank upon receipt:

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

SAMPLE CONDITION UPON RECEIPT

	Yes	No	* Comments/Discrepancies
all bottles labeled	<input checked="" type="checkbox"/>		
samples intact	<input checked="" type="checkbox"/>		
proper container used for sample type	<input checked="" type="checkbox"/>		
sample volume sufficient for analysis	<input checked="" type="checkbox"/>		
proper pres. indicated on the COC	<input checked="" type="checkbox"/>		
VOA's contain headspace			<u>N/A</u>
are samples bi-phasic (if so, indicate sample ID'S):			<u>N/A</u>

MISCELLANEOUS ITEMS

	Yes	No	* Comments/Discrepancies
samples with short holding times	<input checked="" type="checkbox"/>		<u>Miscute / Nitric</u>
samples to subcontract		<input checked="" type="checkbox"/>	

ADDITIONAL COMMENTS/DISCREPANCIES

Completed by / date: M. Miller 1-13-95

Sent to the client (date/initials):

** Client's signature upon receipt:

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

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

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CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

Lab Name: L.A.S. _____

Contract: BECHTEL_HA

BODM25

Lab Code: LOCK__

Case No.: 110WHT

SAS No.: _____

SDG No.: L3604W

Matrix (soil/water): WATER

Lab Sample ID: L3604-2__

Level (low/med): LOW__

Date Received: 01/10/95

% Solids: _____ 0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	61.4	B		P
7440-36-0	Antimony	45.0	U		P
7440-38-2	Arsenic	2.1	B		F
7440-39-3	Barium	14.1	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	3.0	U		P
7440-70-2	Calcium	32400			P
7440-47-3	Chromium	4.2	B		P
7440-48-4	Cobalt	7.0	U		P
7440-50-8	Copper	3.0	U		P
7439-89-6	Iron	76.2	B		P
7439-92-1	Lead	2.0	U		F
7439-95-4	Magnesium	9040			P
7439-96-5	Manganese	1.5	B		P
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	4850	B		P
7782-49-2	Selenium	2.0	U	N	F
7440-22-4	Silver	4.0	U		P
7440-23-5	Sodium	13800			P
7440-28-0	Thallium	3.0	U		F
7440-62-2	Vanadium	12.6	B		P
7440-66-6	Zinc	11.9	B		P

Color Before: COLORLESS

Clarity Before: CLEAR__

Texture: _____

Color After: COLORLESS

Clarity After: CLEAR__

Artifacts: _____

Comments:

FORM I - IN

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CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

BODM27

Lab Name: L.A.S. _____

Contract: BECHTEL_HA

Lab Code: LOCK__

Case No.: 110WHT

SAS No.: _____

SDG No.: L3604W

Matrix (soil/water): WATER

Lab Sample ID: L3628-2__

Level (low/med): LOW__

Date Received: 01/13/95

% Solids: _____0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	26.0	U		P
7440-36-0	Antimony	50.1	B		P
7440-38-2	Arsenic	11.9			F
7440-39-3	Barium	21.8	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	3.0	U		P
7440-70-2	Calcium	30100			P
7440-47-3	Chromium	5.0	B		P
7440-48-4	Cobalt	7.0	U		P
7440-50-8	Copper	3.0	U		P
7439-89-6	Iron	90.4	B		P
7439-92-1	Lead	2.0	U		F
7439-95-4	Magnesium	8310			P
7439-96-5	Manganese	2.7	B		P
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	4840	B		P
7782-49-2	Selenium	2.0	U	N	F
7440-22-4	Silver	4.0	U		P
7440-23-5	Sodium	29000			P
7440-28-0	Thallium	3.0	U		F
7440-62-2	Vanadium	24.4	B		P
7440-66-6	Zinc	6.5	B		P

Color Before: COLORLESS

Clarity Before: CLEAR__

Texture: _____

Color After: COLORLESS

Clarity After: CLEAR__

Artifacts: _____

Comments:

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CLP

6
DUPLICATES

CLIENT ID NO.

BODM25D

Lab Name: L.A.S. _____

Contract: BECHTEL_HA

Lab Code: LOCK__

Case No.: 110WHT

SAS No.: _____

SDG No.: L3604W

Matrix (soil/water): WATER

Level (low/med): LOW

% Solids for Sample: 0

% Solids for Duplicate: 0

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

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum		61.4400	B	27.2500	B	77.1		P
Antimony		45.0000	U	45.0000	U			P
Arsenic		2.1000	B	2.6000	B	21.3		F
Barium		14.0700	B	13.5600	B	3.7		P
Beryllium		1.0000	U	1.0000	U			P
Cadmium		3.0000	U	3.0000	U			P
Calcium		32379.5700		32526.4800		0.5		P
Chromium		4.1900	B	6.1900	B	38.5		P
Cobalt		7.0000	U	7.0000	U			P
Copper		3.0000	U	3.0000	U			P
Iron		76.2200	B	80.4300	B	5.4		P
Lead		2.0000	U	2.4000	B	200.0		F
Magnesium	5000.0	9044.0200		9035.2500		0.1		P
Manganese		1.4600	B	1.0300	B	34.5		P
Nickel		12.0000	U	14.5900	B	200.0		P
Potassium	5000.0	4845.5700	B	5252.9100		8.1		P
Selenium		2.0000	U	2.0000	U			F
Silver		4.0000	U	4.0000	U			P
Sodium	5000.0	13834.5800		13881.7600		0.3		P
Thallium		3.0000	U	3.0000	U			F
Vanadium		12.6000	B	13.0300	B	3.4		P
Zinc		11.8700	B	10.7300	B	10.1		P

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CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

BODM26

Lab Name: L.A.S. _____

Contract: BECHTEL_HA

Lab Code: LOCK__

Case No.: 110WHD

SAS No.: _____

SDG No.: L3604F

Matrix (soil/water): WATER

Lab Sample ID: L3604-10__

Level (low/med): LOW__

Date Received: 01/10/95

% Solids: _____0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	26.0	U		P
7440-36-0	Antimony	45.0	U		P
7440-38-2	Arsenic	2.5	B		F
7440-39-3	Barium	13.9	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	3.0	U		P
7440-70-2	Calcium	33900			P
7440-47-3	Chromium	3.0	U		P
7440-48-4	Cobalt	7.0	U		P
7440-50-8	Copper	3.0	U		P
7439-89-6	Iron	9.3	B		P
7439-92-1	Lead	2.0	U		F
7439-95-4	Magnesium	9320			P
7439-96-5	Manganese	1.0	B		P
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	4990	B		P
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	4.0	U		P
7440-23-5	Sodium	14200			P
7440-28-0	Thallium	3.0	U		F
7440-62-2	Vanadium	13.2	B		P
7440-66-6	Zinc	2.0	U		P

Color Before: _____

Clarity Before: _____

Texture: _____

Color After: _____

Clarity After: _____

Artifacts: _____

Comments:

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CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

BODM28

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

Lab Code: LOCK__ Case No.: 110WHD SAS No.: _____ SDG No.: L3604F

Matrix (soil/water): WATER Lab Sample ID: L3628-10__

Level (low/med): LOW__ Date Received: 01/13/95

% Solids: _____ 0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	26.0	U		P
7440-36-0	Antimony	45.0	U		P
7440-38-2	Arsenic	12.5			F
7440-39-3	Barium	21.2	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	3.0	U		P
7440-70-2	Calcium	30600			P
7440-47-3	Chromium	4.4	B		P
7440-48-4	Cobalt	7.0	U		P
7440-50-8	Copper	3.0	U		P
7439-89-6	Iron	6.6	B		P
7439-92-1	Lead	2.0	U		F
7439-95-4	Magnesium	8320			P
7439-96-5	Manganese	1.0	U		P
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	4700	B		P
7782-49-2	Selenium	2.0	U	W	F
7440-22-4	Silver	4.0	U		P
7440-23-5	Sodium	28600			P
7440-28-0	Thallium	3.0	U		F
7440-62-2	Vanadium	24.0	B		P
7440-66-6	Zinc	2.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

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CLP

6
DUPLICATES

CLIENT ID NO.

BODM26D

Lab Name: L.A.S. _____

Contract: BECHTEL_HA

Lab Code: LOCK__

Case No.: 11CWHD

SAS No.: _____

SDG No.: L3604F

Matrix (soil/water): WATER

Level (low/med): LOW

% Solids for Sample: 0

% Solids for Duplicate: 0

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

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum		26.0000	U	26.0000	U			P
Antimony		45.0000	U	45.0000	U			P
Arsenic		2.5000	B	2.9000	B	14.8		P
Barium		13.9200	B	13.8700	B	0.4		P
Beryllium		1.0000	U	1.0000	U			P
Cadmium		3.0000	U	3.0000	U			P
Calcium		33877.8900		33989.5400		0.3		P
Chromium		3.0000	U	3.3100	B	200.0		P
Cobalt		7.0000	U	7.0000	U			P
Copper		3.0000	U	3.0000	U			P
Iron		9.2700	B	8.6100	B	7.4		P
Lead		2.0000	U	2.0000	U			P
Magnesium	5000.0	9322.0800		9347.3200		0.3		P
Manganese		1.0000	B	1.0000	U	200.0		P
Nickel		12.0000	U	12.0000	U			P
Potassium	5000.0	4985.4000	B	5167.8000		3.6		P
Selenium		2.0000	U	2.0000	U			P
Silver		4.0000	U	4.0000	U			P
Sodium	5000.0	14212.3700		14247.7100		0.2		P
Thallium		3.0000	U	3.0000	U			P
Vanadium		13.1600	B	13.6100	B	3.4		P
Zinc		2.0000	U	2.0000	U			P

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LOCKHEED ANALYTICAL SERVICES

COMMON IONS AND ADDITIONAL ANALYTES

Sample Results

Client Sample ID: B0DM25	Date Collected: 06-JAN-95
Matrix: Water	Date Received: 10-JAN-95

Constituent	Units	Method	Result	Reporting Det Limit	Data Qualifier(s)	Date Analyzed	LAS Batch ID	LAS Sample ID
Turbidity	NTU	180.1	0.19	N/A	H	10-JAN-95	17817	L3604-4
Chloride	mg/L	300.0	5.2	0.02		11-JAN-95	17822	L3604-3
Fluoride	mg/L	300.0	0.38	0.01		11-JAN-95	17825	L3604-3
Nitrate-N	mg/L	300.0	3.6	0.02	H	11-JAN-95	17820	L3604-3
Nitrite-N	mg/L	300.0	< 0.01	0.01	H	11-JAN-95	17823	L3604-3
Ortho Phosphate	mg/L	300.0	< 0.1	0.1	H	11-JAN-95	17826	L3604-3
Sulfate	mg/L	300.0	25.	0.1		11-JAN-95	17824	L3604-3

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LOCKHEED ANALYTICAL SERVICES

COMMON IONS AND ADDITIONAL ANALYTES

Sample Results

Client Sample ID: BODM27	Date Collected: 11-JAN-95
Matrix: Water	Date Received: 13-JAN-95

Constituent	Units	Method	Result	Reporting Det Limit	Data Qualifier(s)	Date Analyzed	LAS Batch ID	LAS Sample ID
Turbidity	NTU	180.1	0.37	N/A		13-JAN-95	17972	L3628-4
Chloride	mg/L	300.0	11.	0.02		13-JAN-95	17933	L3628-3
Fluoride	mg/L	300.0	0.34	0.01		13-JAN-95	17935	L3628-3
Nitrate-N	mg/L	300.0	3.4	0.02		13-JAN-95	17931	L3628-3
Nitrite-N	mg/L	300.0	< 0.01	0.01		13-JAN-95	17932	L3628-3
Ortho Phosphate	mg/L	300.0	< 0.1	0.1		13-JAN-95	17936	L3628-3
Sulfate	mg/L	300.0	25.	0.1		13-JAN-95	17934	L3628-3

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0DM25

LAL Sample ID: L3604-5

Date Collected: 06-JAN-95

Date Received: 10-JAN-95

Matrix: Water

Login Number: L3604

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
Gross Alpha	20-JAN-95	GR ALP/BETA LAL-0060_18036	0.3	1.0	2.0	C	pCi/L
Gross Beta	20-JAN-95	GR ALP/BETA LAL-0060_18036	60.1	4.6	2.2		pCi/L

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0DM25

LAL Sample ID: L3604-7

Date Collected: 06-JAN-95

Date Received: 10-JAN-95

Matrix: Water

Login Number: L3604

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
U-233/4	21-JAN-95	U-ISOTOPIC LAL-0108_18037	1.22	0.31	0.16		pCi/L
U-235	21-JAN-95	U-ISOTOPIC LAL-0108_18037	0.22	0.14	0.12		pCi/L
U-238	21-JAN-95	U-ISOTOPIC LAL-0108_18037	0.93	0.27	0.13		pCi/L

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0DM25

LAL Sample ID: L3604-9

Date Collected: 06-JAN-95

Date Received: 10-JAN-95

Matrix: Water

Login Number: L3604

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
C-14	24-JAN-95	C-14 LAL-0209_18034	154.	83.	95.		pCi/L
H-3	23-JAN-95	TRITIUM(H3) LAL-0066_18039	1890	350	250		pCi/L

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B00M27

LAL Sample ID: L3628-5

Date Collected: 11-JAN-95

Date Received: 13-JAN-95

Matrix: Water

Login Number: L3628

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
Gross Alpha	20-JAN-95	GR ALP/BETA LAL-0060_18036	3.0	1.7	2.0		pCi/L
Gross Beta	20-JAN-95	GR ALP/BETA LAL-0060_18036	4.5	1.5	2.2		pCi/L
U-233/4	21-JAN-95	U-ISOTOPIC LAL-0108_18037	1.79	0.36	0.11		pCi/L
U-235	21-JAN-95	U-ISOTOPIC LAL-0108_18037	0.31	0.15	0.11		pCi/L
U-238	21-JAN-95	U-ISOTOPIC LAL-0108_18037	1.49	0.32	0.11		pCi/L

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B00M27

LAL Sample ID: L3628-9

Date Collected: 11-JAN-95

Date Received: 13-JAN-95

Matrix: Water

Login Number: L3628

Constituent	Analyzed	Batch	Activity	Error	MDA	Datadist	Units
C-14	07-FEB-95	C-14 LAL-0209_18400	255.	57.	51.		pCi/L
H-3	24-JAN-95	TRITIUM(H3) LAL-0066_18039	930	280	250		pCi/L



Lockheed Analytical Services

Ms. Joan Kessner
Bechtel Hanford, Inc.
345 Hill
Richland, WA 99352

ANALYTICAL DATA REPORT
FOR

METALS, ANIONS, TURBIDITY,
AND RADIOCHEMISTRY



LOG-IN NUMBER:	<u>L3604/L3628</u>
QUOTATION NUMBER:	<u>Q400000-B</u>
SAF:	<u>94-125</u>
DOCUMENT FILE NUMBER:	<u>0110596/</u> <u>0113596</u>
WHC DOCUMENT CONTROL NO.	<u>148</u>
SDG NUMBER:	<u>LK3604</u>


Lockheed
Environmental Systems & Technologies Co.

Lockheed Analytical Services
 975 Kelly Johnson Drive
 Las Vegas, Nevada 89119-3705

Phone: (702) 361-0220
 Phone: (800) 582-7605
 Fax: (702) 361-8146

February 13, 1995

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

RE:	Log-in No.:	L3604/L3628
	Quotation No.:	Q400000-B
	SAF:	94-125
	Document File No.:	0110596/0113596
	WHC Document Control No:	148
	SDG No.:	LK3604

L3604- The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on 10 January 1995. The temperature of the cooler upon receipt was 4°C. Sample containers received agree with the chain-of-custody documentation. Sample containers were received intact. Samples were received in time to meet the analytical holding time requirements.

L3628- The attached data report contains the analytical results of samples that were submitted to Lockheed Analytical Services on 13 January 1995. The temperature of the cooler upon receipt was 4°C. Sample containers received agree with the chain-of-custody documentation. Sample containers were received intact. Samples were received in time to meet the analytical holding time requirements.

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

A list of data qualifiers, chain-of-custody forms, sample receiving checklist, and log-in report are also enclosed representing the samples received within this group. If you have any questions concerning the analysis or the data please call Kathleen Hall at (509) 943-4423.

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,

for Kathleen M. Hall
Client Services Representative

cc: Client Services
Document Control

Lockheed Analytical Services

Log-in No.: L3604/L3628
 Quotation No.: Q400000-B
 SAF: 94-125
 Document File No.: 0110596/0113596
 WHC Document Control No.: 148
 SDG No.: LK3604

**CASE NARRATIVE
 INORGANIC NON-METALS ANALYSES
 WATER**

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 sample(s), and duplicate sample(s).

Preparation and Analysis Requirements

- Two water samples were received for LK3604 and prepared as batches 110WH and 113WH and analyzed for selected analytes as requested on the chain of custody.

Batch 110:

Client ID	LAL #		Method
BODM25	L3604-4	DUP,MS	180.1 Turbidity
	L3604-3	DUP,MS	300.0 Anions, 300.0 Fluoride, 300.0 Phosphate

Batch 113:

Client ID	LAL #		Method
BODM27	L3628-4	DUP,MS	180.1 Turbidity
	L3628-3	DUP,MS	300.0 Anions, 300.0 Fluoride, 300.0 Phosphate

Holding Time Requirements

- Batch 110WH:** The samples for Method 180.1 Turbidity, and Method 300.0 Nitrate-Nitrite-Nitrogen, Nitrite and Phosphate were received from the client out of holding time. Analyses proceeded at the direction of the client and the applicable samples are flagged with an "H".

Batch 113WH: All samples were received within the specified holding times.

Lockheed Analytical Services

Log-in No.: L3604/L3628
Quotation No.: Q400000-B
SAF: 94-125
Document File No.: 0110596/0113596
WHC Document Control No.: 148
SDG No.: LK3604

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

January 25, 1995

Prepared By

Date

Lockheed Analytical Services

Log-in No.: L3604/L3628

Quotation No.: Q400000-B

SAF: 94-125

Document File No.: 0110596/0113596

WHC Document Control No.: 148

SDG No.: LK3604

**CASE NARRATIVE
INORGANIC METALS ANALYSES
WATER**

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

Preparation and Analysis Requirements

- Two water samples were received in good condition on January 10, 13, 1995 and logged in as L3604.
- The samples were prepared as LAS Batch 110WHT and analyzed for selected analytes as requested on the chain of custody. Sample BODM25 (L3604-2) was used for matrix spike and duplicate, post-digestion spike and serial dilution. All data flags due to the performance of the above-mentioned QC are associated with every sample digested with this batch.

Holding Time Requirements

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

Method Blanks

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

Internal Quality Control

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

- The matrix spike recovered outside the control limits for selenium. However, the acceptable recovery for the water LCS (prep blank spiked) for selenium indicated that the analytical system was operating correctly and that the out-of-control recovery may be attributed to matrix interferences.

Hongsheng LI

2/6/95

Prepared By

Date

Lockheed Analytical Services

Log-in No.: L3604/L3628

Quotation No.: Q400000-B

SAF: 94-125

Document File No.: 0110596/0113596

WHC Document Control No.: 148

SDG No.: LK3604

**CASE NARRATIVE
INORGANIC METALS ANALYSES
FILTERED WATER**

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

Preparation and Analysis Requirements

- Two water samples were received in good condition on January 10, 13, 1995 and logged in as L3604.
- The samples were prepared as LAS Batch 110WHD and analyzed for selected analytes as requested on the chain of custody. Sample BODM26 (L3604-10) was used for matrix spike and duplicate, post-digestion spike and serial dilution. All data flags due to the performance of the above-mentioned QC are associated with every sample digested with this batch.

Holding Time Requirements

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

Method Blanks

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

Internal Quality Control

All internal quality control were within acceptance limits.

Hongsheng LI

2/6/95

Prepared By

Date

Lockheed Analytical Services

Log-in No.: L3604/L3628
Quotation No.: Q400000-B
SAF: 94-125
Document File No.: 0110596/0113596
WHC Document Control No.: 148
SDG No.: LK3604

CASE NARRATIVE RADIOCHEMICAL ANALYSES

The routine calibration and quality control analyses performed for this batch include as applicable: instrument calibration, initial and continuing calibration verification, quench monitoring standards, instrument background analysis, method blanks, yield tracer, laboratory control samples, matrix spike samples, duplicate samples.

Holding Time Requirements

All holding time requirements were met.

Initial Calibration Data: The initial calibration data for the alpha spec 1 counters, gross alpha beta (gas proportional counter) and tritium (liquid scintillation) were sent with report SDG# LK31 (LAS ID# L3551, Document Control No. 1222596), and are therefore not included in this report. The Carbon-14 (liquid scintillation) initial calibration is included in this report (SDG #LK3604).

Analytical Method

Carbon-14

The carbon-14 analysis was performed using LAL-91-SOP-0209. Sample #BODM27 (L3628-9) showed possible C-14 contamination on a direct analysis of the water; it was reanalyzed using a chemical evolution of CO₂ gas with the gas trapped for analysis. On the separated sample, the sample results agreed with the direct analysis, and was reported. The duplicate on the separated carbon-14 analysis (batch 18400) was low, indicating that the CO₂ was not trapped. All other QC criteria were met on both batches.

Gross Alpha Beta

The gross alpha beta analysis was performed using LAL-91-SOP-0060. No problems were encountered during analysis. All QC criteria were met.

Tritium

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

9713509.1034

Lockheed Analytical Services

Log-in No.: L3604/L3628
Quotation No.: Q400000-B
SAF: 94-125
Document File No.: 0110596/0113596
WHC Document Control No.: 148
SDG No.: LK3604

Uranium-Isotopic

The uranium isotopic analysis was performed using LAL-91-SOP-0108. The sample duplicate analysis was out of limits for U-235; however, because U-234 and -238 were within limits, the data is considered acceptable. All other QC criteria were met.

Yvonne M. Jacoby
Prepared By

February 13, 1995
Date

9713509.1035

LOGIN CHAIN OF CUSTODY REPORT (ln01)

Jan 10 1995, 12:15 pm

Login Number: L3604

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
L3604-1 TEMP 4 Location: 156TMP-3 Water 1 S SCREENING	BODM25	06-JAN-95	10-JAN-95	14-FEB-95
		Hold:05-JUL-95		
L3604-2 TEMP 2 Location: 156TMP-3 Water 1 S CLP FURNACE Water 1 S CLP ICP	BODM25	06-JAN-95	10-JAN-95	14-FEB-95
		Hold:05-JUL-95		
		Hold:05-JUL-95		
L3604-3 TEMP 4 Location: 156TMP-3 Water 1 S 300.0 CHLORIDE Water 1 S 300.0 FLUORIDE Water 1 S 300.0 NITRATE Water 1 S 300.0 NITRITE Water 1 S 300.0 PHOSPHATE Water 1 S 300.0 SULFATE	BODM25	06-JAN-95	10-JAN-95	14-FEB-95
		Hold:03-FEB-95		
		Hold:03-FEB-95		
		Hold:08-JAN-95		
		Hold:08-JAN-95		
		Hold:08-JAN-95		
		Hold:03-FEB-95		
L3604-4 TEMP 4 Location: 156TMP-3 Water 1 S 180.1 TURBIDITY	BODM25	06-JAN-95	10-JAN-95	14-FEB-95
		Hold:08-JAN-95		
L3604-5 TEMP 2 Location: 156TMP-3 Water 1 S GR ALP/BETA LAL-0060	BODM25	06-JAN-95	10-JAN-95	14-FEB-95
		Hold:05-JUL-95		
L3604-6 TEMP 2 Location: 156TMP-3	BODM25	06-JAN-95	10-JAN-95	14-FEB-95
L3604-7 TEMP 4 Location: 156TMP-3 Water 1 S U-ISOTOPIC LAL-0108	BODM25	06-JAN-95	10-JAN-95	14-FEB-95
		Hold:05-JUL-95		
L3604-8 TEMP 2 Location: 156TMP-3	BODM25	06-JAN-95	10-JAN-95	14-FEB-95

9713509.1036

LOGIN CHAIN OF CUSTODY REPORT (ln01)

Jan 10 1995, 12:15 pm

Login Number: L3604

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
L3604-9 TEMP 2 Location: 156TMP-3 Water 1 S C-14 LAL-0209 Water 1 S TRITIUM(H3) LAL-0066	BODM25	06-JAN-95	10-JAN-95	14-FEB-95
L3604-10 TEMP 2 Location: 156TMP-3 Filt H2O 15 S CLP FURNACE Filt H2O 15 S CLP ICP	BODM26	06-JAN-95	10-JAN-95	14-FEB-95
L3604-11 Location: Water 1 S EDD - DISK DEL. Water 1 S INORG TYPE 4A RPT	REPORT TYPE	10-JAN-95	10-JAN-95	14-FEB-95

Signature:

Paul Davis 14

Date:

1-10-95

011052

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST **L3604**

Page 1 of 1

Data Turnaround

Priority
 Normal

Collector SIMPSON	Company Contact R.E. Peterson	Telephone No. (509) 372-9638
Project Designation 100-KR-4 Groundwater Sampling-Round 7	Sampling Location 100 K	SAF No. B94-125
Ice Chest No. 6WS-046	Field Logbook No. EFL-1160	Method of Shipment Federal Express
Shipped To Lockheed	Offsite Property No. W95-0-161-9	Bill of Lading/Air Bill No. 2904615971

Possible Sample Hazards/Remarks	Preservative	HNO3	COOL 4C	COOL 4C	HNO3	COOL 4C	COOL 4C		HNO3						
	Type of Container	G	G	P	G	G	P		G						
	No. of Container(s)	1	1	1	4	1	1		1						
Special Handling and/or Storage Maintain between 2 C and 4 C.	Volume	1L	500ml	250ml	1L	1L	20ml		1L						
SAMPLE ANALYSIS	METALS-TAL														
	UNFIL-TERED														

Sample No.	Matrix*	Date Sampled	Time Sampled												
B00M25	W	1/6/95	1104	X	X	X	X	X	X						
B00M26	W	1/6/95	1104							X					

CHAIN OF POSSESSION		Sign/Print Names		SPECIAL INSTRUCTIONS				Matrix*	
Relinquished By <i>AJ Simpson</i>	Date/Time 1/6/95	Received By <i>ERC</i>	Date/Time 1400	Standalone Data Deliverable Sample analysis for NO2, NO3, and PO4 by EPA 300.0 and turbidity by EPA 180.1 are being requested for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met. The Activity Scan is for both sample numbers. <i>stored in FRIG #3</i>				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>AJ Simpson</i>	Date/Time 1/6/95	Received By <i>ERC</i>	Date/Time 1400						
Relinquished By <i>ERC</i>	Date/Time 0845	Received By <i>ERC</i>	Date/Time 19-95						
Relinquished By <i>ERC</i>	Date/Time 1-9-95	Received By <i>ERC</i>	Date/Time 1-6-95						
LABORATORY SECTION	Received By <i>M. Miller</i>	Title <i>Sample Custodian</i>	Date/Time 1-10-95					0830	
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time						

9713509.1037

1105

9713509.1038

AMPLE STATUS REPORT FOR N 4255. RAD SCREEN 69970-68 TIME: 1/ 9/95 7:
DISPATCHED: 12/28/94 13:15 SAMPLE HAS NOT BEEN SLURPED PAGE
RECEIVED: 1/ 9/95 7:50

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	*****	*****	***	***	*****
4271	TOT-ACT	< 5.00000E 01 pci/G	N	Y	XR544:

END OF REPORT

PRESS ANY KEY TO CONTINUE

BODM25
BODM26

9713509.1039

MESSAGE CONFIRMATION

SESSION NO. = 391

01/10/95 09:31
ID=LOCKHEED LAB SAMPLE RECEIVING

DATE	TIME	S.R-TIME	DISTANT STATION ID	MODE	PAGES	RESULT
01/10	09:30	01'10"	5099434218	G3 -S	01	OK 0000

Figure 1

SAMPLE CHECK-IN LIST

(1 Per Shipping Container)

Date/Time Received 1-10-95 / 0830 Client Name Westinghouse/Hanford
 Project/Client # SAF # B94-125 Batch or Case # N/A
 Cooler ID (if noted on outside of cooler) N/A

1. Condition of shipping container? good
2. Custody Seals on cooler intact? Yes No []
3. Custody Seals dated and signed? Yes No []
4. Chain of Custody record is taped on inside of cooler lid? Yes No []
5. Vermiculite/packing material is: Wet [] Dry _____
6. Each sample is in a plastic bag? Yes No [] _____
7. Number of sample containers in cooler: 10
8. Samples have: _____ tape _____ hazard labels
 custody seals _____ appropriate sample labels
9. Samples are: in good condition _____ leaking
 _____ broken _____ have air bubbles
 _____ other
10. Coolant Present? Yes No [] Sample Temperature 4°C
11. The following paperwork should be accounted for (N/A if not applicable):
 Chain of Custody #(s) N/A
 Request for Analysis #(s) N/A
 Airbill # 290 4615 971 Carrier FPO EX
12. Have any anomalies been identified above? Yes [] No [] N/A
13. Memos have been initiated for all anomalies identified above? Yes [] N/A

Printed Name/Signature PAUL C DAVIS Paul C Davis Date/Time 1-10-95 8:30 AM

Sample Login

Login Review Checklist

Lot Number L3604

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

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

Sample Summary Report

Yes No

N/A

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

Login Chain of Custody Report

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

Sample Receiving Checklist

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

Paul Davis

1-10-95

M. M. M. M.

1-10-95

Primary review signature

Date

Secondary review signature

Date

**Lockheed Analytical Services
Sample Receiving Checklist**

Client Name: *Westing House - Hartford*

Job No. *L3604*

Cooler ID: *d/A*

COOLER CONDITION UPON RECEIPT

Temperature of cooler upon receipt: *4°C*

temperature of temp. blank upon receipt: *—*

	Yes	No	* Comments/Discrepancies
custody seals intact	X		
chain of custody present	X		
blue ice (or equiv.) present/frozen	X		
rad survey completed	X		
	X		<i>RD 1-10-95</i>

SAMPLE CONDITION UPON RECEIPT

	Yes	No	* Comments/Discrepancies
all bottles labeled	X		
samples intact	X		
proper container used for sample type	X		
sample volume sufficient for analysis	X		
proper pres. indicated on the COC	X		
VOA's contain headspace			<i>N/A</i>
are samples bi-phasic (if so, indicate sample ID'S):			<i>N/A</i>

MISCELLANEOUS ITEMS

	Yes	No	* Comments/Discrepancies
samples with short holding times	X		
samples to subcontract		X	<i>nitrate/nitrite (Passed Holding Time)</i>

ADDITIONAL COMMENTS/DISCREPANCIES

Completed by / date: *Paul C Davis 1-10-95*

Sent to the client (date/initials):

** Client's signature upon receipt:

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

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

9713509.1042

011051

9713509.1043

LOGIN CHAIN OF CUSTODY REPORT (ln01)
Jan 13 1995, 02:18 pm

Login Number: L3628
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
L3628-1 temp 4 Location: 157 Water 1 S SCREENING	BODM27	11-JAN-95	13-JAN-95	17-FEB-95
		Hold:10-JUL-95		
L3628-2 temp 4 Location: 157 Water 1 S CLP FURNACE Water 1 S CLP ICP	BODM27	11-JAN-95	13-JAN-95	17-FEB-95
		Hold:10-JUL-95		
		Hold:10-JUL-95		
L3628-3 temp 4 Location: 157 Water 1 S 300.0 CHLORIDE Water 1 S 300.0 FLUORIDE Water 1 S 300.0 NITRATE Water 1 S 300.0 NITRITE Water 1 S 300.0 PHOSPHATE Water 1 S 300.0 SULFATE	BODM27	11-JAN-95	13-JAN-95	17-FEB-95
		Hold:08-FEB-95		
		Hold:08-FEB-95		
		Hold:13-JAN-95		
		Hold:13-JAN-95		
		Hold:13-JAN-95		
		Hold:08-FEB-95		
L3628-4 temp 4 Location: 157 Water 1 S 180.1 TURBIDITY	BODM27	11-JAN-95	13-JAN-95	17-FEB-95
		Hold:13-JAN-95		
L3628-5 temp 4 Location: 157 Water 1 S GR ALP/BETA LAL-0060 Water 1 S U-ISOTOPIC LAL-0108	BODM27	11-JAN-95	13-JAN-95	17-FEB-95
		Hold:10-JUL-95		
		Hold:10-JUL-95		
L3628-6 temp 4 Location: 157	BODM27	11-JAN-95	13-JAN-95	17-FEB-95
L3628-7 temp 4 Location: 157	BODM27	11-JAN-95	13-JAN-95	17-FEB-95
L3628-8 temp 4 Location: 157	BODM27	11-JAN-95	13-JAN-95	17-FEB-95

9713509.1044

LOGIN CHAIN OF CUSTODY REPORT (ln01)
Jan 13 1995, 02:18 pm

Login Number: L3628
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
L3628-9 temp 4 Location: 157	BODM27	11-JAN-95	13-JAN-95	17-FEB-95
Water 1	S C-14 LAL-0209	Hold:10-JUL-95		
Water 1	S TRITIUM(H3) LAL-0066	Hold:10-JUL-95		
L3628-10 temp 4 Location: 157	BODM28	11-JAN-95	13-JAN-95	17-FEB-95
Filt H2O 15	S CLP FURNACE	Hold:10-JUL-95		
Filt H2O 15	S CLP ICP	Hold:10-JUL-95		
L3628-11 Location:	REPORT TYPE	13-JAN-95	13-JAN-95	17-FEB-95
Water 1	S EDD - DISK DEL.			
Water 1	S INORG TYPE 4A RPT			

Page 2

Signature: *M. M. [Signature]* 23
Date: 1-13-95

0113590

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Data Turnaround

Priority
 Normal

Collector <i>K.O. Lee</i>	Company Contact <i>R.E. Peterson</i>	Telephone No. <i>(509) 372-9638</i>
Project Designation <i>100-KR-4 Groundwater Sampling-Round 7</i>	Sampling Location <i>100 K</i>	SAF No. <i>B94-125</i>
Ice Chest No. <i>ER-20</i>	Field Logbook No. <i>EFL-1154</i>	Method of Shipment Federal Express
Shipped To Lockheed	Offsite Property No. <i>W95-0-161-26</i>	Bill of Lading/Air Bill No. <i>2904616373</i>

L3628

Possible Sample Hazards/Remarks	Preservative							HNO3									
	HNO3	COOL 4C	COOL 4C	HNO3	COOL 4C	COOL 4C											
	Type of Container	G	G	P	G	G	P	G									
	No. of Container(s)	1	1	1	4	1	1	1									
Special Handling and/or Storage <i>Maintain between 2 C and 4 C.</i>	Volume	1L	500ml	250ml	1L	1L	20mL	1L									
SAMPLE ANALYSIS		METALS-TAL UNFILTERED	ANIONS-F, Cl, SO4, PO4, NO2, NO3	TURBIDITY	GROSS ALPHA, GROSS BETA, U-234, U-235/238	C-14, TRITIUM	ACTIVITY SCAN	METALS-TAL FILTERED									

Sample No.	Matrix*	Date Sampled	Time Sampled														
B00H27	W	<i>01/11/95</i>	<i>1603</i>	X	X	X	X	X	X								
B00H28	W	<i>01/11/95</i>	<i>1603</i>							X							

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS
Relinquished By <i>K.O. Lee</i>	Date/Time <i>11/11/95 1310</i>	Received By <i>R. Watten</i>
Relinquished By <i>ERC</i>	Date/Time <i>0815</i>	Date/Time <i>1-11-95</i>
Relinquished By <i>Bill Watten</i>	Date/Time <i>1-12-95</i>	Date/Time
Relinquished By	Date/Time	Date/Time
Relinquished By	Date/Time	Date/Time

Standalone Data Deliverable

Sample analysis for NO2, NO3, and PO4 by EPA 300.0 and turbidity by EPA 180.1 are being requested for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met.

The Activity Scan is for both sample numbers.

Stored in Unit #3

LABORATORY SECTION	Received By <i>M. Mills</i>	Title <i>Sample Custodian</i>	Date/Time <i>1-13-95 / 0915</i>
FINAL SAMPLE DISPOSITION	Disposal Method <i>2</i>	Disposed By	Date/Time

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011355

9715509.1046

SAMPLE STATUS REPORT FOR N 4237. RAD SCREEN 199-K-11 TIME: 1/12/95 7:46
DISPATCHED: 12/28/94 13:13 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 1/11/95 13:57

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	*****	*****	***	***	*****
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	XR5440

END OF REPORT

BOD m27
BOD m28
1-12-95
BW

Figure 1

SAMPLE CHECK-IN LIST

(1 Per Shipping Container)

Date/Time Received 1-13-95 / 0915 Client Name Westinghouse
 Project/Client # B94-125 Batch or Case # _____
 Cooler ID (if noted on outside of cooler) N/A

1. Condition of shipping container? good
2. Custody Seals on cooler intact? Yes No
3. Custody Seals dated and signed? Yes No
4. Chain of Custody record is taped on inside of cooler lid? Yes No
5. Vermiculite/packing material is: Wet Dry _____
6. Each sample is in a plastic bag? Yes No _____
7. Number of sample containers in cooler: 10
8. Samples have:

_____ tape	_____ hazard labels
<input checked="" type="checkbox"/> custody seals	<input checked="" type="checkbox"/> appropriate sample labels
9. Samples are:

<input checked="" type="checkbox"/> in good condition	_____ leaking
_____ broken	_____ have air bubbles
_____ other	
10. Coolant Present? Yes No Sample Temperature 4°C
11. The following paperwork should be accounted for (N/A if not applicable):

Chain of Custody #(s) N/A

Request for Analysis #(s) N/A

Airbill # 2904616373 Carrier Fed X
12. Have any anomalies been identified above? Yes No N/A
13. Memos have been initiated for all anomalies identified above? Yes N/A

Printed Name/Signature Anthony Miller MM Date/Time 1-13-95 / 0915

**Lockheed Analytical Services
Sample Receiving Checklist**

Client Name: Westinghouse

Job No. L3628

Cooler ID:

COOLER CONDITION UPON RECEIPT

Temperature of cooler upon receipt:

4°C

temperature of temp. blank upon receipt:

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

SAMPLE CONDITION UPON RECEIPT

	Yes	No	* Comments/Discrepancies
all bottles labeled	<input checked="" type="checkbox"/>		
samples intact	<input checked="" type="checkbox"/>		
proper container used for sample type	<input checked="" type="checkbox"/>		
sample volume sufficient for analysis	<input checked="" type="checkbox"/>		
proper pres. indicated on the COC	<input checked="" type="checkbox"/>		
VOA's contain headspace			<u>N/A</u>
are samples bi-phasic (if so, indicate sample ID'S):			<u>N/A</u>

MISCELLANEOUS ITEMS

	Yes	No	* Comments/Discrepancies
samples with short holding times	<input checked="" type="checkbox"/>		<u>Miscute / N. H. H. K.</u>
samples to subcontract		<input checked="" type="checkbox"/>	

ADDITIONAL COMMENTS/DISCREPANCIES

Completed by / date: MMs/De 1-13-95

Sent to the client (date/initials):

** Client's signature upon receipt:

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

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

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CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

BODM25

Lab Name: L.A.S. _____

Contract: BECHTEL_HA

Lab Code: LOCK__

Case No.: 110WHT

SAS No.: _____

SDG No.: L3604W

Matrix (soil/water): WATER

Lab Sample ID: L3604-2__

Level (low/med): LOW__

Date Received: 01/10/95

% Solids: _____0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	61.4	B		P
7440-36-0	Antimony	45.0	U		P
7440-38-2	Arsenic	2.1	B		F
7440-39-3	Barium	14.1	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	3.0	U		P
7440-70-2	Calcium	32400			P
7440-47-3	Chromium	4.2	B		P
7440-48-4	Cobalt	7.0	U		P
7440-50-8	Copper	3.0	U		P
7439-89-6	Iron	76.2	B		P
7439-92-1	Lead	2.0	U		F
7439-95-4	Magnesium	9040			P
7439-96-5	Manganese	1.5	B		P
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	4850	B		P
7782-49-2	Selenium	2.0	U	N	F
7440-22-4	Silver	4.0	U		P
7440-23-5	Sodium	13800			P
7440-28-0	Thallium	3.0	U		F
7440-62-2	Vanadium	12.6	B		P
7440-66-6	Zinc	11.9	B		P

Color Before: COLORLESS

Clarity Before: CLEAR_

Texture: _____

Color After: COLORLESS

Clarity After: CLEAR_

Artifacts: _____

Comments:

9713509.1051

CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

BODM27

Lab Name: L.A.S. _____

Contract: BECHTEL_HA

Lab Code: LOCK__

Case No.: 110WHT

SAS No.: _____

SDG No.: L3604W

Matrix (soil/water): WATER

Lab Sample ID: L3628-2__

Level (low/med): LOW__

Date Received: 01/13/95

% Solids: _____0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	26.0	U		P
7440-36-0	Antimony	50.1	B		P
7440-38-2	Arsenic	11.9			F
7440-39-3	Barium	21.8	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	3.0	U		P
7440-70-2	Calcium	30100			P
7440-47-3	Chromium	5.0	B		P
7440-48-4	Cobalt	7.0	U		P
7440-50-8	Copper	3.0	U		P
7439-89-6	Iron	90.4	B		P
7439-92-1	Lead	2.0	U		F
7439-95-4	Magnesium	8310			P
7439-96-5	Manganese	2.7	B		P
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	4840	B		P
7782-49-2	Selenium	2.0	U	N	F
7440-22-4	Silver	4.0	U		P
7440-23-5	Sodium	29000			P
7440-28-0	Thallium	3.0	U		F
7440-62-2	Vanadium	24.4	B		P
7440-66-6	Zinc	6.5	B		P

Color Before: COLORLESS

Clarity Before: CLEAR_

Texture: _____

Color After: COLORLESS

Clarity After: CLEAR_

Artifacts: _____

Comments:

9713509.1052

CLP

6
DUPLICATES

CLIENT ID NO.

BODM25D

Lab Name: L.A.S. _____

Contract: BECHTEL_HA

Lab Code: LOCK__

Case No.: 110WHT

SAS No.: _____

SDG No.: L3604W

Matrix (soil/water): WATER

Level (low/med): LOW

% Solids for Sample: 0

% Solids for Duplicate: 0

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

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum		61.4400	B	27.2500	B	77.1		P
Antimony		45.0000	U	45.0000	U			P
Arsenic		2.1000	B	2.6000	B	21.3		F
Barium		14.0700	B	13.5600	B	3.7		P
Beryllium		1.0000	U	1.0000	U			P
Cadmium		3.0000	U	3.0000	U			P
Calcium		32379.5700		32526.4800		0.5		P
Chromium		4.1900	B	6.1900	B	38.5		P
Cobalt		7.0000	U	7.0000	U			P
Copper		3.0000	U	3.0000	U			P
Iron		76.2200	B	80.4300	B	5.4		P
Lead		2.0000	U	2.4000	B	200.0		F
Magnesium	5000.0	9044.0200		9035.2500		0.1		P
Manganese		1.4600	B	1.0300	B	34.5		P
Nickel		12.0000	U	14.5900	B	200.0		P
Potassium	5000.0	4845.5700	B	5252.9100		8.1		P
Selenium		2.0000	U	2.0000	U			F
Silver		4.0000	U	4.0000	U			P
Sodium	5000.0	13834.5800		13881.7600		0.3		P
Thallium		3.0000	U	3.0000	U			F
Vanadium		12.6000	B	13.0300	B	3.4		P
Zinc		11.8700	B	10.7300	B	10.1		P

FORM VI - IN

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CLP

1

CLIENT ID NO.

INORGANIC ANALYSES DATA SHEET

BODM26

Lab Name: L.A.S. _____

Contract: BECHTEL_HA

Lab Code: LOCK__

Case No.: 110WHD

SAS No.: _____

SDG No.: L3604F

Matrix (soil/water): WATER

Lab Sample ID: L3604-10__

Level (low/med): LOW__

Date Received: 01/10/95

% Solids: _____0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	26.0	U		P
7440-36-0	Antimony	45.0	U		P
7440-38-2	Arsenic	2.5	B		F
7440-39-3	Barium	13.9	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	3.0	U		P
7440-70-2	Calcium	33900			P
7440-47-3	Chromium	3.0	U		P
7440-48-4	Cobalt	7.0	U		P
7440-50-8	Copper	3.0	U		P
7439-89-6	Iron	9.3	B		P
7439-92-1	Lead	2.0	U		F
7439-95-4	Magnesium	9320			P
7439-96-5	Manganese	1.0	B		P
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	4990	B		P
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	4.0	U		P
7440-23-5	Sodium	14200			P
7440-28-0	Thallium	3.0	U		F
7440-62-2	Vanadium	13.2	B		P
7440-66-6	Zinc	2.0	U		P

Color Before: _____

Clarity Before: _____

Texture: _____

Color After: _____

Clarity After: _____

Artifacts: _____

Comments:

FORM I - IN

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

BODM28

Lab Name: L.A.S. _____

Contract: BECHTEL_HA

Lab Code: LOCK__

Case No.: 110WHD

SAS No.: _____

SDG No.: L3604F

Matrix (soil/water): WATER

Lab Sample ID: L3628-10__

Level (low/med): LOW__

Date Received: 01/13/95

% Solids: _____0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	26.0	U		P
7440-36-0	Antimony	45.0	U		P
7440-38-2	Arsenic	12.5			F
7440-39-3	Barium	21.2	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	3.0	U		P
7440-70-2	Calcium	30600			P
7440-47-3	Chromium	4.4	B		P
7440-48-4	Cobalt	7.0	U		P
7440-50-8	Copper	3.0	U		P
7439-89-6	Iron	6.6	B		P
7439-92-1	Lead	2.0	U		F
7439-95-4	Magnesium	8320			P
7439-96-5	Manganese	1.0	U		P
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	4700	B		P
7782-49-2	Selenium	2.0	U	W	F
7440-22-4	Silver	4.0	U		P
7440-23-5	Sodium	28600			P
7440-28-0	Thallium	3.0	U		F
7440-62-2	Vanadium	24.0	B		P
7440-66-6	Zinc	2.0	U		P

Color Before: _____

Clarity Before: _____

Texture: _____

Color After: _____

Clarity After: _____

Artifacts: _____

Comments:

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CLP

6
DUPLICATES

CLIENT ID NO.

BODM26D

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

Lab Code: LOCK__ Case No.: 11CWHD SAS No.: _____ SDG No.: L3604F

Matrix (soil/water): WATER Level (low/med): LOW

% Solids for Sample: 0 % Solids for Duplicate: 0

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

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum		26.0000	U	26.0000	U			P
Antimony		45.0000	U	45.0000	U			P
Arsenic		2.5000	B	2.9000	B	14.8		P
Barium		13.9200	B	13.8700	B	0.4		P
Beryllium		1.0000	U	1.0000	U			P
Cadmium		3.0000	U	3.0000	U			P
Calcium		33877.8900		33989.5400		0.3		P
Chromium		3.0000	U	3.3100	B	200.0		P
Cobalt		7.0000	U	7.0000	U			P
Copper		3.0000	U	3.0000	U			P
Iron		9.2700	B	8.6100	B	7.4		P
Lead		2.0000	U	2.0000	U			P
Magnesium	5000.0	9322.0800		9347.3200		0.3		P
Manganese		1.0000	B	1.0000	U	200.0		P
Nickel		12.0000	U	12.0000	U			P
Potassium	5000.0	4985.4000	B	5167.8000		3.6		P
Selenium		2.0000	U	2.0000	U			P
Silver		4.0000	U	4.0000	U			P
Sodium	5000.0	14212.3700		14247.7100		0.2		P
Thallium		3.0000	U	3.0000	U			P
Vanadium		13.1600	B	13.6100	B	3.4		P
Zinc		2.0000	U	2.0000	U			P

FORM VI - IN

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LOCKHEED ANALYTICAL SERVICES

COMMON IONS AND ADDITIONAL ANALYTES

Sample Results

Client Sample ID: B0DM25	Date Collected: 06-JAN-95
Matrix: Water	Date Received: 10-JAN-95

Constituent	Units	Method	Result	Reporting Det Limit	Data Qualifier(s)	Date Analyzed	LAS Batch ID	LAS Sample ID
Turbidity	NTU	180.1	0.19	N/A	H	10-JAN-95	17817	L3604-4
Chloride	mg/L	300.0	5.2	0.02		11-JAN-95	17822	L3604-3
Fluoride	mg/L	300.0	0.38	0.01		11-JAN-95	17825	L3604-3
Nitrate-N	mg/L	300.0	3.6	0.02	H	11-JAN-95	17820	L3604-3
Nitrite-N	mg/L	300.0	< 0.01	0.01	H	11-JAN-95	17823	L3604-3
Ortho Phosphate	mg/L	300.0	< 0.1	0.1	H	11-JAN-95	17826	L3604-3
Sulfate	mg/L	300.0	25.	0.1		11-JAN-95	17824	L3604-3

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LOCKHEED ANALYTICAL SERVICES

COMMON IONS AND ADDITIONAL ANALYTES

Sample Results

Client Sample ID: BODM27	Date Collected: 11-JAN-95
Matrix: Water	Date Received: 13-JAN-95

Constituent	Units	Method	Result	Reporting Det Limit	Data Qualifier(s)	Date Analyzed	LAS Batch ID	LAS Sample ID
Turbidity	NTU	180.1	0.37	N/A		13-JAN-95	17972	L3628-4
Chloride	mg/L	300.0	11.	0.02		13-JAN-95	17933	L3628-3
Fluoride	mg/L	300.0	0.34	0.01		13-JAN-95	17935	L3628-3
Nitrate-N	mg/L	300.0	3.4	0.02		13-JAN-95	17931	L3628-3
Nitrite-N	mg/L	300.0	< 0.01	0.01		13-JAN-95	17932	L3628-3
Ortho Phosphate	mg/L	300.0	< 0.1	0.1		13-JAN-95	17936	L3628-3
Sulfate	mg/L	300.0	25.	0.1		13-JAN-95	17934	L3628-3

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0DM25

LAL Sample ID: L3604-5

Date Collected: 06-JAN-95

Date Received: 10-JAN-95

Matrix: Water

Login Number: L3604

Constituent	Analyzed	Batch	Activity	Error	MDL	DataQual	Units
Gross Alpha	20-JAN-95	GR ALP/BETA LAL-0060_18036	0.3	1.0	2.0	C	pCi/L
Gross Beta	20-JAN-95	GR ALP/BETA LAL-0060_18036	60.1	4.6	2.2		pCi/L

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0DM25

LAL Sample ID: L3604-7

Date Collected: 06-JAN-95

Date Received: 10-JAN-95

Matrix: Water

Login Number: L3604

Constituent	Analyzed	Batch	Activity	Error	MFA	Database	Units
U-233/4	21-JAN-95	U-ISOTOPIC LAL-0108_18037	1.22	0.31	0.16		pCi/L
U-235	21-JAN-95	U-ISOTOPIC LAL-0108_18037	0.22	0.14	0.12		pCi/L
U-238	21-JAN-95	U-ISOTOPIC LAL-0108_18037	0.93	0.27	0.13		pCi/L

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0DM25

LAL Sample ID: L3604-9

Date Collected: 06-JAN-95

Date Received: 10-JAN-95

Matrix: Water

Login Number: L3604

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
C-14	24-JAN-95	C-14 LAL-0209_18034	154.	83.	95.		pCi/L
H-3	23-JAN-95	TRITIUM(H3) LAL-0066_18039	1890	350	250		pCi/L

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0DM27

LAL Sample ID: L3628-5

Date Collected: 11-JAN-95

Date Received: 13-JAN-95

Matrix: Water

Login Number: L3628

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
Gross Alpha	20-JAN-95	GR ALP/BETA LAL-0060_18036	3.0	1.7	2.0		pCi/L
Gross Beta	20-JAN-95	GR ALP/BETA LAL-0060_18036	4.5	1.5	2.2		pCi/L
U-233/4	21-JAN-95	U-ISOTOPIC LAL-0108_18037	1.79	0.36	0.11		pCi/L
U-235	21-JAN-95	U-ISOTOPIC LAL-0108_18037	0.31	0.15	0.11		pCi/L
U-238	21-JAN-95	U-ISOTOPIC LAL-0108_18037	1.49	0.32	0.11		pCi/L

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0DM27

LAL Sample ID: L3628-9

Date Collected: 11-JAN-95

Date Received: 13-JAN-95

Matrix: Water

Login Number: L3628

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
C-14	07-FEB-95	C-14 LAL-0209_18400	255.	57.	51.		pCi/L
H-3	24-JAN-95	TRITIUM(H3) LAL-0066_18039	930	280	250		pCi/L

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2-16

VALIDATION SUMMARY

Golder Associates Inc.

4104-148th Avenue, NE
Redmond, WA 98052
Telephone (206) 883-0777
Fax (206) 882-5498

9713500 10/4
COPY



April 5, 1995

Our ref: 943-1610.081.0400
94-1610/O/308

CH2M Hill
P.O. Box 1510
Richland, Washington 99352

ATTENTION: Ms. Jeanette Duncan

RE: TRANSMITTAL OF DATA VALIDATION FINAL SUMMARY REPORT
CONTRACT NO. MSH-SWV-315905

Dear Ms. Duncan:

This letter is to transmit the data validation summary for the following project:

Project Name

100 KR 4 Round 7 Groundwater Sampling Task

Please call if you have any questions.

Sincerely,

GOLDER ASSOCIATES INC.

Christina I. Jensen
Task Manager

Enclosures

p:\enviros\whc\dv\summary.ltr

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BHI-00403
Rev. 00

COPY



**DATA VALIDATION SUMMARY REPORT FOR THE
100-KR-4 ROUND 7 GROUNDWATER SAMPLING TASK**

Prepared for:

**Bechtel Hanford, Inc.
Richland, Washington**

Prepared by:

**Golder Associates Inc.
Redmond, Washington**

April 3, 1995

943-1610.081.400

0029ej1.spt

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- A Metals Validated Data Summary Tables
- B Metals Validated Field Quality Control Sample Summary
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- D General Chemistry Validated Field Quality Control Sample Summary
- E Radiochemistry Validated Data Summary Tables
- F Radiochemistry Validated Field Quality Control Sample Summary

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1.0 INTRODUCTION

This report presents a summary of data validation results on groundwater samples collected for the 100-KR-4 Round 7 Groundwater Sampling task.

The analyses performed for this project consisted of:

- Metals,
- General Chemistry; and
- Radiochemistry

The laboratories conducting the analyses were Quanterra Environmental Services (QES) and Lockheed.

As required by the contract and the WHC statement of work (WHC 1994), data validation was conducted using the Westinghouse data validation procedures for chemical and radiochemical analyses (WHC 1993a and 1993b). Sample results were validated to levels A and D as outlined in Table 1-1. At the completion of validation and verification of each data package validated to level D, a data validation summary was prepared and transmitted with the original documentation to Hanford Analytical Services (HAS) for inclusion in the project QA record. Table 1-1 provides information concerning the data packages which were validated and verified. Tables 1-2 and 1-3 provide a summary and explanation of all qualifiers applied as a result of inorganic and radiochemical validation, respectively.

Five sections, including this introduction, comprise this report. Sections 2.0 through 4.0 provide summaries of the validation by analytical fraction. Section 5.0 provides a list of references used to prepare this report and Appendixes A through F to this report include validated data summary and field quality control (QC) result tables.

1.1 CHEMICAL ANALYSES

Chemical analysis data consisted of:

- A total of 58 water samples analyzed for target analyte list (TAL) metals and cyanide using CLP methodology.
- A total of 27 water samples analyzed for general chemistry parameters using EPA methodology.

The chemical data and associated QC has been reviewed and validated to verify that reported sample results are acceptable for decision making purposes.

1.2 RADIOCHEMICAL ANALYSES

The radiochemical data consisted of:

- A total of 29 water samples analyzed for radiochemical parameters using Westinghouse approved radiochemical procedures.

The radiochemical data and associated QC has been reviewed and validated to verify that reported sample results are acceptable for decision making purposes.

1.3 WESTINGHOUSE HANFORD GUIDANCE USED

Data validation was conducted using Westinghouse data validation procedures (WHC 1993a and 1993b).

1.4 DEFICIENCIES

There were major deficiencies during the validation of the general chemistry analyses resulting in qualification of sample results as unusable (UR). There were several minor deficiencies identified during validation in which sample results were qualified as estimated (J, BJ, UJ). This report summarizes all the deficiencies identified during validation and the qualification applied.

1.5 SAMPLES AND ANALYSES VALIDATED

Table 1-1 provides a cross-reference list of all samples validated including data package tracking numbers, sample numbers, sample dates, site and sample locations, sample type, validation level and analyses performed.

Table 1-1. 100-KR-4 Data Validation, List of Samples Validated.

Sample ID	Sample Date	Type	Comments	Data Package	Sample Location	Data Validation Level	M ¹	C ¹	R ¹
BODM25	06-Jan-95	WATER	SPLIT	LK3604-LAS	SPLIT 1	D	X	X	X
BODM26	06-Jan-95	WATER	SPLIT	LK3604-LAS	SPLIT 1	D	X		
BODM27	11-Jan-95	WATER	SPLIT	LK3604-LAS	SPLIT 2	D	X*	X*	X*
BODM28	11-Jan-95	WATER	SPLIT	LK3604-LAS	SPLIT 2	D	X		
BODLX5	04-Jan-95	WATER		W0355-QES	199-K-18	D	X	X	X
BODLX6	04-Jan-95	WATER		W0355-QES	199-K-18	A	X		
BODLX7	03-Jan-95	WATER		W0355-QES	199-K-19	A	X	X	X
BODLX8	03-Jan-95	WATER		W0355-QES	199-K-19	A	X		
BODLX9	04-Jan-95	WATER		W0355-QES	199-K-20	A	X	X	X
BODLY0	04-Jan-95	WATER		W0355-QES	199-K-20	A	X		
BODLY1	03-Jan-95	WATER		W0355-QES	199-K-21	A	X	X	X
BODLY2	03-Jan-95	WATER		W0355-QES	199-K-21	A	X		
BODLY3	04-Jan-95	WATER		W0355-QES	199-K-21	A	X	X	X
BODLY4	04-Jan-95	WATER		W0355-QES	199-K-21	A	X		
BODLY7	04-Jan-95	WATER		W0355-QES	199-K-27	A	X	X	X
BODLY8	04-Jan-95	WATER		W0355-QES	199-K-27	A	X		
BODLY9	04-Jan-95	WATER		W0355-QES	199-K-30	A	X	X	X
BODLZ0	04-Jan-95	WATER		W0355-QES	199-K-30	A	X		
BODLZ1	04-Jan-95	WATER		W0355-QES	199-K-31	A	X	X	X
BODLZ2	04-Jan-95	WATER		W0355-QES	199-K-31	A	X		
BODLZ3	03-Jan-95	WATER		W0355-QES	199-K-32B	A	X	X	X
BODLZ4	03-Jan-95	WATER		W0355-QES	199-K-32B	A	X		
BODLZ5	03-Jan-95	WATER		W0355-QES	199-K-32A	A	X	X	X
BODLZ6	03-Jan-95	WATER		W0355-QES	199-K-32A	A	X		
BODLZ9	10-Jan-95	WATER		W0362-QES	199-K-34	D	X*	X*	X*
BODM00	10-Jan-95	WATER		W0362-QES	199-K-34	D	X		
BODM01	06-Jan-95	WATER		W0362-QES	199-K-35	D	X	X	X
BODM02	06-Jan-95	WATER		W0362-QES	199-K-35	D	X*		
BODM03	06-Jan-95	WATER		W0362-QES	199-K-36	D	X	X	X
BODM04	06-Jan-95	WATER		W0362-QES	199-K-36	D	X		
BODM05	10-Jan-95	WATER		W0362-QES	199-K-37	D	X	X	X
BODM06	10-Jan-95	WATER		W0362-QES	199-K-37	D	X		
BODM07	06-Jan-95	WATER		W0362-QES	699-70-68	D	X*	X*	X*
BODM08	06-Jan-95	WATER		W0362-QES	699-70-68	D	X		
BODM09	06-Jan-95	WATER		W0362-QES	699-78-62	D	X	X	X
BODM10	06-Jan-95	WATER		W0362-QES	699-78-62	D	X		
BODM11	05-Jan-95	WATER		W0362-QES	699-73-61	D	X*	X*	X*
BODM12	05-Jan-95	WATER		W0362-QES	699-73-61	D	X		
BODM17	10-Jan-95	WATER	TRIP BLANK	W0362-QES	199-K-34	D	X	X	X

Table 1-2. Glossary of Inorganic Data Reporting Qualifiers.

- B -** Indicates the constituent was analyzed for and detected. The concentration reported is less than the contract required detection limit (CRDL) but greater than the instrument detection limit (IDL). The associated data should be considered usable for decision making purposes.
- U -** Indicates the constituent was analyzed for and not detected. The concentration reported is the sample detection limit corrected for aliquot size, dilution and percent solids (in the case of solid matrices) by the laboratory. The associated data should be considered usable for decision making purposes.
- UJ -** Indicates the constituent was analyzed for and not detected. Due to a minor quality control deficiency identified during data validation the concentration may not accurately reflect the sample detection limit. The associated data have been qualified as estimated but should be considered usable for decision making purposes.
- BJ -** Indicates the constituent was analyzed for and detected at a concentration less than the contract required detection limit (CRDL) but greater than the instrument detection limit (IDL). Due to a minor quality control deficiency identified during data validation the associated data have been qualified as estimated, but should be considered usable for decision making purposes.
- J -** Indicates the constituent was analyzed for and detected. Due to a minor quality control deficiency identified during data validation the associated data have been qualified as estimated, but should be considered usable for decision making purposes.
- UR -** Indicates the constituent was analyzed for and not detected. Due to a major quality control deficiency identified during data validation, the associated data have been qualified as unusable for decision making purposes.
- R -** Indicates the constituent was analyzed for and detected. Due to a major quality control deficiency identified during data validation, the associated data have been qualified as unusable for decision making purposes.

Table 1-3. Glossary of Radiochemistry Data Reporting Qualifiers.

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

2.0 METALS DATA VALIDATION SUMMARY

2.1 SUMMARY

This section presents a summary of the metals data validation results and review in accordance with the WHC Statement of Work (WHC 1994) and validation procedures (WHC 1993a). Table 1-1 shows the data package identification, sample identification, sample collection date, location, sample type and analysis performed. Appendix A provides a tabular summary of all validated data and Appendix B provides a summary of the field QC data.

2.1.1 Sample Delivery Groups

Sample results from five metals data packages are included in this report:

Data Package ID	No. of Samples
LK3604-LAS	4
W0355-QES	20
W0362-QES	20
W0374-QES	12
W0387-QES	2

2.1.2 Samples Validated

Samples and analytical results contained in the data packages listed above were validated to levels A and D as indicated in Table 1-1, in accordance with the validation procedures.

2.1.3 Westinghouse Hanford Validation Guidance Used

Data validation was performed in accordance with Data Validation Procedures for Chemical Analyses (WHC 1993a).

2.1.4 Data Quality Objectives

This section provides a summary of the data in terms of defined laboratory performance criteria and project-specific data quality objectives to assure the data is acceptable for use in the 100-KR-4 Round 7 Groundwater Sampling task.

- **Precision.** Laboratory duplicate relative percent difference (RPD) results were acceptable with the exception of iron and zinc (see Section 2.5.1).

Serial dilution percent difference (%D) results were acceptable with the exception of barium (see Section 2.5.2).

Field split sample RPDs were acceptable for all sample sets collected.

Field duplicate sample RPDs were acceptable for all sample sets collected.

- **Accuracy.** Laboratory spike recoveries were acceptable for all data packages.

Analytical spike recoveries were acceptable with the exception of lead, thallium and selenium (see Section 2.6.1).

Laboratory control sample recoveries were acceptable for all data packages.

- **Representativeness.** Field duplicate sample RPD values were acceptable for all sample sets collected.
- **Completeness.** Overall, 58 samples were validated for metals with 1,334 results reported, all of which were deemed valid. This results in a completeness of 100 percent which meets normal work plan objectives of 90 percent.
- **Comparability.** Samples were analyzed by similar methods and all results were reported in common units facilitating comparison of the data.

2.1.5 Deficiencies Noted

There were no major deficiencies identified requiring qualifications of the data as unusable. There were minor deficiencies identified resulting in qualification of the data as estimated, which are explained in greater detail below.

2.2 ANALYTICAL METHOD

The following paragraphs summarize the method specific QC results for the metals analyses. All samples were analyzed in accordance with CLP methodology for selected TAL metals and cyanide.

2.2.1 Initial and Continuing Calibration

Initial and continuing calibration requirements were met for all analyses in all data packages.

2.2.2 Blanks

Laboratory method blanks (initial and continuing calibration and preparation blanks) were analyzed at the proper frequency and results were undetected with the exception of low concentrations of target analytes as summarized in the following sections.

2.2.2.1 Calibration Blanks. The following is a summary of the analytes detected in the calibration blanks at positive concentrations:

Data Package W0362-QES. Aluminum, beryllium, thallium

Data Package LK3604-LAS. Chromium, iron, manganese, vanadium.

Data Package W0374-QES. Barium, beryllium, copper, iron, manganese, thallium

The following is a summary of the analytes detected in the calibration blanks at negative concentrations:

Data Package W0362-QES. Arsenic, selenium.

Data Package W0374-QES. Vanadium

In accordance with validation requirements, sample results associated with the above calibration blanks were qualified as follows:

- undetected (U) for detected results that are less than five times (5X) the highest associated positive blank concentration.
- estimated (UJ for non-detects, J for sample results within two times (2X) the absolute value of the associated blank) if associated with negative blank results.

2.2.2.2 Preparation Blanks. The following is a summary of the analytes detected in the preparation blanks at positive concentrations:

Data Package W0362-QES. Copper, iron, magnesium, manganese, potassium, sodium, vanadium.

Data Package LK3604-LAS. Zinc.

Data Package W0374-QES. Barium, copper, iron, magnesium, manganese, potassium, sodium, vanadium.

The following is a summary of the analytes detected in the preparation blanks at negative concentrations:

Data Package W0362-QES. Lead

Data Package W0374-QES. Lead

In accordance with validation requirements, sample results associated with the above preparation blanks were qualified as follows:

- undetected (U) for positive sample results less than 5X the highest blank concentration if associated with a positive blank result >IDL but <CRDL.
- estimated (UJ for non-detects, J for sample results within ten times (10X) the absolute value of the associated blank) if associated with negative blank results.

2.2.2.3 Equipment Blanks. Samples B0DM13, B0DM14, B0DM15 and B0DM16 were identified as equipment blanks with the following analytes and concentrations detected:

- B0DM13: aluminum (35.1 ug/L), antimony (166 ug/L), calcium (1700 ug/L), iron (155 ug/L), manganese (4.3 ug/L), nickel (16.7 ug/L), sodium (596 ug/L) and zinc (98.1 ug/L).
- B0DM14: antimony (152 ug/L), calcium (1400 ug/L), iron (34.6 ug/L), manganese (1.2 ug/L), sodium (437 ug/L) and zinc (28.7 ug/L).
- B0DM15: aluminum (24.9 ug/L), antimony (165 ug/L), calcium (1520 ug/L), manganese (1.6 ug/L) and zinc (53.8 ug/L).
- B0DM16: antimony (172 ug/L), calcium (1400 ug/L), iron (52.5 ug/L), manganese (1.8 ug/L), sodium (439 ug/L) and zinc (36.2 ug/L).

In accordance with the data validation procedures, qualification based on field QC was not required.

2.2.2.4 Trip Blanks. Samples B0DM17, B0DM18, B0DM19 and B0DM20 were identified as trip blanks with the following analytes and concentrations detected:

- B0DM17: barium (9.9 ug/L) and calcium (1310 ug/L).
- B0DM18: barium (7.8 ug/L) and calcium (83 ug/L).
- B0DM19: aluminum (24.2 ug/L), calcium (1270 ug/L), iron (119 ug/L) and zinc (68.1 ug/L).
- B0DM20: barium (8.0 ug/L), calcium (1220 ug/L), iron (199 ug/L) and zinc (11.6 ug/L).

In accordance with the data validation procedures, qualification based on field QC was not required.

2.3 HOLDING TIMES

Holding time requirements were acceptable for all samples in all data packages with the following exception:

Data Package W0355-QES. Mercury samples B0DLY2, B0DLX8, B0DLZ4 and B0DLZ6.

In accordance with the data validation procedures, sample results were qualified as estimated (UJ for nondetects, BJ for detects).

2.4 ANALYTICAL ACCURACY

2.4.1 Spike Samples

Matrix spike percent recoveries (%R) were acceptable for all data packages.

2.4.2 Laboratory Control Samples

All laboratory control sample percent recoveries were acceptable for all data packages.

2.5 ANALYTICAL PRECISION

2.5.1 Laboratory Duplicates

The laboratory duplicate relative percent differences were within the specified control limits for all data packages with the following exceptions:

Data Package W0362-QES. Iron.

Data Package W0374-QES. Zinc.

In accordance with the validation procedures, sample results exceeding the specified control limits were qualified as estimated (J).

2.5.2 Serial Dilution

The serial dilution percent difference results were within the specified limit of 10% for sample results greater than 50 times (50X) the instrument detection limit (IDL) with the exception of the following:

Data Package W0362-QES. Barium.

In accordance with the validation procedures, associated sample results were qualified as estimated (J) for detected results greater than 50X the IDL.

2.5.3 Field Duplicates

A total of four field duplicate sample sets were collected and Appendix B presents a summary of the primary and duplicate sample results and the calculated RPD values. All RPD values were acceptable.

2.5.4 Field Splits

A total of four field split sample sets were collected and Appendix B presents a summary of the field split sample results and the calculated RPD values. All RPD values were acceptable.

2.6 GRAPHITE FURNACE PERFORMANCE

2.6.1 Analytical Spikes

Analytical spikes were performed to determine the accuracy of the quantitation of graphite furnace results. All analytical spike recoveries were within the specified limits of 85% to 115% with the exception of the following:

Data Package W0362-QES. Lead sample B0DM03; selenium samples B0DM03, B0DM02, B0DM08, B0DM04, B0DM10, B0DM21 and B0DM22; thallium samples B0DM10, B0DM04, B0DM08, B0DM02, B0DM07, B0DM22, B0DM21, B0DM01 and B0DM09.

Data Package LK3406-LAS. Selenium sample B0DM28.

Data Package W0374-QES. Selenium sample B0DLX4; thallium sample B0DLY6.

In accordance with data validation procedures, results were qualified as estimated (J for detects).

2.7 SAMPLE RESULT QUANTITATION, VERIFICATION, AND REPORTED DETECTION LIMITS

Sample detection limits were calculated properly and were consistent with method detection limit requirements. All samples were verified and results for samples indicated with an asterisk(*) in Table 1-1 were recalculated and compared with the raw data and found acceptable.

2.8 SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

System performance was assessed by a review of the raw data with no indications of poor performance noted.

3.0 GENERAL CHEMISTRY ANALYSIS DATA VALIDATION SUMMARY

3.1 SUMMARY

This section presents a summary of the general chemistry data validation results and review against the WHC Statement of Work (WHC 1994). Table 1-1 shows the data package identification, sample identification, sample collection date, location and sample type. Appendix C provides a summary of all validated data results and Appendix D provides a summary of the field QC results.

3.1.1 Sample Delivery Groups

Sample results from five general chemistry data packages are included in this report:

Data Package ID	No. of Samples
LK3604-LAS	2
W0355-QES	10
W0362-QES	10
W0374-QES	6
W0387-QES	1

3.1.2 Samples Validated

Results for the data packages listed above were validated at the frequency specified in Section 1.0 with data qualifiers assigned as specified in the validation procedures.

3.1.3 Westinghouse Hanford Validation Guidance Used

Data validation was performed in accordance with Data Validation Procedures for Chemical Analyses (WHC 1993a).

3.1.4 Samples Analyzed

This section provides a summary of the data in terms of defined laboratory performance criteria and project-specific data quality objectives to assure the data is acceptable for use in the 100-KR-4 Round 7 Groundwater Sampling task.

- **Precision.** All laboratory duplicate sample RPD results were acceptable.

All field duplicate sample RPD results were acceptable with the exception of turbidity (see Section 3.5.2).

All field split sample RPD results were acceptable with the exception of turbidity (see Section 3.5.3).

- **Accuracy.** All matrix spikes were within specified control limits for all data packages.

All laboratory control sample results were within limits for all data packages.

- **Representativeness.** All field duplicate RPD values were acceptable with the exception of turbidity (see Section 3.5.2).
- **Completeness.** Overall, 27 water samples were validated for general chemistry with 189 results reported, 137 of which were deemed valid. This results in a completeness of 73 percent which does not meet normal work plan QAPjP objectives of 90 percent.
- **Comparability.** Samples were analyzed by similar methods and all results were reported in common units, facilitating comparison of the data.

3.1.5 Deficiencies Noted

Major and minor deficiencies were identified requiring qualification of the data which are explained in greater detail below.

3.2 ANALYTICAL METHOD

Performance of specific instrument quality assurance and quality control procedures, including deficiencies noted during the quality assurance review, are discussed below.

3.2.1 Initial and Continuing Calibration

Initial and continuing calibration requirements were met for all analyses in all data packages.

3.2.2 Blanks

Laboratory method blanks were analyzed at the proper frequency and results were reported and verified as undetected for all general chemistry parameters.

3.2.2.2 Trip Blanks. Samples B0DM17 and B0DM19 were identified as trip blanks with the following detected results:

- B0DM17: turbidity (1.12 NTU).
- B0DM19: turbidity (0.28 NTU).

3.2.2.3 Equipment Blanks. Samples B0DM13 and B0DM15 were identified as equipment blanks with the following detected results:

- B0DM13: turbidity (0.04 NTU).
- B0DM15: turbidity (0.35 NTU).

In accordance with the data validation procedures, no qualification was required based on field QC results.

3.3 HOLDING TIMES

The holding times for general chemistry parameters was met for all samples with the following exceptions:

Data Packages W0362-QES, W0355-QES, LK3604-QES, W0374-QES and W0387-QES.
Nitrate, nitrite, turbidity and phosphate.

In accordance with the validation requirements, undetected results associated with grossly exceeded holding times were qualified as unusable (UR). Undetected results associated with exceeded holding times were qualified as estimated (UJ) as were detected results associated with grossly exceeded holding times (J).

3.4 ANALYTICAL ACCURACY

3.4.1 Matrix Spike and Matrix Spike Duplicates

The matrix spike percent recoveries were all within specified control limits.

3.4.2 Laboratory Control Samples

All laboratory control sample percent recoveries were acceptable for all data packages.

3.5 ANALYTICAL PRECISION

3.5.1 Laboratory Duplicates

The laboratory duplicates relative percent differences were within the specified control limits for all data packages.

3.5.2 Field Duplicates

A total of two field duplicate sets were collected and analyzed for general chemistry parameters. Appendix D presents a summary of the primary and duplicate sample results and the calculated RPD values. All RPD values were acceptable with the exception of the following:

Sample sets B0DLX1/B0DM23 and B0DM07/B0DM21: turbidity.

In accordance with the data validation procedures qualification is not required based on field QC results.

3.5.3 Field Splits

A total of two samples were identified as field splits and were analyzed for general chemistry parameters. Appendix D presents a summary of the primary and field split sample results and the calculated RPD values. All RPD values were acceptable with the exception of the following:

Sample sets B0DLX1/B0DM27 and B0DM07/B0DM25: turbidity.

In accordance with the data validation procedures qualification is not required based on field QC results.

3.6 COMPOUND IDENTIFICATION

The compound identification and confirmation were acceptable for all validated samples.

3.7 SAMPLE RESULT QUANTITATION, VERIFICATION, AND REPORTED DETECTION LIMITS

All sample results were verified and recalculated against the raw data and were acceptable. Sample quantitation limits for all samples were calculated correctly and properly reported.

3.8 SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

System performance was assessed by a review of the raw data. No indications of poor performance were noted such as shifting baselines.

4.0 RADIOCHEMISTRY DATA VALIDATION SUMMARY

4.1 SUMMARY

This section presents a summary of the radiochemistry data validation results and review against the WHC Statement of Work (WHC 1994). Table 1-1 shows the data package identification, sample identification, sample collection date, location and sample type. Appendix E provides a summary of all validated data results and Appendix F provides a summary of the field QC results.

4.1.1 Sample Delivery Groups

Sample results from five radiochemistry data packages are included in this report:

Data Package ID	No. of Samples
LK3604-LAS	2
W0355-QES	10
W0362-QES	10
W0374-QES	6
W0387-QES	1

4.1.2 Samples Validated

Results for the data packages listed above were validated at the frequency specified in Section 1.0 with data qualifiers assigned as specified in the validation procedures.

4.1.3 Westinghouse Hanford Validation Guidance Used

Data validation was performed in accordance with Data Validation Procedures for Radiochemical Analyses (WHC 1993b).

4.1.4 Samples Analyzed

This section provides a summary of the data in terms of defined laboratory performance criteria and project-specific data quality objectives to assure the data is acceptable for use in the 100-KR-4 Round 7 Groundwater Sampling task.

- **Precision.** Laboratory duplicate RPD results were acceptable for all data packages with the exception of carbon-14, uranium-234 and uranium-238 (see Section 4.4.1).

Field duplicate RPD results were acceptable for all sample sets collected.

- **Accuracy.** Laboratory control sample results were acceptable for all data packages.

Matrix spike recoveries were acceptable for all results with the exception of tritium and carbon-14 (see Section 4.3.2).

Tracer yields were acceptable for all samples analyzed.

- **Representativeness.** Field duplicate RPDs were acceptable for all data packages.

Field split sample RPDs were acceptable with the exception of gross beta (see Section 4.4.3).

- **Completeness.** A total of 29 samples were validated for radiochemistry parameters with 203 results reported, all of which were deemed valid. This results in a completeness of 100 percent which meets normal work plan objectives of 90 percent.
- **Comparability.** Samples were analyzed by similar methods and all results were reported in common units, facilitating comparison of results.

4.1.5 Deficiencies Noted

There were no major deficiencies identified during validation which required qualification of the data as unusable. Minor deficiencies were identified requiring qualification of the data which are explained in greater detail below.

4.2 ANALYTICAL METHOD

The following paragraphs summarize the analytical requirements for the radiochemistry analyses.

4.2.1 Instrument Calibration

Initial and continuing calibration requirements were met for all analyses in all data packages.

4.2.2 Blanks

4.2.2.1 Method Blanks. Laboratory method blanks were analyzed at the proper frequency and results were reported and verified as undetected for all analyses.

4.2.2.2 Equipment Blanks. Samples B0DM13 and B0DM15 were identified as equipment blanks and all results were acceptable.

4.2.2.3 Trip Blanks. Samples B0DM17 and B0DM19 were identified as trip blanks with all results reported as nondetected.

4.2.3 Holding Times

Holding time requirements were met for all samples validated.

4.3 ANALYTICAL ACCURACY

4.3.1 Laboratory Control Samples

Laboratory control (blank spike) samples were analyzed at the required frequency and all results were within control limits.

4.3.2 Matrix Spikes

Matrix spike samples were analyzed in addition to blank spikes and all results were within control limits with the exception of the following.

Data Packages W0362-QES and W0374-QES. Tritium and carbon-14 matrix spike analyses were not performed.

In accordance with the validation requirements, sample results of data packages with no matrix spike batch analysis were qualified as estimated (J/UJ).

4.3.3 Chemical Yield

Chemical yields for carriers and tracers were acceptable for all analyses.

4.4 ANALYTICAL PRECISION

4.4.1 Laboratory Duplicates

Laboratory duplicate relative percent difference (RPD) values were acceptable with the exception of the following:

Data Package LK3604-LAS. Carbon-14 for sample B0DM27.

Data Package W0374-QES. Uranium-234, uranium-238, samples B0DLX1, B0DLY5, B0DM13, B0DM15, B0DM19 and B0DLX3.

In accordance with the validation requirements, samples results were qualified as estimated (J, UJ) for the indicated analysis.

4.4.2 Field Duplicates

Two sets of field duplicates were collected and Appendix F presents a summary of the primary and duplicate sample results and the calculated RPD values. All RPD values were acceptable.

4.4.3 Field Splits

Two sets of field splits were collected and Appendix F presents a summary of the primary and duplicate sample results and the calculated RPD values. All RPD values were acceptable with the following exception:

Sample set B0DM07/B0DM25: gross beta.

In accordance with the validation requirements, qualification was not required.

4.5 SAMPLE RESULTS QUANTITATION, VERIFICATION AND REPORTED DETECTION LIMITS

All sample results were verified and confirmed against the raw data and correctly reported. Validated results were calculated using the proper detectors, efficiencies and background counts.

Minimum detectable activities (MDAs) met method detection limit requirements.

4.6 SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

System performance was assessed by a review of the raw data and no indications of poor performance were noted.

5.0 REFERENCES

- WHC 1993a, Data Validation Procedures for Chemical Analyses, WHC-SD-EN-SPP-002, Rev. 2, 1993. Westinghouse Hanford Company, Richland, Washington.
- WHC 1993b, Data Validation Procedures for Radiochemical Analyses, WHC-SD-EN-SPP-001, Rev. 1, 1993. Westinghouse Hanford Company, Richland, Washington.
- WHC 1994, Environmental and Waste Characterization Analytical Data Validation, Statement of Work, MSH-SWV-315905, August 10, 1994, Westinghouse Hanford Company, Richland, Washington.

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APPENDIX A

Metals Validated Data Summary Tables

A-1

Parameter	Samp#	BODLX1		BODLX2		BODLX3		BODLX4		BODLY5		BODLY6	
	Date	1-11-95	1-11-95	1-11-95	1-17-95	1-17-95	1-17-95	1-17-95	1-11-95	1-11-95	1-11-95	1-11-95	1-11-95
	Location	199-K-11		199-K-11		199-K-13		199-K-13		199-K-23		199-K-23	
	Depth	---		---		---		---		---		---	
	Type	WATER											
	Comments												
	Units	Result	Q										
ALUMINUM	UG/L	23.500	U	23.500	U	23.500	U	23.500	U	161.000	B	23.500	U
ANTIMONY	UG/L	32.800	U	32.800	U	83.400		92.100		32.800	U	32.800	U
ARSENIC	UG/L	12.200		12.200		1.200	U	1.200	U	2.900	B	3.000	B
BARIUM	UG/L	31.000	B	28.100	B	25.300	B	19.000	B	52.400	B	43.300	B
BERYLLIUM	UG/L	1.200	U	1.200	U	0.650	U	0.270	U	1.200	U	1.200	U
CADMIUM	UG/L	3.800	U										
CALCIUM	UG/L	32600.000		32100.000		23500.000		22900.000		71800.000		71500.000	
CHROMIUM	UG/L	3.000	B	2.900	U	2.900	U	2.900	U	115.000		28.400	
COBALT	UG/L	4.100	U										
COPPER	UG/L	27.400	U	34.000	U	12.100	U	8.900	U	40.600	U	36.600	U
IRON	UG/L	133.000		57.600	U	994.000		411.000		2540.000		80.600	U
LEAD	UG/L	0.800	UJ	0.800	UJ	0.800	U	0.800	U	0.800	UJ	0.800	UJ
MAGNESIUM	UG/L	9210.000		9050.000		9180.000		9060.000		19300.000		19200.000	
MANGANESE	UG/L	5.800	U	5.000	U	52.700		50.700		43.200		19.200	
MERCURY	UG/L	0.100	U										
NICKEL	UG/L	15.200	U	15.200	U	15.200	U	15.200	U	47.100		15.200	U
POTASSIUM	UG/L	7270.000	U	6120.000	U	6780.000		6110.000		8620.000	U	8770.000	U
SELENIUM	UG/L	1.000	U	1.000	U	1.000	U	1.000	UJ	1.000	U	1.000	U
SILVER	UG/L	3.800	U										
SODIUM	UG/L	29400.000		28100.000		18800.000		18700.000		23400.000		23500.000	
THALLIUM	UG/L	0.950	U	0.900	UJ								
VANADIUM	UG/L	45.900	U	47.600	U	7.600	UJ	4.000	UJ	32.600	U	31.400	U
ZINC	UG/L	15.000	BJ	12.200	BJ	370.000	J	36.400	J	49.400	J	13.200	BJ

The decimal places shown do not reflect the precision reported by the laboratory

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Parameter	Samp#	BODL27		BODL28		BODM04		BODM05		BODM06		BODM07	
	Date	1-18-95		1-18-95		1-6-95		1-10-95		1-10-95		1-6-95	
	Location	199-K-33		199-K-33		199-K-36		199-K-37		199-K-37		699-70-68	
	Depth	---		---		---		---		---		---	
	Type	WATER		WATER		WATER		WATER		WATER		WATER	
	Comments												
	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
ALUMINUM	UG/L	23.500	U	23.500	U	26.000	B	23.500	U	23.500	U	23.500	U
ANTIMONY	UG/L	32.700	U	32.700	U	32.800	U	32.800	U	32.800	U	32.800	U
ARSENIC	UG/L	1.200	U	1.400	B	3.200	B	3.400	B	3.700	B	3.200	B
BARIUM	UG/L	41.100	B	42.800	B	46.300	BJ	33.400	BJ	31.900	BJ	16.200	B
BERYLLIUM	UG/L	0.710	B	0.470	B	0.270	U	1.100	U	1.100	U	0.260	U
CADMIUM	UG/L	3.800	U	3.800	U	3.800	U	3.800	U	3.800	U	3.800	U
CALCIUM	UG/L	89600.000		93400.000		59800.000		40100.000		38600.000		35200.000	
CHROMIUM	UG/L	17.500		17.700	B	914.000		110.000		106.000		2.900	U
COBALT	UG/L	4.100	U	4.100	U	4.100	U	4.100	U	4.100	U	4.100	U
COPPER	UG/L	11.300	B	11.600	B	10.500	U	26.300	U	24.900	U	12.600	U
IRON	UG/L	81.400	B	46.600	B	50.100	U	60.700	U	89.100	B	83.500	BJ
LEAD	UG/L	0.800	U	0.800	U	0.800	UJ	0.800	UJ	0.800	UJ	0.800	UJ
MAGNESIUM	UG/L	11400.000		11800.000		14900.000		8830.000		8570.000		9900.000	
MANGANESE	UG/L	4.800	B	4.100	B	4.800	U	4.700	U	4.100	U	2.100	U
MERCURY	UG/L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U
NICKEL	UG/L	15.200	U	15.200	U	52.600		15.200	U	15.200	U	15.200	U
POTASSIUM	UG/L	2660.000	U	2660.000	U	7040.000	U	4740.000	U	2710.000	U	5250.000	U
SELENIUM	UG/L	2.400	B	1.600	B	1.000	UJ	1.000	UJ	1.000	UJ	1.000	U
SILVER	UG/L	3.800	U	3.800	U	3.800	U	3.800	U	3.800	U	3.800	U
SODIUM	UG/L	15300.000		16000.000		15200.000		9730.000		9500.000		14200.000	
THALLIUM	UG/L	0.900	U	0.900	U	1.600	BJ	0.900	U	0.900	U	0.900	UJ
VANADIUM	UG/L	10.600	B	10.300	B	15.800	U	33.600	U	34.900	U	20.400	U
ZINC	UG/L	23.900		15.200	B	9.600	B	12.200	B	5.200	U	16.000	B

The decimal places shown do not reflect the precision reported by the laboratory

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Parameter	Samp#	BODM08		BODM09		BODM10		BODM11		BODM12		BODM13	
	Date	1-6-95		1-6-95		1-6-95		1-5-95		1-5-95		1-17-95	
	Location	699-70-68		699-78-62		699-78-62		699-73-61		699-73-61		EQUIP BLANK 1	
	Depth	---		---		---		---		---		---	
	Type	WATER		WATER									
	Comments											EQUIPMENT BLANK	
	Units	Result	Q	Result	Q								
ALUMINUM	UG/L	33.400	B	26.900	U	23.500	U	23.500	U	23.500	U	35.100	B
ANTIMONY	UG/L	32.800	U	166.000									
ARSENIC	UG/L	3.500	B	4.000	B	3.400	B	2.700	B	2.100	B	1.200	U
BARIUM	UG/L	16.200	B	31.100	BJ	33.000	BJ	27.100	BJ	27.100	BJ	6.300	U
BERYLLIUM	UG/L	0.200	U	0.260	U	0.260	U	0.240	U	0.250	U	0.440	U
CADMIUM	UG/L	3.800	U	3.800	U								
CALCIUM	UG/L	35500.000		42100.000		45200.000		39800.000		39900.000		1700.000	B
CHROMIUM	UG/L	2.900	U	38.400		38.700		8.900	B	6.900	B	2.900	U
COBALT	UG/L	4.100	U	4.100	U								
COPPER	UG/L	8.900	U	12.000	U	16.400	U	14.700	U	8.800	U	11.700	U
IRON	UG/L	39.400	U	96.900	BJ	36.900	U	86.500	BJ	24.300	U	155.000	U
LEAD	UG/L	0.800	UJ	0.910	BJ	0.800	UJ	2.700	BJ	1.800	BJ	0.800	U
MAGNESIUM	UG/L	10000.000		11900.000		12800.000		10800.000		10800.000		440.000	U
MANGANESE	UG/L	1.200	U	1.500	U	1.500	U	7.100	B	6.900	B	4.300	B
MERCURY	UG/L	0.100	U	0.100	U	0.100	UJ	0.100	U	0.100	U	0.100	U
NICKEL	UG/L	15.200	U	16.700	B								
POTASSIUM	UG/L	6940.000	U	6380.000	U	5640.000		6780.000		5980.000		2660.000	U
SELENIUM	UG/L	1.000	UJ	1.000	U	1.000	UJ	1.200	B	1.000	U	1.000	U
SILVER	UG/L	3.800	U	3.800	U								
SODIUM	UG/L	14600.000		17100.000		18400.000		19200.000		19100.000		596.000	B
THALLIUM	UG/L	0.900	UJ	0.900	UJ	0.900	UJ	0.900	U	1.000	B	0.900	U
VANADIUM	UG/L	16.100	U	19.300	U	23.200	U	14.000	U	14.900	U	5.900	UJ
ZINC	UG/L	7.800	B	128.000		35.800		144.000		61.200		98.100	J

The decimal places shown do not reflect the precision reported by the laboratory

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Parameter	Samp#	BODM14		BODM15		BODM16		BODM17		BODM18		BODM19	
	Date	1-17-95		1-17-95		1-17-95		1-10-95		1-10-95		1-11-95	
	Location	EQUIP BLANK 1		EQUIP BLANK 2		EQUIP BLANK 2		199-K-34		199-K-34		TRIP BLANK 2	
	Depth	---		---		---		---		---		---	
	Type	WATER		WATER		WATER		WATER		WATER		WATER	
	Comments	EQUIPMENT BLANK		EQUIPMENT BLANK		EQUIPMENT BLANK		TRIP BLANK		TRIP BLANK		TRIP BLANK	
	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
ALUMINUM	UG/L	23.500	U	24.900	B	23.500	U	23.500	U	23.500	U	24.200	B
ANTIMONY	UG/L	152.000		165.000		172.000		32.800	U	32.800	U	32.800	U
ARSENIC	UG/L	1.200	U	1.200	U	1.200	U	1.200	UJ	1.200	UJ	1.200	U
BARIUM	UG/L	4.000	U	4.200	U	5.000	U	9.900	B	7.800	B	5.600	U
BERYLLIUM	UG/L	0.220	U	0.330	U	0.330	U	0.920	U	0.920	U	1.000	U
CADMIUM	UG/L	3.800	U	3.800	U	3.800	U	3.800	U	3.800	U	3.800	U
CALCIUM	UG/L	1400.000	B	1520.000	B	1400.000	B	1310.000	B	83.000	B	1270.000	B
CHROMIUM	UG/L	2.900	U	2.900	U	2.900	U	2.900	U	2.900	U	2.900	U
COBALT	UG/L	4.100	U	4.100	U	4.100	U	4.100	U	4.100	U	4.100	U
COPPER	UG/L	8.600	U	8.200	U	12.000	U	25.200	U	25.600	U	28.400	U
IRON	UG/L	34.600	B	24.200	U	52.500	B	45.600	U	27.500	U	119.000	
LEAD	UG/L	0.800	U	0.800	U	0.800	U	0.800	UJ	0.800	UJ	0.800	UJ
MAGNESIUM	UG/L	347.000	U	325.000	U	359.000	U	533.000	U	373.000	U	590.000	U
MANGANESE	UG/L	1.200	B	1.600	B	1.800	B	3.000	U	2.800	U	4.000	U
MERCURY	UG/L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U
NICKEL	UG/L	15.200	U	15.200	U	15.200	U	15.200	U	15.200	U	15.200	U
POTASSIUM	UG/L	2660.000	U	2660.000	U	2660.000	U	2660.000	U	2660.000	U	2660.000	U
SELENIUM	UG/L	1.000	U	1.000	U	1.000	U	1.000	UJ	1.000	UJ	1.000	U
SILVER	UG/L	3.800	U	3.800	U	3.800	U	3.800	U	3.800	U	3.800	U
SODIUM	UG/L	437.000	B	362.000	U	439.000	B	496.000	U	362.000	U	452.000	U
THALLIUM	UG/L	0.900	U	0.900	U	0.900	U	0.900	U	0.900	U	0.900	U
VANADIUM	UG/L	3.000	UJ	3.000	UJ	5.700	UJ	17.900	U	21.400	U	20.200	U
ZINC	UG/L	27.800	J	53.800	J	36.200	J	20.600		5.200	U	68.100	J

The decimal places shown do not reflect the precision reported by the laboratory

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Parameter	Samp#	BODM20		BODM21		BODM22		BODM24	
	Date	1-11-95		1-6-95		1-6-95		1-11-95	
	Location	TRIP BLANK 2		DUPLICATE 1		DUPLICATE 1		DUPLICATE 2	
	Depth	---		---		---		---	
	Type	WATER		WATER		WATER		WATER	
	Comments	TRIP BLANK		FIELD DUPLICATE		FIELD DUPLICATE		FIELD DUPLICATE	
	Units	Result	Q	Result	Q	Result	Q	Result	Q
ALUMINUM	UG/L	23.500	U	23.500	U	23.500	U	23.500	U
ANTIMONY	UG/L	32.800	U	32.800	U	32.800	U	32.800	U
ARSENIC	UG/L	1.200	U	3.400	B	3.700	B	12.100	
BARIUM	UG/L	8.000	B	17.000	B	17.200	B	26.700	BJ
BERYLLIUM	UG/L	1.200	U	0.260	U	0.260	U	1.200	U
CADMIUM	UG/L	3.800	U	3.800	U	3.800	U	3.800	U
CALCIUM	UG/L	1220.000	B	37100.000		37500.000		32700.000	
CHROMIUM	UG/L	2.900	U	2.900	U	2.900	U	3.000	B
COBALT	UG/L	4.100	U	4.100	U	4.100	U	4.100	U
COPPER	UG/L	31.000	U	11.900	U	14.000	U	28.500	U
IRON	UG/L	199.000		136.000	J	27.700	U	89.100	U
LEAD	UG/L	0.800	UJ	0.800	UJ	0.800	UJ	0.800	UJ
MAGNESIUM	UG/L	637.000	U	10400.000		10600.000		9240.000	
MANGANESE	UG/L	4.200	U	2.100	U	1.900	U	4.200	U
MERCURY	UG/L	0.100	U	0.100	U	0.100	U	0.100	U
NICKEL	UG/L	15.200	U	15.200	U	15.200	U	15.200	U
POTASSIUM	UG/L	2660.000	U	6570.000	U	4920.000	U	4770.000	U
SELENIUM	UG/L	1.000	U	1.000	UJ	1.000	UJ	1.000	U
SILVER	UG/L	3.800	U	3.800	U	3.800	U	3.800	U
SODIUM	UG/L	498.000	U	15000.000		15300.000		29800.000	
THALLIUM	UG/L	0.900	U	1.200	UJ	0.900	UJ	0.900	U
VANADIUM	UG/L	23.400	U	21.700	U	21.300	U	48.000	U
ZINC	UG/L	11.600	BJ	11.000	B	15.100	B	5.200	U

The decimal places shown do not reflect the precision reported by the laboratory

A-5

Parameter	Samp#	BODLX5		BODLX6		BODLX7		BODLX8		BODLX9		BODLY0	
	Date	1-4-95		1-4-95		1-3-95		1-3-95		1-4-95		1-4-95	
	Location	199-K-18		199-K-18		199-K-19		199-K-19		199-K-20		199-K-20	
	Depth	---		---		---		---		---		---	
	Type	WATER		WATER		WATER		WATER		WATER		WATER	
	Comments												
	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
ALUMINUM	UG/L	23.500	U	29.800	B	66.700	B	23.500	U	23.800	B	23.500	U
ANTIMONY	UG/L	88.400	U	88.400	U	88.400	U	88.400	U	88.400	U	88.400	U
ARSENIC	UG/L	1.800	B	1.700	B	1.200	U	1.200	U	2.800	B	2.600	B
BARIUM	UG/L	40.400	B	38.400	B	27.100	B	26.000	B	27.500	B	25.800	B
BERYLLIUM	UG/L	0.270	B	0.260	B	0.250	B	0.250	B	0.530	B	0.260	B
CADMIUM	UG/L	3.800	U	3.800	U	3.800	U	3.800	U	3.800	U	3.800	U
CALCIUM	UG/L	71600.000		70100.000		58100.000		54800.000		47500.000		47100.000	
CHROMIUM	UG/L	44.500		34.900		113.000		108.000		163.000		155.000	
COBALT	UG/L	4.100	U	4.100	U	4.100	U	4.100	U	4.100	U	4.100	U
COPPER	UG/L	21.300	B	12.000	B	10.400	B	16.000	B	16.400	B	17.600	B
IRON	UG/L	1310.000		101.000		213.000		80.600	B	646.000		118.000	
LEAD	UG/L	0.800	U	0.800	U	0.800	U	0.800	U	0.800	U	0.800	U
MAGNESIUM	UG/L	12300.000		11900.000		8820.000		8440.000		9980.000		9820.000	
MANGANESE	UG/L	15.000	B	5.300	B	7.300	B	3.200	B	6.500	B	1.800	B
MERCURY	UG/L	0.100	U	0.100	U	0.100	U	0.100	UJ	0.100	U	0.100	U
NICKEL	UG/L	15.200	U	15.200	U	15.200	U	15.200	U	15.200	U	15.200	U
POTASSIUM	UG/L	4650.000	B	4240.000	B	2660.000	U	2660.000	U	3590.000	B	2660.000	U
SELENIUM	UG/L	1.000	U	1.000	U	1.000	U	1.000	U	1.500	B	1.000	U
SILVER	UG/L	3.800	U	3.800	U	3.800	U	3.800	U	3.800	U	3.800	U
SODIUM	UG/L	5240.000		5100.000		6840.000		6740.000		5890.000		5760.000	
THALLIUM	UG/L	1.000	B	0.900	U	0.900	U	0.900	U	0.900	U	0.900	U
VANADIUM	UG/L	19.300	B	14.500	B	11.500	B	11.200	B	19.300	B	16.600	B
ZINC	UG/L	11.300	B	45.300		241.000		78.200		34.500		14.400	B

The decimal places shown do not reflect the precision reported by the laboratory

9713509.1097

971509.1098

Parameter	Samp# Date Location Depth Type Comments	BODLY1 1-3-95 199-K-21 --- WATER		BODLY2 1-3-95 199-K-21 --- WATER		BODLY3 1-4-95 199-K-21 --- WATER		BODLY4 1-4-95 199-K-21 --- WATER		BODLY7 1-4-95 199-K-27 --- WATER		BODLY8 1-4-95 199-K-27 --- WATER	
	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
ALUMINUM	UG/L	228.000		23.500	U	23.500	U	23.500	U	23.500	U	23.500	U
ANTIMONY	UG/L	88.400	U	88.400	U	88.400	U	88.400	U	88.400	U	88.400	U
ARSENIC	UG/L	1.200	U	1.200	U	1.200	U	1.200	U	1.200	U	1.200	U
BARIUM	UG/L	21.500	B	18.000	B	22.600	B	22.700	B	30.400	B	29.600	B
BERYLLIUM	UG/L	0.460	B	0.390	B	0.270	B	0.260	B	0.260	B	0.260	B
CADMIUM	UG/L	3.800	U	3.800	U	3.800	U	3.800	U	3.800	U	3.800	U
CALCIUM	UG/L	47000.000		45300.000		46800.000		47100.000		56500.000		55400.000	
CHROMIUM	UG/L	131.000		90.000		162.000		160.000		2.900	U	2.900	U
COBALT	UG/L	4.100	U	4.100	U	4.100	U	4.100	U	4.100	U	4.100	U
COPPER	UG/L	15.800	B	12.500	B	12.300	B	10.800	B	11.600	B	13.100	B
IRON	UG/L	714.000		47.100	B	43.400	B	28.100	B	90.600	B	38.100	B
LEAD	UG/L	0.800	U	0.800	U	0.800	U	0.800	U	2.600	B	0.800	U
MAGNESIUM	UG/L	9540.000		9110.000		8800.000		8780.000		12600.000		12300.000	
MANGANESE	UG/L	20.700		3.200	B	1.900	B	1.900	B	1.900	B	1.700	B
MERCURY	UG/L	0.100	U	0.100	UJ	0.100	U	0.100	U	0.100	U	0.100	U
NICKEL	UG/L	28.100	B	15.200	U	15.200	U	15.200	U	15.200	U	15.200	U
POTASSIUM	UG/L	2660.000	U	2660.000	U	3730.000	B	5330.000		4580.000	B	4870.000	B
SELENIUM	UG/L	1.000	U	1.000	U	1.000	U	1.200	B	1.000	U	1.000	U
SILVER	UG/L	3.800	U	3.800	U	15.500		3.800	U	3.800	U	3.800	U
SODIUM	UG/L	4230.000	B	4020.000	B	7120.000		7040.000		7250.000		6940.000	
THALLIUM	UG/L	0.900	U	1.100	B	0.900	U	0.900	U	0.900	U	0.900	U
VANADIUM	UG/L	7.900	B	9.300	B	11.000	B	9.000	B	12.100	B	13.400	B
ZINC	UG/L	27.800		12.000	B	332.000		191.000		10.700	B	14.600	B

The decimal places shown do not reflect the precision reported by the laboratory

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9715509.1099

Parameter	Samp#	BODLY9		BODLZ0		BODLZ1		BODLZ2		BODLZ3		BODLZ4	
	Date	1-4-95		1-4-95		1-4-95		1-4-95		1-3-95		1-3-95	
	Location	199-K-30		199-K-30		199-K-31		199-K-31		199-K-32B		199-K-32B	
	Depth	---		---		---		---		---		---	
	Type	WATER											
	Comments												
	Units	Result	Q										
ALUMINUM	UG/L	23.500	U	23.500	U	23.500	U	23.500	U	36.400	B	26.000	B
ANTIMONY	UG/L	88.400	U										
ARSENIC	UG/L	2.200	B	1.900	B	1.900	B	1.800	B	1.200	U	1.200	U
BARIUM	UG/L	38.000	B	38.600	B	26.800	B	25.900	B	24.800	B	24.800	B
BERYLLIUM	UG/L	0.250	B	0.250	B	0.270	B	0.200	U	0.250	B	0.240	B
CADMIUM	UG/L	3.800	U										
CALCIUM	UG/L	72900.000		75200.000		38700.000		37700.000		46900.000		46600.000	
CHROMIUM	UG/L	5.000	B	4.100	B	13.200		13.800		31.100		23.700	
COBALT	UG/L	4.100	U										
COPPER	UG/L	9.300	B	13.300	B	10.700	B	9.300	B	8.000	B	10.000	B
IRON	UG/L	106.000		28.000	B	61.200	B	34.300	B	80.000	B	58.300	B
LEAD	UG/L	0.800	U										
MAGNESIUM	UG/L	16100.000		16600.000		9070.000		8860.000		5960.000		5910.000	
MANGANESE	UG/L	5.600	B	2.500	B	2.400	B	0.800	U	2.500	B	2.400	B
MERCURY	UG/L	0.100	U	0.160	BJ								
NICKEL	UG/L	15.200	U										
POTASSIUM	UG/L	7690.000		7230.000		5040.000		4890.000	B	2720.000	B	4570.000	B
SELENIUM	UG/L	1.200	B	1.000	U								
SILVER	UG/L	3.800	U										
SODIUM	UG/L	11900.000		12300.000		14000.000		13600.000		6890.000		6810.000	
THALLIUM	UG/L	0.900	U										
VANADIUM	UG/L	14.500	B	17.300	B	16.500	B	14.900	B	6.600	B	8.000	B
ZINC	UG/L	26.400		10.500	B	17.300	B	13.800	B	13.500	B	11.500	B

The decimal places shown do not reflect the precision reported by the laboratory

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Parameter	Samp#	B0DL25		B0DL26		B0DL29		B0DM00		B0DM01		B0DM02	
	Date	1-3-95		1-3-95		1-10-95		1-10-95		1-6-95		1-6-95	
	Location	199-K-32A		199-K-32A		199-K-34		199-K-34		199-K-35		199-K-35	
	Depth	---		---		---		---		---		---	
	Type	WATER		WATER		WATER		WATER		WATER		WATER	
	Comments												
	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
ALUMINUM	UG/L	45.800	B	26.200	B	24.200	B	23.500	U	28.300	U	23.500	U
ANTIMONY	UG/L	88.400	U	88.400	U	32.800	U	32.800	U	32.800	U	32.800	U
ARSENIC	UG/L	1.200	U	1.200	U	1.500	BJ	1.200	UJ	4.000	B	3.200	B
BARIUM	UG/L	72.600	B	70.600	B	34.500	BJ	39.800	BJ	29.600	BJ	29.100	BJ
BERYLLIUM	UG/L	0.200	U	0.200	U	1.200	U	0.920	U	0.260	U	0.200	U
CADMIUM	UG/L	3.800	U	3.800	U	3.800	U	3.800	U	3.800	U	3.800	U
CALCIUM	UG/L	29400.000		28600.000		61200.000		59900.000		37200.000		36700.000	
CHROMIUM	UG/L	54.600		6.100	B	29.700		19.300		28.800		14.300	
COBALT	UG/L	4.100	U	4.100	U	4.100	U	4.100	U	4.100	U	4.100	U
COPPER	UG/L	9.300	B	7.500	B	23.600	U	29.300	U	16.700	U	10.000	U
IRON	UG/L	239.000		61.300	B	96.600	BJ	44.100	U	166.000	J	34.100	U
LEAD	UG/L	0.800	U	0.800	U	0.800	UJ	0.800	UJ	0.800	UJ	0.800	UJ
MAGNESIUM	UG/L	16100.000		15800.000		11900.000		11700.000		10100.000		10100.000	
MANGANESE	UG/L	16.700		10.500	B	6.000	U	4.100	U	3.700	U	0.850	U
MERCURY	UG/L	0.100	U	0.100	UJ	0.100	U	0.100	U	0.100	U	0.100	U
NICKEL	UG/L	60.000		15.200	U								
POTASSIUM	UG/L	5890.000		4430.000	B	5380.000	U	4510.000	U	5300.000	U	4220.000	U
SELENIUM	UG/L	1.100	B	1.600	B	1.000	UJ	1.000	UJ	1.000	U	1.000	UJ
SILVER	UG/L	3.800	U	3.800	U	3.800	U	3.800	U	3.800	U	3.800	U
SODIUM	UG/L	29700.000		29100.000		17600.000		16700.000		13400.000		13400.000	
THALLIUM	UG/L	0.900	U	0.900	U	0.900	U	0.900	U	0.900	UJ	0.900	UJ
VANADIUM	UG/L	8.700	B	8.600	B	24.300	U	22.500	U	21.600	U	17.200	U
ZINC	UG/L	12.500	B	15.100	B	6.000	B	9.600	B	9.900	B	11.300	B

The decimal places shown do not reflect the precision reported by the laboratory

9715509.1100

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Parameter	Samp#	B0DM03		B0DM23		B0DM25		B0DM26		B0DM27		B0DM28	
	Date	1-6-95		1-11-95		1-6-95		1-6-95		1-11-95		1-11-95	
	Location	199-K-36		DUPLICATE 2		SPLIT 1		SPLIT 1		SPLIT 2		SPLIT 2	
	Depth	---		---		---		---		---		---	
	Type	WATER		WATER		WATER		WATER		WATER		WATER	
	Comments			FIELD DUPLICATE		SPLIT		SPLIT		SPLIT		SPLIT	
	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
ALUMINUM	UG/L	34.900	U	23.500	U	61.400	B	26.000	U	26.000	U	26.000	U
ANTIMONY	UG/L	32.800	U	32.800	U	45.000	U	45.000	U	50.100	B	45.000	U
ARSENIC	UG/L	3.100	B	12.000		2.100	B	2.500	B	11.900		12.500	
BARIUM	UG/L	47.600	BJ	27.300	BJ	14.100	B	13.900	B	21.800	B	21.200	B
BERYLLIUM	UG/L	0.260	U	1.200	U	1.000	U	1.000	U	1.000	U	1.000	U
CADMIUM	UG/L	3.800	U	3.800	U	3.000	U	3.000	U	3.000	U	3.000	U
CALCIUM	UG/L	61500.000		31300.000		32400.000		33900.000		30100.000		30600.000	
CHROMIUM	UG/L	956.000		2.900	U	4.200	U	3.000	U	5.000	U	4.400	U
COBALT	UG/L	4.100	U	4.100	U	7.000	U	7.000	U	7.000	U	7.000	U
COPPER	UG/L	11.600	U	25.900	U	3.000	U	3.000	U	3.000	U	3.000	U
IRON	UG/L	337.000	J	156.000	J	76.200	B	9.300	U	90.400	B	6.600	U
LEAD	UG/L	0.800	UJ	0.800	UJ	2.000	U	2.000	U	2.000	U	2.000	U
MAGNESIUM	UG/L	15300.000		8930.000		9040.000		9320.000		8310.000		8320.000	
MANGANESE	UG/L	7.500	U	5.200	U	1.500	U	1.000	U	2.700	U	1.000	U
MERCURY	UG/L	0.100	U	0.100	U	NR		NR		NR		NR	
NICKEL	UG/L	67.400		15.200	U	12.000	U	12.000	U	12.000	U	12.000	U
POTASSIUM	UG/L	6670.000	U	6740.000	U	4850.000	B	4990.000	B	4840.000	B	4700.000	B
SELENIUM	UG/L	1.000	UJ	1.000	U	2.000	U	2.000	U	2.000	U	2.000	UJ
SILVER	UG/L	3.800	U	3.800	U	4.000	U	4.000	U	4.000	U	4.000	U
SODIUM	UG/L	15500.000		29400.000		13800.000		14200.000		29000.000		28600.000	
THALLIUM	UG/L	0.970	B	0.920	U	3.000	U	3.000	U	3.000	U	3.000	U
VANADIUM	UG/L	16.100	U	44.800	U	12.600	U	13.200	U	24.400	U	24.000	B
ZINC	UG/L	15.600	B	5.200	U	11.900	U	2.000	U	6.500	U	2.000	U

The decimal places shown do not reflect the precision reported by the laboratory

9713509.1102

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APPENDIX B

Metals Validated Field Quality Control Sample Summary

LOCATION		199-K-11					
DATE		1/11/95					
SAMPLE TYPE		SAMPLE		DUPLICATE			
SAMPLE ID		B0DLX1		B0DM23			
COMPOUND	CRDL	RESULT	Q	RESULT	Q	UNITS	RPD(%)
ALUMINUM	200.00	23.50	U	23.50	U	ug/L	NC
ANTIMONY	60.00	32.80	U	32.80	U	ug/L	NC
ARSENIC	10.00	12.20		12.00		ug/L	1.65
BARIIUM	200.00	31.00	B	27.30	BJ	ug/L	12.69
BERYLLIUM	5.00	1.20	U	1.20	U	ug/L	NC
CADMIUM	5.00	3.80	U	3.80	U	ug/L	NC
CALCIUM	5000.00	32600.00		31300.00		ug/L	4.07
CHROMIUM	10.00	3.00	B	2.90	U	ug/L	200
COBALT	50.00	4.10	U	4.10	U	ug/L	NC
COPPER	25.00	27.40	U	25.90	U	ug/L	NC
IRON	100.00	133.00		156.00	J	ug/L	15.91
LEAD	3.00	0.80	UJ	0.80	UJ	ug/L	NC
MAGNESIUM	5000.00	9210.00		8930.00		ug/L	3.09
MANGANESE	15.00	5.80	U	5.20	U	ug/L	NC
MERCURY	0.20	0.10	U	0.10	U	ug/L	NC
NICKEL	40.00	15.20	U	15.20	U	ug/L	NC
POTASSIUM	5000.00	7270.00	U	6740.00	U	ug/L	NC
SELENIUM	5.00	1.00	U	1.00	U	ug/L	NC
SILVER	10.00	3.80	U	3.80	U	ug/L	NC
SODIUM	5000.00	29400.00		29400.00		ug/L	0
THALLIUM	10.00	0.95	U	0.92	U	ug/L	NC
VANADIUM	50.00	45.90	U	44.80	U	ug/L	NC
ZINC	20.00	15.00	BJ	5.20	U	ug/L	200
NC - Not calculated							

LOCATION		199-K-11					
DATE		1/11/95					
SAMPLE TYPE		SAMPLE-FILT.		DUPLICATE-FILT.			
SAMPLE ID		B0DLX2		B0DM24			
COMPOUND	CRDL	RESULT	Q	RESULT	Q	UNITS	RPD (%)
ALUMINUM	200.00	23.50	U	23.50	U	ug/L	NC
ANTIMONY	60.00	32.80	U	32.80	U	ug/L	NC
ARSENIC	10.00	12.20		12.10		ug/L	.82
BARIUM	200.00	28.10	B	26.70	BJ	ug/L	5.11
BERYLLIUM	5.00	1.20	U	1.20	U	ug/L	NC
CADMIUM	5.00	3.80	U	3.80	U	ug/L	NC
CALCIUM	5000.00	32100.00		32700.00		ug/L	1.85
CHROMIUM	10.00	2.90	U	3.00	B	ug/L	200
COBALT	50.00	4.10	U	4.10	U	ug/L	NC
COPPER	25.00	34.00	U	28.50	U	ug/L	NC
IRON	100.00	57.60	U	89.10	U	ug/L	NC
LEAD	3.00	0.80	UJ	0.80	UJ	ug/L	NC
MAGNESIUM	5000.00	9050.00		9240.00		ug/L	2.08
MANGANESE	15.00	5.00	U	4.20	U	ug/L	NC
MERCURY	0.20	0.10	U	0.10	U	ug/L	NC
NICKEL	40.00	15.20	U	15.20	U	ug/L	NC
POTASSIUM	5000.00	6120.00	U	4770.00	U	ug/L	NC
SELENIUM	5.00	1.00	U	1.00	U	ug/L	NC
SILVER	10.00	3.80	U	3.80	U	ug/L	NC
SODIUM	5000.00	28100.00		29800.00		ug/L	5.87
THALLIUM	10.00	0.90	U	0.90	U	ug/L	NC
VANADIUM	50.00	47.60	U	48.00	U	ug/L	NC
ZINC	20.00	12.20	BJ	5.20	U	ug/L	200
NC - Not calculated							

LOCATION		699-70-68					
DATE		1/06/95					
SAMPLE TYPE		SAMPLE-FILT.		DUPLICATE-FILT.			
SAMPLE ID		B0DM08		B0DM22			
COMPOUND	CRDL	RESULT	Q	RESULT	Q	UNITS	RPD (%)
ALUMINUM	200.00	33.40	B	23.50	U	ug/L	200
ANTIMONY	60.00	32.80	U	32.80	U	ug/L	NC
ARSENIC	10.00	3.50	B	3.70	B	ug/L	5.56
BARIUM	200.00	16.20	B	17.20	B	ug/L	5.99
BERYLLIUM	5.00	0.20	U	0.26	U	ug/L	NC
CADMIUM	5.00	3.80	U	3.80	U	ug/L	NC
CALCIUM	5000.00	35500.00		37500.00		ug/L	5.48
CHROMIUM	10.00	2.90	U	2.90	U	ug/L	NC
COBALT	50.00	4.10	U	4.10	U	ug/L	NC
COPPER	25.00	8.90	U	14.00	U	ug/L	NC
IRON	100.00	39.40	U	27.70	U	ug/L	NC
LEAD	3.00	0.80	UJ	0.80	UJ	ug/L	NC
MAGNESIUM	5000.00	10000.00		10600.00		ug/L	5.83
MANGANESE	15.00	1.20	U	1.90	U	ug/L	NC
MERCURY	0.20	0.10	U	0.10	U	ug/L	NC
NICKEL	40.00	15.20	U	15.20	U	ug/L	NC
POTASSIUM	5000.00	6940.00	U	4920.00	U	ug/L	NC
SELENIUM	5.00	1.00	UJ	1.00	UJ	ug/L	NC
SILVER	10.00	3.80	U	3.80	U	ug/L	NC
SODIUM	5000.00	14600.00		15300.00		ug/L	4.68
THALLIUM	10.00	0.90	UJ	0.90	UJ	ug/L	NC
VANADIUM	50.00	16.10	U	21.30	U	ug/L	NC
ZINC	20.00	7.80	B	15.10	B	ug/L	63.76

NC - Not calculated

LOCATION		699-70-68					
DATE		1/06/95					
SAMPLE TYPE		SAMPLE		DUPLICATE			
SAMPLE ID		B0DM07		B0DM21			
COMPOUND	CRDL	RESULT	Q	RESULT	Q	UNITS	RPD (%)
ALUMINUM	200.00	23.50	U	23.50	U	ug/L	NC
ANTIMONY	60.00	32.80	U	32.80	U	ug/L	NC
ARSENIC	10.00	3.20	B	3.40	B	ug/L	6.06
BARIUM	200.00	16.20	B	17.00	B	ug/L	4.82
BERYLLIUM	5.00	0.26	U	0.26	U	ug/L	NC
CADMIUM	5.00	3.80	U	3.80	U	ug/L	NC
CALCIUM	5000.00	35200.00		37100.00		ug/L	5.26
CHROMIUM	10.00	2.90	U	2.90	U	ug/L	NC
COBALT	50.00	4.10	U	4.10	U	ug/L	NC
COPPER	25.00	12.60	U	11.90	U	ug/L	NC
IRON	100.00	83.50	BJ	136.00	J	ug/L	47.83
LEAD	3.00	0.80	UJ	0.80	UJ	ug/L	NC
MAGNESIUM	5000.00	9900.00		10400.00		ug/L	4.93
MANGANESE	15.00	2.10	U	2.10	U	ug/L	NC
MERCURY	0.20	0.10	U	0.10	U	ug/L	NC
NICKEL	40.00	15.20	U	15.20	U	ug/L	NC
POTASSIUM	5000.00	5250.00	U	6570.00	U	ug/L	NC
SELENIUM	5.00	1.00	U	1.00	UJ	ug/L	NC
SILVER	10.00	3.80	U	3.80	U	ug/L	NC
SODIUM	5000.00	14200.00		15000.00		ug/L	5.48
THALLIUM	10.00	0.90	UJ	1.20	UJ	ug/L	NC
VANADIUM	50.00	20.40	U	21.70	U	ug/L	NC
ZINC	20.00	16.00	B	11.00	B	ug/L	37.04
NC - Not calculated							

LOCATION		699-70-68					
DATE		1/06/95					
SAMPLE TYPE		SAMPLE		SPLIT			
SAMPLE ID		B0DM07		B0DM25			
COMPOUND	CRDL	RESULT	Q	RESULT	Q	UNITS	RPD (%)
ALUMINUM	200.00	23.50	U	61.40	B	ug/L	200
ANTIMONY	60.00	32.80	U	45.00	U	ug/L	NC
ARSENIC	10.00	3.20	B	2.10	B	ug/L	41.51
BARIUM	200.00	16.20	B	14.10	B	ug/L	13.86
BERYLLIUM	5.00	0.26	U	1.00	U	ug/L	NC
CADMIUM	5.00	3.80	U	3.00	U	ug/L	NC
CALCIUM	5000.00	35200.00		32400.00		ug/L	8.28
CHROMIUM	10.00	2.90	U	4.20	U	ug/L	NC
COBALT	50.00	4.10	U	7.00	U	ug/L	NC
COPPER	25.00	12.60	U	3.00	U	ug/L	NC
IRON	100.00	83.50	BJ	76.20	B	ug/L	9.14
LEAD	3.00	0.80	UJ	2.00	U	ug/L	NC
MAGNESIUM	5000.00	9900.00		9040.00		ug/L	9.08
MANGANESE	15.00	2.10	U	1.50	U	ug/L	NC
MERCURY	0.20	0.10	U	NR		ug/L	NC
NICKEL	40.00	15.20	U	12.00	U	ug/L	NC
POTASSIUM	5000.00	5250.00	U	4850.00	B	ug/L	200
SELENIUM	5.00	1.00	U	2.00	U	ug/L	NC
SILVER	10.00	3.80	U	4.00	U	ug/L	NC
SODIUM	5000.00	14200.00		13800.00		ug/L	2.86
THALLIUM	10.00	0.90	UJ	3.00	U	ug/L	NC
VANADIUM	50.00	20.40	U	12.60	U	ug/L	NC
ZINC	20.00	16.00	B	11.90	U	ug/L	200

NR - Not reported by the laboratory
NC - Not calculated

LOCATION		699-70-68					
DATE		1/06/95					
SAMPLE TYPE		SAMPLE-FILT.		SPLIT-FILT.			
SAMPLE ID		B0DM08		B0DM26			
COMPOUND	CRDL	RESULT	Q	RESULT	Q	UNITS	RPD (%)
ALUMINUM	200.00	33.40	B	26.00	U	ug/L	200
ANTIMONY	60.00	32.80	U	45.00	U	ug/L	NC
ARSENIC	10.00	3.50	B	2.50	B	ug/L	33.33
BARIUM	200.00	16.20	B	13.90	B	ug/L	15.28
BERYLLIUM	5.00	0.20	U	1.00	U	ug/L	NC
CADMIUM	5.00	3.80	U	3.00	U	ug/L	NC
CALCIUM	5000.00	35500.00		33900.00		ug/L	4.61
CHROMIUM	10.00	2.90	U	3.00	U	ug/L	NC
COBALT	50.00	4.10	U	7.00	U	ug/L	NC
COPPER	25.00	8.90	U	3.00	U	ug/L	NC
IRON	100.00	39.40	U	9.30	U	ug/L	NC
LEAD	3.00	0.80	UJ	2.00	U	ug/L	NC
MAGNESIUM	5000.00	10000.00		9320.00		ug/L	7.04
MANGANESE	15.00	1.20	U	1.00	U	ug/L	NC
MERCURY	0.20	0.10	U	NR		ug/L	200
NICKEL	40.00	15.20	U	12.00	U	ug/L	NC
POTASSIUM	5000.00	6940.00	U	4990.00	B	ug/L	200
SELENIUM	5.00	1.00	UJ	2.00	U	ug/L	NC
SILVER	10.00	3.80	U	4.00	U	ug/L	NC
SODIUM	5000.00	14600.00		14200.00		ug/L	2.78
THALLIUM	10.00	0.90	UJ	3.00	U	ug/L	NC
VANADIUM	50.00	16.10	U	13.20	U	ug/L	NC
ZINC	20.00	7.80	B	2.00	U	ug/L	200

NR - Not reported by the laboratory
NC - Not calculated

LOCATION		199-K-11					
DATE		1/11/95					
SAMPLE TYPE		SAMPLE		SPLIT			
SAMPLE ID		B0DLX1		B0DM27			
COMPOUND	CRDL	RESULT	Q	RESULT	Q	UNITS	RPD (%)
ALUMINUM	200.00	23.50	U	26.00	U	ug/L	NC
ANTIMONY	60.00	32.80	U	50.10	B	ug/L	200
ARSENIC	10.00	12.20		11.90		ug/L	2.49
BARIUM	200.00	31.00	B	21.80	B	ug/L	34.84
BERYLLIUM	5.00	1.20	U	1.00	U	ug/L	NC
CADMIUM	5.00	3.80	U	3.00	U	ug/L	NC
CALCIUM	5000.00	32600.00		30100.00		ug/L	7.97
CHROMIUM	10.00	3.00	B	5.00	U	ug/L	200
COBALT	50.00	4.10	U	7.00	U	ug/L	NC
COPPER	25.00	27.40	U	3.00	U	ug/L	NC
IRON	100.00	133.00		90.40	B	ug/L	38.14
LEAD	3.00	0.80	UJ	2.00	U	ug/L	NC
MAGNESIUM	5000.00	9210.00		8310.00		ug/L	10.27
MANGANESE	15.00	5.80	U	2.70	U	ug/L	NC
MERCURY	0.20	0.10	U	NR		ug/L	NC
NICKEL	40.00	15.20	U	12.00	U	ug/L	NC
POTASSIUM	5000.00	7270.00	U	4840.00	B	ug/L	200
SELENIUM	5.00	1.00	U	2.00	U	ug/L	NC
SILVER	10.00	3.80	U	4.00	U	ug/L	NC
SODIUM	5000.00	29400.00		29000.00		ug/L	1.37
THALLIUM	10.00	0.95	U	3.00	U	ug/L	NC
VANADIUM	50.00	45.90	U	24.40	U	ug/L	NC
ZINC	20.00	15.00	BJ	6.50	U	ug/L	200

NR - Not reported by the laboratory
NC - Not calculated

LOCATION		199-K-11					
DATE		1/11/95					
SAMPLE TYPE		SAMPLE-FILT.		SPLIT-FILT.			
SAMPLE ID		B0DLX2		B0DM28			
COMPOUND	CRDL	RESULT	Q	RESULT	Q	UNITS	RPD (%)
ALUMINUM	200.00	23.50	U	26.00	U	ug/L	NC
ANTIMONY	60.00	32.80	U	45.00	U	ug/L	NC
ARSENIC	10.00	12.20		12.50		ug/L	2.43
BARIUM	200.00	28.10	B	21.20	B	ug/L	27.99
BERYLLIUM	5.00	1.20	U	1.00	U	ug/L	NC
CADMIUM	5.00	3.80	U	3.00	U	ug/L	NC
CALCIUM	5000.00	32100.00		30600.00		ug/L	4.78
CHROMIUM	10.00	2.90	U	4.40	U	ug/L	NC
COBALT	50.00	4.10	U	7.00	U	ug/L	NC
COPPER	25.00	34.00	U	3.00	U	ug/L	NC
IRON	100.00	57.60	U	6.60	U	ug/L	NC
LEAD	3.00	0.80	UJ	2.00	U	ug/L	NC
MAGNESIUM	5000.00	9050.00		8320.00		ug/L	8.41
MANGANESE	15.00	5.00	U	1.00	U	ug/L	NC
MERCURY	0.20	0.10	U	NR		ug/L	NC
NICKEL	40.00	15.20	U	12.00	U	ug/L	NC
POTASSIUM	5000.00	6120.00	U	4700.00	B	ug/L	200
SELENIUM	5.00	1.00	U	2.00	UJ	ug/L	NC
SILVER	10.00	3.80	U	4.00	U	ug/L	NC
SODIUM	5000.00	28100.00		28600.00		ug/L	1.76
THALLIUM	10.00	0.90	U	3.00	U	ug/L	NC
VANADIUM	50.00	47.60	U	24.00	B	ug/L	200
ZINC	20.00	12.20	BJ	2.00	U	ug/L	200

NR - Not reported by the laboratory
NC - Not calculated

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APPENDIX C

General Chemistry Validated Data Summary Tables

Parameter	Samp#	BODLX1		BODLX3		BODLY5		BODLZ7		BODM05		BODM07	
	Date	1-11-95		1-17-95		1-11-95		1-18-95		1-10-95		1-6-95	
	Location	199-K-11		199-K-13		199-K-23		199-K-33		199-K-37		699-70-68	
	Depth	---		---		---		---		---		---	
	Type	WATER		WATER									
	Comments												
	Units	Result	Q	Result	Q								
CHLORIDE	MG/L	11.700		8.180		14.200		11.700		4.160		5.240	
FLUORIDE	MG/L	0.330		0.210		0.310		0.130		0.230		0.350	
NITRATE	MG/L	3.580	J	0.020	UJ	14.300	J	21.600	J	1.260	J	3.660	J
NITRITE	MG/L	0.020	UR	0.020	UJ	0.020	UR	0.020	UR	0.020	UR	0.020	UR
ORTHO-PHOSPHATE	MG/L	1.000	UR	1.000	UJ	1.000	UR	1.000	UR	1.000	UR	1.000	UR
SULFATE	MG/L	25.400	U	22.600		49.200	U	79.800		34.900		24.900	
TURBIDITY	NTU	4.120	J	6.330	J	0.780	J	0.290	J	1.140	J	0.790	J

The decimal places shown do not reflect the precision reported by the laboratory

9713009.12

Parameter	Samp#	BODM09		BODM11		BODM13		BODM15		BODM17		BODM19	
	Date	1-6-95		1-5-95		1-17-95		1-17-95		1-10-95		1-11-95	
	Location	699-78-62		699-73-61		EQUIP BLANK 1		EQUIP BLANK 2		199-K-34		TRIP BLANK 2	
	Depth	---		---		---		---		---		---	
	Type	WATER		WATER		WATER		WATER		WATER		WATER	
	Comments					EQUIPMENT BLANK		EQUIPMENT BLANK		TRIP BLANK		TRIP BLANK	
	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
CHLORIDE	MG/L	7.430		6.480		0.250	U	0.250	U	0.250	U	0.250	U
FLUORIDE	MG/L	0.360		0.290		0.100	U	0.100	U	0.100	U	0.100	U
NITRATE	MG/L	2.080	J	2.220	J	0.020	UJ	0.020	UJ	0.020	UR	0.020	UR
NITRITE	MG/L	0.020	UR	0.020	UR	0.020	UJ	0.020	UJ	0.020	UR	0.020	UR
ORTHO-PHOSPHATE	MG/L	1.000	UR	1.000	UR	1.000	UJ	1.000	UJ	1.000	UR	1.000	UR
SULFATE	MG/L	56.800		42.700		1.000	U	1.000	U	1.000	U	1.000	U
TURBIDITY	NTU	0.850	J	0.130	J	0.040	J	0.350	J	1.120	J	0.280	J

The decimal places shown do not reflect the precision reported by the laboratory

9715009.113

	Samp#	B0DM21	
	Date	1-6-95	
	Location	DUPLICATE 1	
	Depth	---	
	Type	WATER	
	Comments	FIELD DUPLICATE	
Parameter	Units	Result	Q
CHLORIDE	MG/L	5.260	
FLUORIDE	MG/L	0.350	
NITRATE	MG/L	3.660	J
NITRITE	MG/L	0.020	UR
ORTHO-PHOSPHATE	MG/L	1.000	UR
SULFATE	MG/L	24.900	
TURBIDITY	NTU	0.480	J

The decimal places shown do not reflect the precision reported by the laboratory

Parameter	Samp#	BODLX5		BODLX7		BODLX9		BODLY1		BODLY3		BODLY7	
	Date	1-4-95		1-3-95		1-4-95		1-3-95		1-4-95		1-4-95	
	Location	199-K-18		199-K-19		199-K-20		199-K-21		199-K-21		199-K-27	
	Depth	---		---		---		---		---		---	
	Type	WATER											
	Comments												
	Units	Result	Q										
CHLORIDE	MG/L	22.900		6.060		5.110		7.150		5.520		25.900	
FLUORIDE	MG/L	0.150		0.150		0.140		0.100	U	0.140		0.160	
NITRATE	MG/L	23.200	J	7.460	J	3.360	J	3.600	J	3.000	J	2.070	J
NITRITE	MG/L	0.025	J	0.020	UR								
ORTHO-PHOSPHATE	MG/L	1.000	UR										
SULFATE	MG/L	66.700		52.900		49.700		55.800		49.400		20.400	
TURBIDITY	NTU	5.560	J	0.430	J	15.500	J	4.240	J	0.020	J	0.140	J

The decimal places shown do not reflect the precision reported by the laboratory

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Parameter	Samp#	BODLY9	BODLZ1	BODLZ3	BODLZ5	BODLZ9	BODM01						
	Date	1-4-95	1-4-95	1-3-95	1-3-95	1-10-95	1-6-95						
	Location	199-K-30	199-K-31	199-K-32B	199-K-32A	199-K-34	199-K-35						
	Depth	---	---	---	---	---	---						
	Type	WATER	WATER	WATER	WATER	WATER	WATER						
	Comments												
	Units	Result	Q	Result	Q	Result	Q	Result	Q				
CHLORIDE	MG/L	4.940		5.850		3.640		4.680		7.870		6.560	
FLUORIDE	MG/L	0.210		0.250		0.140		0.290		0.200		0.270	
NITRATE	MG/L	28.800	J	2.000	J	3.880	J	2.320	J	6.060	J	1.840	J
NITRITE	MG/L	0.020	UR	0.020	UR	0.020	UR	0.020	UR	0.020	UR	0.020	UR
ORTHO-PHOSPHATE	MG/L	1.000	UR	1.000	UR	1.000	UR	1.000	UR	1.000	UR	1.000	UR
SULFATE	MG/L	37.900		22.900		32.600		35.200		30.500		23.900	
TURBIDITY	NTU	0.160	J	0.480	J	0.710	J	1.610	J	2.020	J	1.390	J

The decimal places shown do not reflect the precision reported by the laboratory

Parameter	Samp#	BODM03		BODM23		BODM25		BODM27	
	Date	1-6-95		1-11-95		1-6-95		1-11-95	
	Location	199-K-36		DUPLICATE 2		SPLIT 1		SPLIT 2	
	Depth	---		---		---		---	
	Type	WATER		WATER		WATER		WATER	
	Comments			FIELD DUPLICATE		SPLIT		SPLIT	
	Units	Result	Q	Result	Q	Result	Q	Result	Q
CHLORIDE	MG/L	19.800		11.700		5.200		11.000	
FLUORIDE	MG/L	0.320		0.320		0.380		0.340	
NITRATE	MG/L	3.710	J	3.660	J	3.600	J	3.400	
NITRITE	MG/L	0.020	UR	0.020	UR	0.010	UR	0.010	U
ORTHO-PHOSPHATE	MG/L	1.000	UR	1.000	UR	0.100	UR	0.100	U
SULFATE	MG/L	73.100		25.700		25.000		25.000	
TURBIDITY	NTU	10.870	J	7.840	J	0.190	J	0.370	

The decimal places shown do not reflect the precision reported by the laboratory

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APPENDIX D

General Chemistry Validated Field Quality Control Sample Summary

LOCATION		199-K-11					
DATE		1/11/95					
SAMPLE TYPE		SAMPLE		DUPLICATE			
SAMPLE ID		B0DLX1		B0DM23			
COMPOUND	RDL	RESULT	Q	RESULT	Q	UNITS	RPD(%)
CHLORIDE	10	11.7		11.7		mg/L	0
FLUORIDE	0.1	0.33		0.32		mg/L	3.08
NITRITE	0.25	0.02	UR	0.02	UR	mg/L	NC
NITRATE	0.1	3.58	J	3.66	J	mg/L	2.21
ORTHO-PHOSPHATE	0.1	1	UR	1	UR	mg/L	NC
SULFATE	2	25.4	U	25.7		mg/L	200
TURBIDITY	0.05	4.12	J	7.84	J	NTU	62.21

LOCATION		699-70-68					
DATE		1/06/95					
SAMPLE TYPE		SAMPLE		DUPLICATE			
SAMPLE ID		B0DM07		B0DM21			
COMPOUND	CRDL	RESULT	Q	RESULT	Q	UNITS	RPD(%)
CHLORIDE	10	5.24		5.26		mg/L	.38
FLUORIDE	0.1	0.35		0.35		mg/L	0
NITRITE	0.25	0.02	UR	0.02	UR	mg/L	NC
NITRATE	0.1	3.66	J	3.66	J	mg/L	0
ORTHO-PHOSPHATE	0.1	1	UR	1	UR	mg/L	NC
SULFATE	2	24.9		24.9		mg/L	0
TURBIDITY	0.05	0.79	J	0.48	J	NTU	48.81

LOCATION		199-K-11					
DATE		1/11/95					
SAMPLE TYPE		SAMPLE		SPLIT			
SAMPLE ID		BODLX1		BODM27			
COMPOUND	RDL	RESULT	Q	RESULT	Q	UNITS	RPD(%)
CHLORIDE	10	11.7		11		mg/L	6.17
FLUORIDE	0.1	0.33		0.34		mg/L	2.99
NITRITE	0.25	0.02	UR	0.01	U	mg/L	NC
NITRATE	0.1	3.58	J	3.4		mg/L	5.16
ORTHO-PHOSPHATE	0.1	1	UR	0.1	U	mg/L	NC
SULFATE	2	25.4	U	25		mg/L	200
TURBIDITY	0.05	4.12	J	0.37		NTU	167.0
NC - Not calculated							

LOCATION		699-70-68					
DATE		1/06/95					
SAMPLE TYPE		SAMPLE		SPLIT			
SAMPLE ID		B0DM07		B0DM25			
COMPOUND	CRDL	RESULT	Q	RESULT	Q	UNITS	RPD(%)
CHLORIDE	10	5.24		5.2		mg/L	.77
FLUORIDE	0.1	0.35		0.38		mg/L	8.22
NITRITE	0.25	0.02	UR	0.01	UR	mg/L	NC
NITRATE	0.1	3.66	J	3.6	J	mg/L	1.65
ORTHO-PHOSPHATE	0.1	1	UR	0.1	UR	mg/L	NC
SULFATE	2	24.9		25		mg/L	.40
TURBIDITY	0.05	0.79	J	0.19	J	NTU	122.4
NC - Not calculated							

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APPENDIX E

Radiochemistry Validated Data Summary Tables

Parameter	Samp#	BODLX1		BODLX3		BODLY5		BODLZ7		BODM05		BODM07	
	Date	1-11-95		1-17-95		1-11-95		1-18-95		1-10-95		1-6-95	
	Location	199-K-11		199-K-13		199-K-23		199-K-33		199-K-37		699-70-68	
	Depth	---		---		---		---		---		---	
	Type	WATER		WATER		WATER		WATER		WATER		WATER	
	Comments												
	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
GROSS ALPHA	pCi/L	3.020		0.081	U	5.430		5.260		1.060	U	2.620	
GROSS BETA	pCi/L	6.240		5.580		13.300		9.710		15.700		27.300	
CARBON-14	pCi/L	180.000	J	217.000	J	35.700	J	9570.000		3.960	J	0.315	UJ
TRITIUM	pCi/L	849.000	J	1110.000	J	91.900	UJ	6720.000		93.900	UJ	2080.000	J
URANIUM-233/234	pCi/L	---		---		---		---		---		---	
URANIUM-234	pCi/L	1.610	J	0.231	UJ	4.090	J	1.960		1.030		0.801	
URANIUM-235	pCi/L	-0.003	U	-0.010	U	0.048	U	0.019	U	-0.017	U	0.199	U
URANIUM-238	pCi/L	---		---		---		---		---		---	
URANIUM-238DA	pCi/L	1.610	J	0.110	UJ	4.100	J	1.790		0.948		0.569	

The decimal places shown do not reflect the precision reported by the laboratory

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Parameter	Samp# Date Location Depth Type Comments	BODM09 1-6-95 699-78-62 --- WATER		BODM11 1-5-95 699-73-61 --- WATER		BODM13 1-17-95 EQUIP BLANK 1 --- WATER EQUIPMENT BLANK		BODM15 1-17-95 EQUIP BLANK 2 --- WATER EQUIPMENT BLANK		BODM17 1-10-95 199-K-34 --- WATER TRIP BLANK		BODM19 1-11-95 TRIP BLANK 2 --- WATER TRIP BLANK	
	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
GROSS ALPHA	pCi/L	3.330		0.035	U	0.302	U	-0.128	U	-0.010	U	0.070	U
GROSS BETA	pCi/L	7.160		6.560	U	0.388	U	-0.182	U	0.616	U	0.445	U
CARBON-14	pCi/L	0.878	UJ	1.280	UJ	0.541	UJ	-1.220	UJ	1.980	UJ	-1.910	UJ
TRITIUM	pCi/L	-2.050	UJ	105.000	UJ	74.400	UJ	158.000	UJ	-15.400	UJ	2.570	UJ
URANIUM-233/234	pCi/L	---		---		---		---		---		---	
URANIUM-234	pCi/L	1.590		1.450		0.106	UJ	0.055	UJ	0.034	U	0.019	UJ
URANIUM-235	pCi/L	0.119	U	0.089	U	-0.030	U	-0.003	U	-0.008	U	0.000	U
URANIUM-238	pCi/L	---		---		---		---		---		---	
URANIUM-238DA	pCi/L	1.940		1.140		0.032	UJ	0.019	UJ	-0.016	U	0.019	UJ

The decimal places shown do not reflect the precision reported by the laboratory

E-2

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BHI-00403
Rev. 00

Parameter	Samp#	BDM21	
	Date	1-6-95	
	Location	DUPLICATE 1	
	Depth	---	
	Type	WATER	
	Comments	FIELD DUPLICATE	
	Units	Result	Q
GROSS ALPHA	pCi/L	0.372	U
GROSS BETA	pCi/L	31.400	
CARBON-14	pCi/L	-0.113	UJ
TRITIUM	pCi/L	2410.000	J
URANIUM-233/234	pCi/L	---	
URANIUM-234	pCi/L	0.941	
URANIUM-235	pCi/L	-0.004	U
URANIUM-238	pCi/L	---	
URANIUM-238DA	pCi/L	0.507	

The decimal places shown do not reflect the precision reported by the laboratory

Parameter	Samp#	B0DLX5	B0DLX7	B0DLX9	B0DLY1	B0DLY3	B0DLY7						
	Date	1-4-95	1-3-95	1-4-95	1-3-95	1-4-95	1-4-95						
	Location	199-K-18	199-K-19	199-K-20	199-K-21	199-K-21	199-K-27						
	Depth	---	---	---	---	---	---						
	Type	WATER	WATER	WATER	WATER	WATER	WATER						
	Comments												
Units	Result	Q	Result	Q	Result	Q	Result	Q					
GROSS ALPHA	pCi/L	0.157	U	0.543	U	1.230	U	1.210	U	0.376	U	2.260	
GROSS BETA	pCi/L	4.290		20.100		19.300		56.300		13.500		21.900	
CARBON-14	pCi/L	13.400		12.500		11.200		18.200		7.030		296.000	
TRITIUM	pCi/L	16800.000		5170.000		496.000		753.000		349.000	U	234000.000	
URANIUM-233/234	pCi/L	---		---		---		---		---		---	
URANIUM-234	pCi/L	0.913		0.555		0.807		0.668		0.563		1.750	
URANIUM-235	pCi/L	0.215	U	0.063	U	0.157	U	0.441		0.038	U	0.153	U
URANIUM-238	pCi/L	---		---		---		---		---		---	
URANIUM-238DA	pCi/L	0.168	U	0.662		0.762		0.506		0.622		1.840	

The decimal places shown do not reflect the precision reported by the laboratory

B-4

971009127

Parameter	Samp#	BODLY9	BODLZ1	BODLZ3	BODLZ5	BODLZ9	BODM01						
	Date	1-4-95	1-4-95	1-3-95	1-3-95	1-10-95	1-6-95						
	Location	199-K-30	199-K-31	199-K-32B	199-K-32A	199-K-34	199-K-35						
	Depth	---	---	---	---	---	---						
	Type	WATER	WATER	WATER	WATER	WATER	WATER						
	Comments												
Parameter	Units	Result	Q	Result	Q	Result	Q	Result	Q				
GROSS ALPHA	pCi/L	4.330		1.220	U	1.510		2.840		3.300		3.570	
GROSS BETA	pCi/L	6.450		5.730		10.000		4.620		8.700		8.110	
CARBON-14	pCi/L	11500.000		41.900		256.000		-1.800	U	5890.000	J	28.900	J
TRITIUM	pCi/L	1060000.000		1540.000		3090.000		-70.400	U	2730.000	J	1550.000	J
URANIUM-233/234	pCi/L	---		---		---		---		---		---	
URANIUM-234	pCi/L	1.770		0.955		0.518		1.950		2.860		0.490	U
URANIUM-235	pCi/L	0.066	U	-0.019	U	-0.036	U	-0.010	U	-0.008	U	0.085	U
URANIUM-238	pCi/L	---		---		---		---		---		---	
URANIUM-238DA	pCi/L	1.550		0.664		0.690		1.890		1.620		0.854	

The decimal places shown do not reflect the precision reported by the laboratory

E-5

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BHI-00403
Rev. 00

Parameter	Samp#	B0DM03		B0DM23		B0DM25		B0DM27	
	Date	1-6-95		1-11-95		1-6-95		1-11-95	
	Location	199-K-36		DUPLICATE 2		SPLIT 1		SPLIT 2	
	Depth	---		---		---		---	
	Type	WATER		WATER		WATER		WATER	
	Comments			FIELD DUPLICATE		SPLIT		SPLIT	
	Units	Result	q	Result	q	Result	q	Result	q
GROSS ALPHA	pCi/L	2.850		1.690	U	0.300	U	3.000	
GROSS BETA	pCi/L	8.140		5.790		60.100		4.500	
CARBON-14	pCi/L	259.000	J	203.000	J	154.000		255.000	J
TRITIUM	pCi/L	1310.000	J	656.000	J	1890.000		930.000	
URANIUM-233/234	pCi/L	---		---		1.220		1.790	
URANIUM-234	pCi/L	2.640		1.540		---		---	
URANIUM-235	pCi/L	0.071	U	0.238	U	0.220		0.310	
URANIUM-238	pCi/L	---		---		0.930		1.490	
URANIUM-238DA	pCi/L	1.940		1.560		---		---	

The decimal places shown do not reflect the precision reported by the laboratory

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BHI-00403
Rev. 00

APPENDIX F

Radiochemistry Validated Field Quality Control Sample Summary

LOCATION		199-K-11					
DATE		1/11/95					
SAMPLE TYPE		SAMPLE		DUPLICATE			
SAMPLE ID		B0DLX1		B0DM23			
RADIONUCLIDE	RDL	Result	Q	Result	Q	Units	RPD(%)
GROSS ALPHA	3	3.02		1.69	U	pCi/L	200
GROSS BETA	4	6.24		5.79		pCi/L	7.48
CARBON-14	200	180	J	203	J	pCi/L	12.01
TRITIUM	400	849	J	656	J	pCi/L	25.65
URANIUM-233/234	1	1.61	J	1.54		pCi/L	4.44
URANIUM-235	1	-0.00329	U	0.238	U	pCi/L	NC
URANIUM-238	1	1.61	J	1.56		pCi/L	3.15
NC - Not calculated							

LOCATION		699-70-68	-				
DATE		1/06/95					
SAMPLE TYPE		SAMPLE		DUPLICATE			
SAMPLE ID		B0DM07		B0DM21			
RADIONUCLIDE	RDL	Result	Q	Result	Q	Units	RPD(%)
GROSS ALPHA	3	2.62		0.372	U	pCi/L	200
GROSS BETA	4	27.3		31.4		pCi/L	13.97
CARBON-14	200	0.315	UJ	-0.113	UJ	pCi/L	NC
TRITIUM	400	2080	J	2410	J	pCi/L	14.70
URANIUM-233/234	1	0.801		0.941		pCi/L	16.07
URANIUM-235	1	0.199	U	-0.0043	U	pCi/L	NC
URANIUM-238	1	0.569		0.507		pCi/L	11.52
NC - Not calculated							

LOCATION		199-K-11	-				
DATE		1/11/95					
SAMPLE TYPE		SAMPLE		SPLIT			
SAMPLE ID		B0DLX1		B0DM27			
RADIONUCLIDE	RDL	Result	Q	Result	Q	Units	RPD(%)
GROSS ALPHA	3	3.02		3		pCi/L	.66
GROSS BETA	4	6.24		4.5		pCi/L	32.40
CARBON-14	200	180	J	255	J	pCi/L	34.48
TRITIUM	400	849	J	930		pCi/L	9.11
URANIUM-233/234	1	1.61	J	1.79		pCi/L	10.59
URANIUM-235	1	-0.00329	U	0.31		pCi/L	200
URANIUM-238	1	1.61	J	1.49		pCi/L	7.74
NC - Not calculated							

LOCATION		699-70-68	-				
DATE		1/06/95					
SAMPLE TYPE		SAMPLE		SPLIT			
SAMPLE ID		B0DM07		B0DM25			
RADIONUCLIDE	RDL	Result	Q	Result	Q	Units	RPD(%)
GROSS ALPHA	3	2.62		0.3	U	pCi/L	200
GROSS BETA	4	27.3		60.1		pCi/L	75.06
CARBON-14	200	0.315	UJ	154		pCi/L	200
TRITIUM	400	2080	J	1890		pCi/L	9.57
URANIUM-233/234	1	0.801		1.22		pCi/L	41.46
URANIUM-235	1	0.199	U	0.22		pCi/L	200
URANIUM-238	1	0.569		0.93		pCi/L	48.17
NC - Not calculated							

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Golder Associates Inc.

4104-148th Avenue, NE
Redmond, WA 98052
Telephone (206) 883-0777
Fax (206) 882-5498

RECORD COPY



March 7, 1995

CH2M Hill
345 Hills Street, MS H4-29
Richland, Washington 99352



Our ref: 943-1610.075.0400
94-1610/O/271

ATTENTION: Ms. Jeanette Duncan

RE: TRANSMITTAL OF DATA VALIDATION PACKAGES
CONTRACT NO. MSH-SWV-315905

Dear Ms. Duncan:

This letter is to transmit the following data validation packages:

<u>SAF#</u>	<u>Project</u>	<u>Data Package</u>	<u>Analyses</u>
94-125	100 KR 4 Rnd 7 Groundwater	LK3604-LAS	Inorganics, Radiochemistry, General Chemistry

Please call if you have any questions.

Sincerely,

GOLDER ASSOCIATES INC.

Christina I. Jensen
Task Manager

Enclosures

p:\enviros\wbc\ldv\dptran.htr

DON'T SAY IT - - WRITE IT!

Date: 3/23/95

From: P. K. Reich H4-14, (509) 372-2785

Subject: Correction of Validation Date Received Stamp

The Date Stamped on this Validation Report is the date the final correction documents were received in the completion of the Validation Review Process.

The original front page(s) are maintained as a documented record of the date the Validation Report was originally received from the Validators.

Thank You,

Pat Reich
Data Management



TO: 100-KR-4 Round 7 Groundwater Project QA Records March 6, 1995

FR: Anne Jensen, Golder Associates Inc. *aj*

RE: RADIOCHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE
 LK3604-LAS (943-1610.075 LK36RAD.KR4)

INTRODUCTION

This memo presents the results of data validation on data package LK3604-LAS prepared by Lockheed Analytical Services. Sample information is provided in the following table.

SAMPLE ID	COMMENTS	ANALYSIS	MEDIA
B0DM25* B0DM27*	FIELD SPLIT FIELD SPLIT	RADIOCHEMISTRY SEE ATTACHMENT 4	WATER WATER
* - Indicates sample results which were 100% recalculated.			

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

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

DATA QUALITY OBJECTIVES

This section presents a summary of the data quality in terms of the referenced validation criteria.

Precision. Goals for precision were met.

Accuracy. Goals for accuracy were met.

Sample Result Verification. All sample results were supported in the raw data.

Detection Limits. Detection limit goals were met for all sample results.

Completeness. The data package was complete for all requested analyses. A total of two samples were validated in this data package with a total of fourteen determinations reported, all of which were deemed valid. This results in a completeness of 100 percent, which meets the 90% objective of the work plan.



MEMORANDUM

TO: 100 KR 4 Round 7 Groundwater Project QA Record March 2, 1995

FR: Heidi Gregerson, Golder Associates Inc. HLG

RE: GENERAL CHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE LK3604-LAS (943-1610.075 LK3604GEN.KR4)

INTRODUCTION

This memo presents the results of data validation on data package LK3604-LAS prepared by Lockheed Analytical Services. Sample information is provided in the following table.

SAMPLE ID	COMMENTS	ANALYSIS	MEDIA
B0DM25 B0DM27*	SPLIT SPLIT	GENERAL CHEMISTRY SEE ATTACHMENT 4	WATER WATER

* - Indicates sample results which were 100% recalculated.

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

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

DATA QUALITY OBJECTIVES

This section presents a summary of the data quality in terms of the referenced validation criteria.

Precision. Goals for precision were met.

Accuracy. Goals for accuracy were met.

Sample Result Verification. All sample results were supported in the raw data.

Detection Limits. Detection limit goals were met for all sample results.

Completeness. The data package was complete for all requested analyses. A total of two samples were validated in this data package with a total of fourteen determinations reported, twelve of which were deemed valid. This results in a completeness of 86%, which fails to meet the 90% objective of the work plan.

MAJOR DEFICIENCIES

The following major deficiencies were identified during data validation which required qualification of data.

Holding Times

- B0DM25 holding times were exceeded for nitrite and phosphate by greater than twice the limit. Attachments 2 and 5 provide a summary of the sample affected, data qualifications applied and supporting documentation.

MINOR DEFICIENCIES

The following minor deficiencies were identified during data validation which required qualification of data.

Holding Times

- B0DM25 holding times for nitrate and turbidity were exceeded. Attachments 2 and 5 provide a summary of samples affected, data qualifications applied and supporting documentation.

FIELD QC

- B0DM25 and B0DM27 were identified as field splits. The RPDs will be evaluated in the final summary report.

DATA REPORTING

- Results that were reported by the laboratory as less than the detection limit on the sample result form were qualified as undetected (U).

REFERENCES

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

WHC 1994, Environmental and Waste Characterization Analytical Data Validation, Purchase Order MSH-SWV-315905; Validation Statement of Work, Revision 1.0, September 7, 1994; Westinghouse Hanford Company, Richland, Washington.

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ATTACHMENT 1
GLOSSARY OF DATA REPORTING QUALIFIERS

Glossary of Inorganic Data Reporting Qualifiers.

- B - Indicates the constituent was analyzed for and detected. The concentration reported is less than the contract required detection limit (CRDL) but greater than the instrument detection limit (IDL). The associated data should be considered usable for decision making purposes.
- U - Indicates the constituent was analyzed for and not detected. The concentration reported is the sample detection limit corrected for aliquot size, dilution and percent solids (in the case of solid matrices) by the laboratory. The associated data should be considered usable for decision making purposes.
- UJ - Indicates the constituent was analyzed for and not detected. Due to a minor quality control deficiency identified during data validation the concentration may not accurately reflect the sample detection limit. The associated data have been qualified as estimated but should be considered usable for decision making purposes.
- BJ - Indicates the constituent was analyzed for and detected at a concentration less than the contract required detection limit (CRDL) but greater than the instrument detection limit (IDL). Due to a minor quality control deficiency identified during data validation the associated data have been qualified as estimated, but should be considered usable for decision making purposes.
- J - Indicates the constituent was analyzed for and detected. Due to a minor quality control deficiency identified during data validation the associated data have been qualified as estimated, but should be considered usable for decision making purposes.
- UR - Indicates the constituent was analyzed for and not detected. Due to a major quality control deficiency identified during data validation, the associated data have been qualified as unusable for decision making purposes.
- R - Indicates the constituent was analyzed for and detected. Due to a major quality control deficiency identified during data validation, the associated data have been qualified as unusable for decision making purposes.

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ATTACHMENT 2
SUMMARY OF DATA QUALIFICATIONS

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WHC-SD-EN-SPP-002, REV.2

DATA QUALIFICATION SUMMARY - FORM B-7

SDG: LK3604-LAS	REVIEWER: H. Gregerson	DATE: 3-2-95	PAGE <u>1</u> OF <u>1</u>
COMMENTS: GENERAL CHEMISTRY			
COMPOUND/ANALYTE	QUALIFIER	SAMPLES AFFECTED	REASON
NITRATE TURBIDITY	J	B0DM25	HOLDING TIME EXCEEDED
NITRITE PHOSPHATE	UR	B0DM25	HOLDING TIME EXCEEDED BY MORE THAN TWICE THE LIMIT

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ATTACHMENT 3

QUALIFIED DATA SUMMARY and ANNOTATED LABORATORY REPORTS

9713509.1146

LOCKHEED ANALYTICAL SERVICES

COMMON IONS AND ADDITIONAL ANALYTES

Sample Results

Client Sample ID: B0DM25	Date Collected: 06-JAN-95
Matrix: Water	Date Received: 10-JAN-95

Constituent	Units	Method	Result	Reporting Det Limit	Data Qualifier(s)	Date Analyzed	LAS Batch ID	LAS Sample ID
Turbidity	NTU	180.1	0.19	N/A	H	10-JAN-95	17817	L3604-4
Chloride	mg/L	300.0	5.2	0.02		11-JAN-95	17822	L3604-3
Fluoride	mg/L	300.0	0.38	0.01		11-JAN-95	17825	L3604-3
Nitrate-N	mg/L	300.0	3.6	0.02	H	11-JAN-95	17820	L3604-3
Nitrite-N	mg/L	300.0	< 0.01	0.01	H	11-JAN-95	17823	L3604-3
Ortho Phosphate	mg/L	300.0	< 0.1	0.1	H	11-JAN-95	17826	L3604-3
Sulfate	mg/L	300.0	25.	0.1		11-JAN-95	17824	L3604-3

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HRG 3/2/95
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LOCKHEED ANALYTICAL SERVICES

COMMON IONS AND ADDITIONAL ANALYTES

Sample Results

Client Sample ID: BODM27	Date Collected: 11-JAN-95
Matrix: Water	Date Received: 13-JAN-95

Constituent	Units	Method	Result	Reporting Det Limit	Data Qualifier(s)	Date Analyzed	LAS Batch ID	LAS Sample ID
Turbidity	NTU	180.1	0.37	N/A		13-JAN-95	17972	L3628-4
Chloride	mg/L	300.0	11.	0.02		13-JAN-95	17933	L3628-3
Fluoride	mg/L	300.0	0.34	0.01		13-JAN-95	17935	L3628-3
Nitrate-N	mg/L	300.0	3.4	0.02		13-JAN-95	17931	L3628-3
Nitrite-N	mg/L	300.0	< 0.01	0.01		13-JAN-95	17932	L3628-3
Ortho Phosphate	mg/L	300.0	< 0.1	0.1		13-JAN-95	17936	L3628-3
Sulfate	mg/L	300.0	25.	0.1		13-JAN-95	17934	L3628-3

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HRG 3/2/95
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ATTACHMENT 4

LABORATORY NARRATIVE and CHAIN-OF-CUSTODY DOCUMENTATION

Lockheed Analytical Services

Log-in No.: L3604/L3628
 Quotation No.: Q400000-B
 SAF: 94-125
 Document File No.: 0110596/0113596
 WHC Document Control No.: 148
 SDG No.: LK3604

**CASE NARRATIVE
 INORGANIC NON-METALS ANALYSES
 WATER**

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 sample(s), and duplicate sample(s).

Preparation and Analysis Requirements

- Two water samples were received for LK3604 and prepared as batches 110WH and 113WH and analyzed for selected analytes as requested on the chain of custody.

Batch 110:

Client ID	LAL #		Method
BODM25	L3604-4	DUP,MS	180.1 Turbidity
	L3604-3	DUP,MS	300.0 Anions, 300.0 Fluoride, 300.0 Phosphate

Batch 113:

Client ID	LAL #		Method
BODM27	L3628-4	DUP,MS	180.1 Turbidity
	L3628-3	DUP,MS	300.0 Anions, 300.0 Fluoride, 300.0 Phosphate

Holding Time Requirements

- Batch 110WH:** The samples for Method 180.1 Turbidity, and Method 300.0 Nitrate-Nitrite-Nitrogen, Nitrite and Phosphate were received from the client out of holding time. Analyses proceeded at the direction of the client and the applicable samples are flagged with an "H".

Batch 113WH: All samples were received within the specified holding times.

Lockheed Analytical Services

Log-in No.: L3604/L3628
Quotation No.: Q400000-B
SAF: 94-125
Document File No.: 0110596/0113596
WHC Document Control No.: 148
SDG No.: LK3604

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

January 25, 1995

Prepared By

Date

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST **L3604**

Page 1 of 1

Data Turnaround

Priority
 Normal

Collector <i>SIMPSON</i>	Company Contact R.E. Peterson	Telephone No. (509) 372-9638
Project Designation 100-KR-4 Groundwater Sampling-Round 7	Sampling Location 100 K	SAF No. B94-125
Ice Chest No. <i>6WS-046</i>	Field Logbook No. <i>EFL-1160</i>	Method of Shipment Federal Express
Shipped To Lockheed	Offsite Property No. <i>W95-0-161-9</i>	Bill of Lading/Air Bill No. <i>2904615971</i>

Possible Sample Hazards/Remarks	Preservative			HNO3			COOL 4C			HNO3			COOL 4C			HNO3			COOL 4C		
	Type of Container	No. of Container(s)	Volume	G	P	1L	G	P	1L	G	P	1L	G	P	1L	G	P	1L			
Special Handling and/or Storage Maintain between 2 C and 4 C.				G	P	1L	G	P	1L	G	P	1L	G	P	1L	G	P	1L			
014 SAMPLE ANALYSIS	METALS-TAL	ANIONS-F, CL, SO4, PO4, NO2, NO3	TURBIDITY	GROSS ALPHA, GROSS BETA, J-234, 235/238	C-14, TRITIUM	ACTIVITY SCAN															
	UNFILTERED																				

Sample No.	Matrix*	Date Sampled	Time Sampled																
B0DM25	W	1/6/95	1104	X	X	X	X	X	X										
B0DM26	W	1/6/95	1104																X

CHAIN OF POSSESSION		Sign/Print Names		SPECIAL INSTRUCTIONS				Matrix*	
Relinquished By <i>AJ Simpson</i>	Date/Time 1/6/95	Received By <i>ERC</i>	Date/Time 1400	Standalone Data Deliverable Sample analysis for NO2, NO3, and PO4 by EPA 300.0 and turbidity by EPA 180.1 are being requested for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met. The Activity Scan is for both sample numbers. <i>stored in FR-6 #3</i>				S = Soil	
Relinquished By <i>AJ Simpson</i>	Date/Time 1-6-95	Received By <i>B. Whitten</i>	Date/Time 1-6-95					SE = Sediment	
Relinquished By <i>ERC</i>	Date/Time 0845	Received By <i>B. Whitten</i>	Date/Time 1-9-95					SO = Solid	
Relinquished By <i>ERC</i>	Date/Time	Received By	Date/Time	SL = Sludge					
Relinquished By <i>ERC</i>	Date/Time	Received By	Date/Time	W = Water					
Relinquished By <i>ERC</i>	Date/Time	Received By	Date/Time	O = Oil					
Relinquished By <i>ERC</i>	Date/Time	Received By	Date/Time	A = Air					
Relinquished By <i>ERC</i>	Date/Time	Received By	Date/Time	DS = Drum Solids					
Relinquished By <i>ERC</i>	Date/Time	Received By	Date/Time	DL = Drum Liquids					
Relinquished By <i>ERC</i>	Date/Time	Received By	Date/Time	T = Tissue					
Relinquished By <i>ERC</i>	Date/Time	Received By	Date/Time	WI = Wipe					
Relinquished By <i>ERC</i>	Date/Time	Received By	Date/Time	L = Liquid					
Relinquished By <i>ERC</i>	Date/Time	Received By	Date/Time	V = Vegetation					
Relinquished By <i>ERC</i>	Date/Time	Received By	Date/Time	X = Other					
LABORATORY SECTION	Received By <i>M. Miller</i>	Title Sample Custodian	Date/Time 1-10-95 / 0830						
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time						

971509 151

Data Turnaround
 Priority
 Normal

Collector <i>K.D. Lee</i>	Company Contact <i>R.E. Peterson</i>	Telephone No. <i>(509) 372-9638</i>
Project Designation <i>100-KR-4 Groundwater Sampling-Round 7</i>	Sampling Location <i>100 K</i>	SAF No. <i>894-125</i>
Ice Chest No. <i>ER-20</i>	Field Logbook No. <i>EFL-1154</i>	Method of Shipment Federal Express
Shipped To Lockheed	Offsite Property No. <i>W95-0-161-26</i>	Bill of Lading/Air Bill No. <i>2904616373</i>

L3628

Possible Sample Hazards/Remarks	Preservative		HNO3		COOL 4C		COOL 4C		HNO3		COOL 4C		COOL 4C		HNO3	
	Type of Container	No. of Container(s)	Volume	1L	500mL	250mL	1L	1L	20mL	1L	1L	20mL	1L	1L	20mL	1L
Special Handling and/or Storage <i>Maintain between 2 C and 4 C.</i>	G	1	1L				1L					1L				1L
SAMPLE ANALYSIS <i>015</i>	METALS-TAL	ANIONS-F, Cl, SO4, PO4, NO2, NO3	TURBIDITY	GROSS ALPHA, GROSS BETA, U-234, 235/238	C-14, TRITIUM	ACTIVITY SCAN										METALS-TAL
	UNFILTERED															FILTERED

Sample No.	Matrix*	Date Sampled	Time Sampled	METALS-TAL	ANIONS	TURBIDITY	GROSS ALPHA, GROSS BETA, U-234, 235/238	C-14, TRITIUM	ACTIVITY SCAN	METALS-TAL
B0DM27	W	01/11/95	1603	X	X	X	X	X	X	
B0DM28	W	01/11/95	1603							X

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS
Relinquished By <i>K.D. Lee</i>	Date/Time <i>11/11/95 1310</i>	Standalone Data Deliverable Sample analysis for NO2, NO3, and PO4 by EPA 300.0 and turbidity by EPA 180.1 are being requested for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met. The Activity Scan is for both sample numbers. <i>Stored in Unit #3</i>
Received By <i>R.E. Peterson</i>	Date/Time <i>1-11-95</i>	
Relinquished By <i>R.E. Peterson</i>	Date/Time <i>08/5</i>	
Received By <i>B. Whitten</i>	Date/Time <i>1-12-95</i>	
Relinquished By	Date/Time	Received By
Relinquished By	Date/Time	Received By

- 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>M. Miller</i>	Title <i>Sample Custodian</i>	Date/Time <i>1-13-95 / 0915</i>
FINAL SAMPLE DISPOSITION	Disposal Method <i>2</i>	Disposed By	Date/Time

011270

0713510 1152

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ATTACHMENT 5
DATA VALIDATION SUPPORTING DOCUMENTATION

GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT:	100 KR 4 Rnd 7		DATA PACKAGE: LK3604-LAS		
VALIDATOR:	H. GREGERSON		LAB: Lockheed	DATE: 3/2/95	
CASE:			SDG:		
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 ₃ /NO ₂
<input type="checkbox"/> Sulfate	<input type="checkbox"/> TDS	<input type="checkbox"/> TKN	<input type="checkbox"/> Phosphate	<input checked="" type="checkbox"/> Turbidity	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SAMPLES/MATRIX	BODM25 BODM27		/ water		

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^{1.} N/A
 Comments: _____

1. BODM25 holding times for NO₃, NO₂, PO₄, and ~~total~~ turbidity were exceeded. Qualification was applied, see supporting documentation.

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

GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

Comments: 1. BODM25 and BODM27 are both splits, however, their associated samples are not in this sample group, the PPDs will be evaluated in the final summary report.

7. ANALYTE QUANTITATION

Was analyte quantitation performed properly? Yes No N/A

Comments:

8. REPORTED RESULTS AND DETECTION LIMITS

Are results reported for all requested analyses? Yes No N/A

Are 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: Results that were reported as < detection limit on the sample result form were given U qualifiers.

[Empty lines for additional comments]

RECORD COPY

MEMORANDUM



TO: 100 KR 4 Round 7 Groundwater Project QA Records March 7, 1995

FR: Heidi Gregerson, Golder Associates Inc. HLG

RE: INORGANIC DATA VALIDATION SUMMARY FOR DATA PACKAGE
LK3604-LAS (943-1610.075 3604INO.KR4)**INTRODUCTION**

This memo presents the results of data validation on data package LK3604-LAS prepared by Lockheed Analytical Services. Sample information is provided in the following table.

SAMPLE ID	COMMENTS	ANALYSIS	MEDIA
B0DM25	SPLIT	INORGANICS	WATER
B0DM26	SPLIT		WATER
B0DM27*	SPLIT	SEE ATTACHMENT 4	WATER
B0DM28	SPLIT		WATER

* - Indicates sample results which were 100% recalculated.

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

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

DATA QUALITY OBJECTIVES

This section presents a summary of the data quality in terms of the referenced validation criteria.

Precision. Goals for precision were met.

Accuracy. Goals for accuracy were met with the exception of deficiencies identified below.

Sample Result Verification. All sample results were supported in the raw data.

Detection Limits. Detection limit goals were met for all sample results.

Completeness. The data package was complete for all requested analyses. Four samples were validated in this data package with a total of 88 determinations reported, all of which were deemed valid. This results in a completeness of 100%, which meets the 90% objective of the work plan.

MAJOR DEFICIENCIES

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

MINOR DEFICIENCIES

The following minor deficiencies were identified during data validation which required qualification of data.

Laboratory Blanks

- Iron was detected in the initial calibration blank at a positive concentration. Attachments 2 and 5 provide a summary of the samples affected, data qualification applied and supporting documentation.
- Zinc was detected in the preparation blank at a positive concentration. Attachments 2 and 5 provide a summary of the samples affected, data qualifications applied and supporting documentation.
- Chromium, manganese, and vanadium were detected in the continuing calibration blanks at positive concentrations. Attachment 2 and 5 provide a summary of the samples affected, data qualifications applied and supporting documentation.

Analytical Spike Recovery

- For sample B0DM28 the analytical spike recovery was outside control limits for selenium. Attachments 2 and 5 provide a summary of samples affected, data qualifications applied and supporting documentation.

FIELD QC

- Samples B0DM25, B0DM26, B0DM27, and B0DM28 were identified as field splits. The associated samples are in another delivery group and the RPD values will be evaluated in the final summary report.

REFERENCES

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

WHC 1994, Environmental and Waste Characterization Analytical Data Validation, Purchase Order MSH-SWV-315905; Validation Statement of Work, Revision 1.0, September 7, 1994; Westinghouse Hanford Company, Richland, Washington.

*Revised
Add
3/16/95*

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ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

Glossary of Inorganic Data Reporting Qualifiers.

- B - Indicates the constituent was analyzed for and detected. The concentration reported is less than the contract required detection limit (CRDL) but greater than the instrument detection limit (IDL). The associated data should be considered usable for decision making purposes.
- U - Indicates the constituent was analyzed for and not detected. The concentration reported is the sample detection limit corrected for aliquot size, dilution and percent solids (in the case of solid matrices) by the laboratory. The associated data should be considered usable for decision making purposes.
- UJ - Indicates the constituent was analyzed for and not detected. Due to a minor quality control deficiency identified during data validation the concentration may not accurately reflect the sample detection limit. The associated data have been qualified as estimated but should be considered usable for decision making purposes.
- BJ - Indicates the constituent was analyzed for and detected at a concentration less than the contract required detection limit (CRDL) but greater than the instrument detection limit (IDL). Due to a minor quality control deficiency identified during data validation the associated data have been qualified as estimated, but should be considered usable for decision making purposes.
- J - Indicates the constituent was analyzed for and detected. Due to a minor quality control deficiency identified during data validation the associated data have been qualified as estimated, but should be considered usable for decision making purposes.
- UR - Indicates the constituent was analyzed for and not detected. Due to a major quality control deficiency identified during data validation, the associated data have been qualified as unusable for decision making purposes.
- R - Indicates the constituent was analyzed for and detected. Due to a major quality control deficiency identified during data validation, the associated data have been qualified as unusable for decision making purposes.

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ATTACHMENT 2
SUMMARY OF DATA QUALIFICATIONS

DATA QUALIFICATION SUMMARY - FORM B-7

SDG: LK3604-LAS	REVIEWER: H. Gregerson	DATE: 3-7-95	PAGE <u>1</u> OF <u>1</u>
COMMENTS: INORGANICS			
COMPOUND/ANALYTE	QUALIFIER	SAMPLES AFFECTED	REASON
IRON	U	B0DM26 B0DM28	DETECTED IN INITIAL CALIBRATION BLANK AT POSITIVE CONCENTRATION
ZINC	U	B0DM25 B0DM27	DETECTED IN PREPARATION BLANK AT POSITIVE CONCENTRATION
CHROMIUM	U	B0DM25 B0DM27 B0DM28	DETECTED IN CONTINUING CALIBRATION BLANK AT POSITIVE CONCENTRATION
MANGANESE	U	B0DM25 B0DM26 B0DM27	DETECTED IN CONTINUING CALIBRATION BLANK AT POSITIVE CONCENTRATION
SELENIUM	UJ	B0DM28	ANALYTICAL SPIKE RECOVERY WAS OUTSIDE CONTROL LIMITS
VANADIUM	U	B0DM25 B0DM26 B0DM27	DETECTED IN CONTINUING CALIBRATION BLANK AT POSITIVE CONCENTRATION

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ATTACHMENT 3

QUALIFIED DATA SUMMARY and ANNOTATED LABORATORY REPORTS

Validated Data Summary, Data Package: LK3604-LAS

Parameter	Samp#	BODM25		BODM26		BODM27		BODM28	
	Date	1-6-95		1-6-95		1-11-95		1-11-95	
	Location	SPLIT 1		SPLIT 1		SPLIT 2		SPLIT 2	
	Depth	---		---		---		---	
	Type	WATER		WATER		WATER		WATER	
	Comments	SPLIT		SPLIT		SPLIT		SPLIT	
	Units	Result	Q	Result	Q	Result	Q	Result	Q
ALUMINUM	UG/L	61.400	B	26.000	U	26.000	U	26.000	U
ANTIMONY	UG/L	45.000	U	45.000	U	50.100	B	45.000	U
ARSENIC	UG/L	2.100	B	2.500	B	11.900	B	12.500	B
BARIUM	UG/L	14.100	B	13.900	B	21.800	B	21.200	B
BERYLLIUM	UG/L	1.000	U	1.000	U	1.000	U	1.000	U
CADMIUM	UG/L	3.000	U	3.000	U	3.000	U	3.000	U
CALCIUM	UG/L	32400.000		33900.000		30100.000		30600.000	
CHROMIUM	UG/L	4.200	U	3.000	U	5.000	U	4.400	U
COBALT	UG/L	7.000	U	7.000	U	7.000	U	7.000	U
COPPER	UG/L	3.000	U	3.000	U	3.000	U	3.000	U
IRON	UG/L	76.200	B	9.300	U	90.400	B	6.600	U
LEAD	UG/L	2.000	U	2.000	U	2.000	U	2.000	U
MAGNESIUM	UG/L	9040.000		9320.000		8310.000		8320.000	
MANGANESE	UG/L	1.500	U	1.000	U	2.700	U	1.000	U
NICKEL	UG/L	12.000	U	12.000	U	12.000	U	12.000	U
POTASSIUM	UG/L	4850.000	B	4990.000	B	4840.000	B	4700.000	B
SELENIUM	UG/L	2.000	U	2.000	U	2.000	U	2.000	UJ
SILVER	UG/L	4.000	U	4.000	U	4.000	U	4.000	U
SODIUM	UG/L	13800.000		14200.000		29000.000		28600.000	
THALLIUM	UG/L	3.000	U	3.000	U	3.000	U	3.000	U
VANADIUM	UG/L	12.600	U	13.200	U	24.400	U	24.000	B
ZINC	UG/L	11.900	U	2.000	U	6.500	U	2.000	U

The decimal places shown do not reflect the precision reported by the laboratory

*Verified
HRG 3/7/95*

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CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

BODM25

Lab Name: L.A.S. _____

Contract: BECHTEL_HA

Lab Code: LOCK__

Case No.: 110WHT

SAS No.: _____

SDG No.: L3604W

Matrix (soil/water): WATER

Lab Sample ID: L3604-2__

Level (low/med): LOW__

Date Received: 01/10/95

% Solids: _____ 0

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

CAS No.	Analyte	Concentration	C	Q	M	Q
7429-90-5	Aluminum	61.4	B		P	
7440-36-0	Antimony	45.0	U		P	
7440-38-2	Arsenic	2.1	B		F	
7440-39-3	Barium	14.1	B		P	
7440-41-7	Beryllium	1.0	U		P	
7440-43-9	Cadmium	3.0	U		P	
7440-70-2	Calcium	32400			P	
7440-47-3	Chromium	4.2	B		P	u
7440-48-4	Cobalt	7.0	U		P	
7440-50-8	Copper	3.0	U		P	
7439-89-6	Iron	76.2	B		P	
7439-92-1	Lead	2.0	U		F	
7439-95-4	Magnesium	9040			P	
7439-96-5	Manganese	1.5	B		P	u
7440-02-0	Nickel	12.0	U		P	
7440-09-7	Potassium	4850	B		P	
7782-49-2	Selenium	2.0	U	N	F	u HRG 3/6/95
7440-22-4	Silver	4.0	U		P	
7440-23-5	Sodium	13800			P	
7440-28-0	Thallium	3.0	U		F	
7440-62-2	Vanadium	12.6	B		P	u
7440-66-6	Zinc	11.9	B		P	u

Color Before: COLORLESS

Clarity Before: CLEAR_

Texture: _____

Color After: COLORLESS

Clarity After: CLEAR_

Artifacts: _____

Comments:

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31

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CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

BODM26

Lab Name: L.A.S. _____

Contract: BECHTEL_HA

Lab Code: LOCK__

Case No.: 110WHD

SAS No.: _____

SDG No.: L3604F

Matrix (soil/water): WATER

Lab Sample ID: L3604-10__

Level (low/med): LOW__

Date Received: 01/10/95

% Solids: _____0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	26.0	U		P
7440-36-0	Antimony	45.0	U		P
7440-38-2	Arsenic	2.5	B		F
7440-39-3	Barium	13.9	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	3.0	U		P
7440-70-2	Calcium	33900			P
7440-47-3	Chromium	3.0	U		P
7440-48-4	Cobalt	7.0	U		P
7440-50-8	Copper	3.0	U		P
7439-89-6	Iron	9.3	B		P
7439-92-1	Lead	2.0	U		F
7439-95-4	Magnesium	9320			P
7439-96-5	Manganese	1.0	B		P
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	4990	B		P
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	4.0	U		P
7440-23-5	Sodium	14200			P
7440-28-0	Thallium	3.0	U		F
7440-62-2	Vanadium	13.2	B		P
7440-66-6	Zinc	2.0	U		P

Q
u
u
u

Color Before: _____

Clarity Before: _____

Texture: _____

Color After: _____

Clarity After: _____

Artifacts: _____

Comments:

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CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

BODM27

Lab Name: L.A.S. _____

Contract: BECHTEL_HA

Lab Code: LOCK__

Case No.: 110WHT

SAS No.: _____

SDG No.: L3604W

Matrix (soil/water): WATER

Lab Sample ID: L3628-2__

Level (low/med): LOW__

Date Received: 01/13/95

% Solids: _____0

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

CAS No.	Analyte	Concentration	C	Q	M	Q
7429-90-5	Aluminum	26.0	U		P	
7440-36-0	Antimony	50.1	B		P	
7440-38-2	Arsenic	11.9			F	
7440-39-3	Barium	21.8	B		P	
7440-41-7	Beryllium	1.0	U		P	
7440-43-9	Cadmium	3.0	U		P	
7440-70-2	Calcium	30100			P	
7440-47-3	Chromium	5.0	B		P	U
7440-48-4	Cobalt	7.0	U		P	
7440-50-8	Copper	3.0	U		P	
7439-89-6	Iron	90.4	B		P	
7439-92-1	Lead	2.0	U		F	
7439-95-4	Magnesium	8310			P	
7439-96-5	Manganese	2.7	B		P	U
7440-02-0	Nickel	12.0	U		P	
7440-09-7	Potassium	4840	B		P	
7782-49-2	Selenium	2.0	U	N	F	U HRG 3/6/95
7440-22-4	Silver	4.0	U		P	
7440-23-5	Sodium	29000			P	
7440-28-0	Thallium	3.0	U		F	
7440-62-2	Vanadium	24.4	B		P	U
7440-66-6	Zinc	6.5	B		P	U

Color Before: COLORLESS

Clarity Before: CLEAR_

Texture: _____

Color After: COLORLESS

Clarity After: CLEAR_

Artifacts: _____

Comments:

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32

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CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

BODM28

Lab Name: L.A.S. _____

Contract: BECHTEL_HA

Lab Code: LOCK__

Case No.: 110WHD

SAS No.: _____

SDG No.: L3604F

Matrix (soil/water): WATER

Lab Sample ID: L3628-10__

Level (low/med): LOW__

Date Received: 01/13/95

% Solids: _____0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	26.0	U		P
7440-36-0	Antimony	45.0	U		P
7440-38-2	Arsenic	12.5			F
7440-39-3	Barium	21.2	B		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	3.0	U		P
7440-70-2	Calcium	30600			P
7440-47-3	Chromium	4.4	B		P
7440-48-4	Cobalt	7.0	U		P
7440-50-8	Copper	3.0	U		P
7439-89-6	Iron	6.6	B		P
7439-92-1	Lead	2.0	U		F
7439-95-4	Magnesium	8320			P
7439-96-5	Manganese	1.0	U		P
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium	4700	B		P
7782-49-2	Selenium	2.0	B	W	F
7440-22-4	Silver	4.0	B		P
7440-23-5	Sodium	28600			P
7440-28-0	Thallium	3.0	U		F
7440-62-2	Vanadium	24.0	B		P
7440-66-6	Zinc	2.0	U		P

Q

U

U

HEG 3/7/95
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UJ HEG 3/6/95

Color Before: _____

Clarity Before: _____

Texture: _____

Color After: _____

Clarity After: _____

Artifacts: _____

Comments:

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HEG 3/7/95
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ATTACHMENT 4

LABORATORY NARRATIVE and CHAIN-OF-CUSTODY DOCUMENTATION

Lockheed Analytical Services

Log-in No.: L3604/L3628
Quotation No.: Q400000-B
SAF: 94-125
Document File No.: 0110596/0113596
WHC Document Control No.: 148
SDG No.: LK3604

**CASE NARRATIVE
INORGANIC METALS ANALYSES
WATER**

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

Preparation and Analysis Requirements

- Two water samples were received in good condition on January 10, 13, 1995 and logged in as L3604.
- The samples were prepared as LAS Batch 110WHT and analyzed for selected analytes as requested on the chain of custody. Sample BODM25 (L3604-2) was used for matrix spike and duplicate, post-digestion spike and serial dilution. All data flags due to the performance of the above-mentioned QC are associated with every sample digested with this batch.

Holding Time Requirements

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

Method Blanks

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

Internal Quality Control

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

- The matrix spike recovered outside the control limits for selenium. However, the acceptable recovery for the water LCS (prep blank spiked) for selenium indicated that the analytical system was operating correctly and that the out-of-control recovery may be attributed to matrix interferences.

Hongsheng LI

2/6/95

Prepared By

Date

014

~~007~~

Lockheed Analytical Services

Log-in No.: L3604/L3628
Quotation No.: Q400000-B
SAF: 94-125
Document File No.: 0110596/0113596
WHC Document Control No.: 148
SDG No.: LK3604

**CASE NARRATIVE
INORGANIC METALS ANALYSES
FILTERED WATER**

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

Preparation and Analysis Requirements

- Two water samples were received in good condition on January 10, 13, 1995 and logged in as L3604.
- The samples were prepared as LAS Batch 110WHD and analyzed for selected analytes as requested on the chain of custody. Sample BODM26 (L3604-10) was used for matrix spike and duplicate, post-digestion spike and serial dilution. All data flags due to the performance of the above-mentioned QC are associated with every sample digested with this batch.

Holding Time Requirements

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

Method Blanks

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

Internal Quality Control

All internal quality control were within acceptance limits.

Hongsheng LI

2/6/95

Prepared By _____

Date _____

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Data Turnaround

Priority
 Normal

Collector <i>K.D. Lee</i>	Company Contact R.E. Peterson	Telephone No. (509) 372-9638
Project Designation 100-KR-4 Groundwater Sampling-Round 7	Sampling Location 100 K	SAF No. B94-125
Ice Chest No. <i>ER-20</i>	Field Logbook No. <i>EFL-1154</i>	Method of Shipment Federal Express
Shipped To Lockheed	Offsite Property No. <i>W95-0-161-26</i>	Bill of Lading/Air Bill No. <i>2904616373</i>

L3628

Possible Sample Hazards/Remarks	Preservative	HNO3	COOL 4C	COOL 4C	HNO3	COOL 4C	COOL 4C	HNO3						
		Type of Container	G	G	P	G	G	P	G					
	No. of Container(s)	1	1	1	4	1	1	1						
Special Handling and/or Storage Maintain between 2 C and 4 C.	Volume	1L	500mL	250mL	1L	1L	20mL	1L						
SAMPLE ANALYSIS		METALS-TAL UNFILTERED	ANIONS-F, Cl, SO4, PO4, NO2, NO3	TURBIDITY	GROSS ALPHA, GROSS BETA, U-234/235/238	C-14, TRITIUM	ACTIVITY SCAN	METALS-TAL FILTERED						

Sample No.	Matrix*	Date Sampled	Time Sampled											
B00M27	W	01/11/95	1603	X	X	X	X	X	X					
B00M28	W	01/11/95	1603							X				

CHAIN OF POSSESSION		Sign/Print Names		SPECIAL INSTRUCTIONS				Matrix*	
Relinquished By <i>K.D. Lee</i>	Date/Time 1/11/95 1310	Received By <i>R. Watten</i>	Date/Time 1-11-95	Standalone Data Deliverable Sample analysis for NO2, NO3, and PO4 by EPA 300.0 and turbidity by EPA 180.1 are being requested for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met. The Activity Scan is for both sample numbers. <i>Stored in Unit #3</i>				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>ERC</i>	Date/Time 0815	Received By	Date/Time						
Relinquished By <i>B. Watten</i>	Date/Time 1-12-95	Received By	Date/Time						
Relinquished By	Date/Time	Received By	Date/Time						

LABORATORY SECTION	Received By <i>M. Miller</i>	Title Sample Custodian	Date/Time 1-13-95 / 0915
FINAL SAMPLE DISPOSITION	Disposal Method 24	Disposed By	Date/Time

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Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST L3604

Page 1 of 1

Data Turnaround

Priority
 Normal

Collector SIMPSON	Company Contact R.E. Peterson	Telephone No. (509) 372-9638	
Project Designation 100-KR-4 Groundwater Sampling-Round 7	Sampling Location 100 K	SAF No. B94-125	
Ice Chest No. 6W5-046	Field Logbook No. EFL-1160	Method of Shipment Federal Express	
Shipped To Lockheed	Offsite Property No. W95-0-161-9	Bill of Lading/Air Bill No. 2904615971	

Possible Sample Hazards/Remarks	Preservative	HNO3	COOL 4C	COOL 4C	HNO3	COOL 4C	COOL 4C		HNO3							
	Type of Container	G	G	P	G	G	P		G							
	No. of Container(s)	1	1	1	4	1	1		1							
Special Handling and/or Storage Maintain between 2 C and 4 C.	Volume	1L	500mL	250mL	1L	1L	20mL		1L							
SAMPLE ANALYSIS		METALS-TAL UNFILTERED	ANIONS-F, CL, SO4, PO4, NO2, NO3	TURBIDITY	GROSS ALPHA, GROSS BETA, J-234/235/238	C-14, TRITIUM	ACTIVITY SCAN		METALS-TAL FILTERED							

Sample No.	Matrix*	Date Sampled	Time Sampled													
B00M25	W	1/6/95	1104	X	X	X	X	X	X							
B00M26	W	1/6/95	1104							X						

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS	Matrix*
Relinquished By <i>A.S. Simpson</i>	Received By <i>ERC</i>	Standalone Data Deliverable Sample analysis for NO2, NO3, and PO4 by EPA 300.0 and turbidity by EPA 180.1 are being requested for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met. The Activity Scan is for both sample numbers. <i>Stored in FR-6 #3</i>	S = Soil SE = Sediment SO = Solid SL = Sludge W = Water O = Oil A = Air DS = Drum Solids DL = Drum Liquids T = Tissue WI = Wipe L = Liquid V = Vegetation X = Other
Date/Time <i>1/6/95 1400</i>	Date/Time <i>1-6-95</i>		
Relinquished By <i>ERC</i>	Received By <i>B.W.H.</i>		
Date/Time <i>1-9-95</i>	Date/Time		
Relinquished By <i>ERC</i>	Received By		
Date/Time	Date/Time		
Relinquished By <i>ERC</i>	Received By		
Date/Time	Date/Time		
LABORATORY SECTION	Received By <i>M. Miller</i>	Title <i>Sample Custodian</i>	Date/Time <i>1-10-95 / 0830</i>
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

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ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 100 KR4 Rnd 7 GH ₂ O			DATA PACKAGE: LK3604-LAS		
VALIDATOR: H. GREGERSON		LAB: Lockheed		DATE: 3/2/95	
CASE:			SDG:		
ANALYSES PERFORMED					
<input checked="" type="checkbox"/> CLP/ICP	<input checked="" 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	BODM27	BODM28			
	BODM25	BODM26	/ water		

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: _____

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 No¹ N/A
- Were preparation blanks analyzed? Yes No N/A
- Are preparation blank results acceptable? Yes No² N/A
- Were field/trip blanks analyzed? Yes No N/A
- Are field/trip blank results acceptable? Yes No N/A

Comments: _____

1. Fe was detected in the ICB and Cr, Mn, ~~V~~ were detected in the CCB. Associated samples were qualified, see supporting do.
 2. Zn was detected in the prep. blank. Associated samples were qualified, see supporting documentation.

5. ACCURACY

- Were spike samples analyzed? Yes No¹ 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: _____

1. Se % recovery was outside control limits, however the sample result was <IDL and the % recovery was > 125% so no qualification was applied.

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 ^{X IRG}
- Are field split RPD values acceptable? Yes No N/A ^{1.}

Comments:

1. BODM25, BODM26, BODM27, BODM28 were identified as field splits. The associated samples are in another delivery group so the RPD values will be evaluated in the final summary report.

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 ^{1.} N/A
- Was MSA performed as required? Yes No N/A
- Are MSA results acceptable? Yes No N/A

Comments:

1. BODM28 %R for Se was outside control limits, qualification was applied (UJ).

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:

HOLDING TIME SUMMARY

SDG: LK3604-LAS VALIDATOR: HEIDI GREGERSON DATE: 3/6/95 PAGE 1 OF 2

COMMENTS:							
FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
BODM25	ICP Metals	1/6/95		2/2/95		27	none
BODM26	ICP Metals	1/6/95		↓		27	
BODM27	ICP Metals	1/11/95				22	
BODM28	ICP Metals	1/11/95		↓		22	
BODM25	GFAA As	1/6/95		1/23/95		17	
BODM26		1/6/95		1/20/95		14	
BODM27		1/11/95				9	
BODM28	↓	1/11/95				9	
BODM25	GFAA Pb	1/6/95				14	
BODM26		1/6/95				14	
BODM27		1/11/95				9	
BODM28	↓	1/11/95				9	
BODM25	GFAA Se	1/6/95				14	
BODM26		1/6/95				14	
BODM27		1/11/95				9	
BODM28	↓	1/11/95		↓		9	↓

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MHC-SD-EN-SPP-002, Rev. 2

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CLP

3
BLANKS

Lab Name: L.A.S. _____

Contract: BECHTEL_HA

Lab Code: LOCK__

Case No.: 110WHT

SAS No.: _____

SDG No.: L3604W

Preparation Blank Matrix (soil/water): WATER

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

Analyte	Initial Calib. Blank (ug/L)		Continuing Calibration Blank (ug/L)						110WHT Preparation Blank		M
		C	1	C	2	C	3	C		C	
Aluminum	26.0	U	38.8	B	26.0	U	26.0	U	26.000	U	P
Antimony	45.0	U	45.0	U	45.0	U	45.0	U	45.000	U	P
Arsenic	2.0	U	2.0	U	2.0	U	2.0	U	2.000	U	F
Barium	12.0	U	12.0	U	12.0	U	12.0	U	12.000	U	P
Beryllium	1.0	U	1.0	U	1.0	U	1.0	U	1.000	U	P
Cadmium	3.0	U	3.0	U	3.0	U	3.0	U	3.000	U	P
Calcium	20.0	U	20.5	B	20.0	U	20.0	U	32.500	B	P
Chromium	3.0	U	4.3	B	3.3	B	4.0	B	3.000	U	P
Cobalt	7.0	U	7.0	U	7.0	U	7.0	U	7.000	U	P
Copper	3.0	U	3.0	U	3.0	U	3.0	U	3.000	U	P
Iron	7.1	B	9.3	B	6.0	U	6.0	U	6.840	B	P
Lead	2.0	U	2.0	U	2.0	U	2.0	U	2.000	U	F
Magnesium	37.0	U	37.0	U	37.0	U	37.0	U	37.000	U	P
Manganese	1.0	U	1.7	B	1.0	U	1.4	B	1.000	U	P
Nickel	12.0	U	12.0	U	12.0	U	12.0	U	12.000	U	P
Potassium	680.0	U	680.0	U	735.6	B	680.0	U	680.000	U	P
Selenium	2.0	U	2.0	U	2.0	U	2.0	U	2.000	U	F
Silver	4.0	U	4.0	U	4.0	U	4.0	U	4.000	U	P
Sodium	23.0	U	23.0	U	23.0	U	23.0	U	55.440	B	P
Thallium	3.0	U	3.0	U	3.0	U	3.0	U	3.000	U	F
Vanadium	3.0	U	3.0	U	3.0	U	3.2	B	3.000	U	P
Zinc	2.0	U	2.0	U	2.0	U	2.0	B	7.930	B	P

BODM25
BODM27
BODM26
BODM28

BODM26
BODM28
BODM25

BODM27

BODM25
BODM27

FORM III - IN

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CLP

3
BLANKS

Lab Name: L.A.S. _____

Contract: BECHTEL_HA

Lab Code: LOCK__

Case No.: 110WHD

SAS No.: _____

SDG No.: L3604F

Preparation Blank Matrix (soil/water): _____

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

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L)						Preparation Blank	C	M
			1	C	2	C	3	C			
Aluminum			26.0	U	34.7	B					P
Antimony			45.0	U	45.0	U					P
Arsenic			2.0	U							F
Barium			12.0	U	12.0	U					P
Beryllium			1.0	U	1.0	U					P
Cadmium			3.0	U	3.0	U					P
Calcium			20.0	U	28.9	B					P
Chromium			6.0	B	4.5	B					P
Cobalt			7.0	U	7.0	U					P
Copper			5.2	B	3.8	B					P
Iron			9.7	B	14.1	B					P
Lead			2.0	U	2.0	U					F
Magnesium			37.0	U	37.0	U					P
Manganese			4.9	B	2.7	B					P
Nickel			12.0	U	12.0	U					P
Potassium			680.0	U	680.0	U					P
Selenium			2.0	U							F
Silver			4.0	U	4.0	U					P
Sodium			67.4	B	51.0	B					P
Thallium			3.0	U							F
Vanadium			7.5	B	3.0	U					P
Zinc			6.2	B	3.6	B					P

B00M27

FORM III - IN

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TO: 100-KR-4 Round 7 Groundwater Project QA Report March 16, 1995

FR: Anne Jensen, Golder Associates Inc.

RE: RADIOCHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE LK3604-LAS (943-1610.075 LK36RAD.KR4)

INTRODUCTION

This memo presents the results of data validation on data package LK3604-LAS prepared by Lockheed Analytical Services. Sample information is provided in the following table.

SAMPLE ID	COMMENTS	ANALYSIS	MEDIA
B0DM25*	FIELD SPLIT	RADIOCHEMISTRY	WATER
B0DM27*	FIELD SPLIT	SEE ATTACHMENT 4	WATER
* - Indicates sample results which were 100% recalculated.			

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

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

DATA QUALITY OBJECTIVES

This section presents a summary of the data quality in terms of the referenced validation criteria.

Precision. Goals for precision were met.

Accuracy. Goals for accuracy were met.

Sample Result Verification. All sample results were supported in the raw data.

Detection Limits. Detection limit goals were met for all sample results.

Completeness. The data package was complete for all requested analyses. A total of two samples were validated in this data package with a total of fourteen determinations reported, all of which were deemed valid. This results in a completeness of 100 percent, which meets the 90% objective of the work plan.

-HGT
 Revised
 3/16/95
 002

Data Package ID: LK3604-LAS

Analysis: RADIOCHEMISTRY

MAJOR DEFICIENCIES

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

MINOR DEFICIENCIES

The following minor deficiencies were identified during data validation which required qualification of data.

Laboratory Duplicates

- The duplicate result for carbon-14 exceeded control limits. Attachments 2 and 5 provide a summary of samples affected, data qualifications applied and supporting documentation.

FIELD QC

- Sample B0DM25 was identified as the field split of sample B0DM07. A comparison of these results will be made in the final summary report.
- Sample B0DM27 was identified as the field split of sample B0DLX1. A comparison of these results will be made in the final summary report.

DATA REPORTING

- Reported sample results which are less than the minimum detectable activity (MDA) have been qualified as undetected (U) on the laboratory results form (see Attachment 3).

REFERENCES

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

WHC 1994, Environmental and Waste Characterization Analytical Data Validation, Purchase Order MSH-SWV-315905; Validation Statement of Work, Revision 1.0, September 7, 1994; Westinghouse Hanford Company, Richland, Washington.

*Reviewed
3/2/95*

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ATTACHMENT 1
GLOSSARY OF DATA REPORTING QUALIFIERS

ATTACHMENT 1

GLOSSARY OF RADIOCHEMISTRY DATA REPORTING QUALIFIERS

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

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ATTACHMENT 2
SUMMARY OF DATA QUALIFICATIONS

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WHC-SD-EN-SPP-002, REV.2

DATA QUALIFICATION SUMMARY - FORM B-7

SDG: LK3604-LAS	REVIEWER: A. JENSEN	DATE: 3-06-95	PAGE <u>1</u> OF <u>1</u>
COMMENTS: RADIOCHEMISTRY			
COMPOUND/ANALYTE	QUALIFIER	SAMPLES AFFECTED	REASON
CARBON-14	J	BODM27	DUPLICATE RESULT EXCEEDED CONTROL LIMITS

9713509.1190

ATTACHMENT 3

QUALIFIED DATA SUMMARY and ANNOTATED LABORATORY REPORTS

Validated Data Summary, Data Package: LK3604-LAS

Parameter	Samp#	BODM25		BODM27	
	Date	1-6-95		1-11-95	
	Location	SPLIT 1		SPLIT 2	
	Depth	---		---	
	Type	WATER		WATER	
	Comments	SPLIT		SPLIT	
	Units	Result	Q	Result	Q
URANIUM-233/234	pCi/L	1.220		1.790	
URANIUM-235	pCi/L	0.220		0.310	
URANIUM-238	pCi/L	0.930		1.490	
GROSS ALPHA	pCi/L	0.300	U	3.000	
GROSS BETA	pCi/L	60.100		4.500	
CARBON-14	pCi/L	154.000		255.000	J
TRITIUM	pCi/L	1890.000		930.000	

The decimal places shown do not reflect the precision reported by the laboratory

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verified af
3/6/95

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WHC-SD-EN-SPP-002, REV.2

DATA QUALIFICATION SUMMARY - FORM B-7

SDG: LK3604-LAS	REVIEWER: A. JENSEN	DATE: 3-06-95	PAGE <u>1</u> OF <u>1</u>
COMMENTS: RADIOCHEMISTRY			
COMPOUND/ANALYTE	QUALIFIER	SAMPLES AFFECTED	REASON
CARBON-14	J	B0DM27	DUPLICATE RESULT EXCEEDED CONTROL LIMITS

*Revised
and
3/17/95*

005

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0DM25

LAL Sample ID: L3604-7

Date Collected: 06-JAN-95

Date Received: 10-JAN-95

Matrix: Water

Login Number: L3604

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
U-233/4	21-JAN-95	U-ISOTOPIC LAL-0108_18037	1.22	0.31	0.16		pCi/L
U-235	21-JAN-95	U-ISOTOPIC LAL-0108_18037	0.22	0.14	0.12		pCi/L
U-238	21-JAN-95	U-ISOTOPIC LAL-0108_18037	0.93	0.27	0.13		pCi/L

verified af
3/6/95

9713509.1194

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: B0DM25

LAL Sample ID: L3604-9

Date Collected: 06-JAN-95

Date Received: 10-JAN-95

Matrix: Water

Login Number: L3604

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
C-14	24-JAN-95	C-14 LAL-0209_18034	154.	83.	95.		pCi/L
H-3	23-JAN-95	TRITIUM(H3) LAL-0066_18039	1890	350	250		pCi/L

verified by
3/6/95

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011

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: BODM27

LAL Sample ID: L3628-5

Date Collected: 11-JAN-95

Date Received: 13-JAN-95

Matrix: Water

Login Number: L3628

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
Gross Alpha	20-JAN-95	GR ALP/BETA LAL-0060_18036	3.0	1.7	2.0		pCi/L
Gross Beta	20-JAN-95	GR ALP/BETA LAL-0060_18036	4.5	1.5	2.2		pCi/L
U-233/4	21-JAN-95	U-ISOTOPIC LAL-0108_18037	1.79	0.36	0.11		pCi/L
U-235	21-JAN-95	U-ISOTOPIC LAL-0108_18037	0.31	0.15	0.11		pCi/L
U-238	21-JAN-95	U-ISOTOPIC LAL-0108_18037	1.49	0.32	0.11		pCi/L

verified by 3/6/95

506

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: BODM27

LAL Sample ID: L3628-9

Date Collected: 11-JAN-95

Date Received: 13-JAN-95

Matrix: Water

Login Number: L3628

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
C-14	07-FEB-95	C-14 LAL-0209_18400	255.	57.	51.		pCi/L
H-3	24-JAN-95	TRITIUM(H3) LAL-0066_18039	930	280	250		pCi/L

verified by
3/6/95
507

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ATTACHMENT 4

LABORATORY NARRATIVE and CHAIN-OF-CUSTODY DOCUMENTATION

Lockheed Analytical Services

Log-in No.: L3604/L3628
Quotation No.: Q400000-B
SAF: 94-125
Document File No.: 0110596/0113596
WHC Document Control No.: 148
SDG No.: LK3604

CASE NARRATIVE RADIOCHEMICAL ANALYSES

The routine calibration and quality control analyses performed for this batch include as applicable: instrument calibration, initial and continuing calibration verification, quench monitoring standards, instrument background analysis, method blanks, yield tracer, laboratory control samples, matrix spike samples, duplicate samples.

Holding Time Requirements

All holding time requirements were met.

Initial Calibration Data: The initial calibration data for the alpha spec 1 counters, gross alpha beta (gas proportional counter) and tritium (liquid scintillation) were sent with report SDG# LK31 (LAS ID# L3551, Document Control No. 1222596), and are therefore not included in this report. The Carbon-14 (liquid scintillation) initial calibration is included in this report (SDG #LK3604).

Analytical Method

Carbon-14

The carbon-14 analysis was performed using LAL-91-SOP-0209. Sample #BODM27 (L3628-9) showed possible C-14 contamination on a direct analysis of the water; it was reanalyzed using a chemical evolution of CO₂ gas with the gas trapped for analysis. On the separated sample, the sample results agreed with the direct analysis, and was reported. The duplicate on the separated carbon-14 analysis (batch 18400) was low, indicating that the CO₂ was not trapped. All other QC criteria were met on both batches.

Gross Alpha Beta

The gross alpha beta analysis was performed using LAL-91-SOP-0060. No problems were encountered during analysis. All QC criteria were met.

Tritium

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

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Lockheed Analytical Services

Log-in No.: L3604/L3628
Quotation No.: Q400000-B
SAF: 94-125
Document File No.: 0110596/0113596
WHC Document Control No.: 148
SDG No.: LK3604

Uranium-Isotopic

The uranium isotopic analysis was performed using LAL-91-SOP-0108. The sample duplicate analysis was out of limits for U-235; however, because U-234 and -238 were within limits, the data is considered acceptable. All other QC criteria were met.

Yvonne M. Jacoby
Prepared By

February 13, 1995
Date

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Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST L3604

Page 1 of 1

Data Turnaround

Priority
 Normal

Collector <i>SIMPSON</i>	Company Contact R.E. Peterson	Telephone No. (509) 372-9638
Project Designation 100-KR-4 Groundwater Sampling-Round 7	Sampling Location 100 K	SAF No. B94-125
Ice Chest No. <i>6WS-046</i>	Field Logbook No. <i>EFL-1160</i>	Method of Shipment Federal Express
Shipped To Lockheed	Offsite Property No. <i>W950-161-9</i>	Bill of Lading/Air Bill No. <i>2904615971</i>

Possible Sample Hazards/Remarks	Preservative	HNO3	COOL 4C	COOL 4C	HNO3	COOL 4C	COOL 4C	HNO3						
<div style="text-align: center; font-size: 2em;">017</div> <p style="text-align: center;">SAMPLE ANALYSIS</p>	Type of Container	G	G	P	G	G	P	G						
	No. of Container(s)	1	1	1	4	1	1	1						
	Volume	1L	500mL	250mL	1L	1L	20mL	1L						
		METALS-TAL UNFIL-TERED	ANIONS-F, Cl, SO4, PO4, NO2, NO3	TURBID-ITY	GROSS ALPHA, GROSS BETA, U-234, 235/238	C-14, TRITIUM	ACTIVI-TY SCAN	METALS-TAL FILTER-ED						

Sample No.	Matrix*	Date Sampled	Time Sampled												
B00M25	W	1/6/95	1104	X	X	X	X	X	X						
B00M26	W	1/6/95	1104 ^{1/40} _{11/5}							X					

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS
Relinquished By <i>AJ Simpson</i>	Received By <i>ERC</i>	<p>Standalone Data Deliverable</p> <p>Sample analysis for NO2, NO3, and PO4 by EPA 300.0 and turbidity by EPA 180.1 are being requested for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met.</p> <p>The Activity Scan is for both sample numbers.</p> <p style="text-align: center;"><i>stored in FA-6 #3</i></p>
Date/Time <i>1/6/95 1400</i>	Date/Time <i>1/6/95 1400</i>	
Relinquished By <i>ERC</i>	Received By <i>B.W. HEN</i>	
Date/Time <i>0845</i>	Date/Time <i>1-9-95</i>	
Relinquished By <i>[Signature]</i>	Received By <i>[Signature]</i>	
Date/Time <i>[Signature]</i>	Date/Time <i>[Signature]</i>	

LABORATORY SECTION	Received By <i>MMiller</i>	Title Sample Custodian	Date/Time <i>1-10-95 / 0830</i>
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

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Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Data Turnaround

Priority
 Normal

Collector <i>K.O Lee</i>	Company Contact <i>R.E. Peterson</i>	Telephone No. <i>(509) 372-9638</i>
Project Designation <i>100-KR-4 Groundwater Sampling-Round 7</i>	Sampling Location <i>100 K</i>	SAF No. <i>B94-125</i>
Ice Chest No. <i>ER20</i>	Field Logbook No. <i>FFL-1154</i>	Method of Shipment <i>Federal Express</i>
Shipped To <i>Lockheed</i>	Offsite Property No. <i>W95-0-161-26</i>	Bill of Lading/Air Bill No. <i>2904616373</i>

L3628

Possible Sample Hazards/Remarks	Preservative	HNO3	COOL 4C	COOL 4C	HNO3	COOL 4C	COOL 4C	HNO3						
	Type of Container	G	G	P	G	G	P	G						
	No. of Container(s)	1	1	1	4	1	1	1						
Special Handling and/or Storage <i>Maintain between 2 C and 4 C.</i>	Volume	1L	500mL	250mL	1L	1L	20mL	1L						
SAMPLE ANALYSIS	METALS-TAL	ANIONS-F, Cl, SO4, PO4, NO2, NO3	TURBIDITY	GROSS ALPHA, GROSS BETA, U-234/235/238	C-14, TRITIUM	ACTIVITY SCAN		METALS-TAL						
	UNFILTERED							FILTERED						

Sample No.	Matrix*	Date Sampled	Time Sampled											
B00M27	W	01/11/95	1603	X	X	X	X	X	X					
B00M28	W	01/11/95	1603							X				

CHAIN OF POSSESSION		Sign/Print Names		SPECIAL INSTRUCTIONS				Matrix*	
Relinquished By <i>K.O Lee</i>	Date/Time <i>1/11/95 1310</i>	Received By <i>ERC</i>	Date/Time <i>1310</i>	Standalone Data Deliverable Sample analysis for NO2, NO3, and PO4 by EPA 300.0 and turbidity by EPA 180.1 are being requested for information only. The ERC Contractor acknowledges that the 48-hour holding time will not be met. The Activity Scan is for both sample numbers. <i>Stored in Unit #3</i>				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>ERC</i>	Date/Time <i>0815</i>	Received By <i>B. Watten</i>	Date/Time <i>1-11-95</i>						
Relinquished By <i>Bill Watten</i>	Date/Time <i>1-12-95</i>	Received By	Date/Time						
Relinquished By	Date/Time	Received By	Date/Time						

LABORATORY SECTION	Received By <i>M. Miller</i>	Title <i>Sample Custodian</i>	Date/Time <i>1-13-95 / 0915</i>
FINAL SAMPLE DISPOSITION	Disposal Method <i>1</i>	Disposed By	Date/Time

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ATTACHMENT 5
DATA VALIDATION SUPPORTING DOCUMENTATION

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 100-KR-4 Rnd 7 6/120.		DATA PACKAGE: LK3604-LAS			
VALIDATOR: A. Jensen		LAB: Lockheed		DATE: 3/6/95	
CASE:			SDG:		
ANALYSES PERFORMED					
<input checked="" type="checkbox"/> Gross Alpha/Beta	<input type="checkbox"/> Strontium-90	<input type="checkbox"/> Technetium-99	<input checked="" type="checkbox"/> Alpha Spectroscopy	<input type="checkbox"/> Gamma Spectroscopy	
<input type="checkbox"/> Total Uranium	<input type="checkbox"/> Radium-22	<input checked="" type="checkbox"/> Tritium	<input checked="" type="checkbox"/> Carbon-14		
SAMPLES/MATRIX					
BODM25/WATER					
BODM27/WATER					

1. Completeness N/A

Technical verification forms present? Yes No N/A

Comments: _____

2. Initial Calibration N/A

Instruments/detectors calibrated within one year of sample analysis? Yes No N/A

Initial calibration acceptable? Yes No N/A

Standards NIST traceable? Yes No N/A

Standards Expired? Yes No N/A

Comments: _____

- 3. Continuing Calibration N/A
- Calibration checked within one week of sample analysis? . . . Yes No N/A
- Calibration check acceptable? Yes No N/A
- Calibration check standards NIST traceable? Yes No N/A
- Calibration check standards expired? Yes No N/A

Comments: _____

- 4. Blanks N/A
- Method blank analyzed? Yes No N/A
- Method blank results acceptable? Yes No N/A
- Analytes detected in method blank? . . . *see note ①* Yes No N/A
- Field blank(s) analyzed? Yes No N/A
- Field blank results acceptable? Yes No N/A
- Analytes detected in field blank(s)? Yes No N/A
- Transcription/Calculation Errors? Yes No N/A

Comments: ① U-234, -235, -238 were detected in the
method blank. However, the sample results were
greater than 5 times the associated blank concentration,
therefore no qualification is required.

- 5. Matrix Spikes N/A
- Matrix spike analyzed? Yes No N/A
- Spike recoveries acceptable? Yes No N/A
- Spike source traceable? Yes No N/A
- Spike source expired? Yes No N/A
- Transcription/Calculation Errors? Yes No N/A

Comments: _____

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- 6. Laboratory Control Samples N/A
- LCS analyzed? Yes No N/A
- LCS recoveries acceptable? Yes No N/A
- LCS traceable? Yes No N/A
- Transcription/Calculation Errors? Yes No N/A

Comments: _____

- 7. Chemical Recovery N/A
- Chemical carrier added? Yes No N/A
- Chemical recovery acceptable? Yes No N/A
- Chemical carrier traceable? Yes No N/A
- Chemical carrier expired? Yes No N/A
- Transcription/Calculation errors? Yes No N/A

Comments: _____

- 8. Duplicates N/A
- Duplicates Analyzed? Yes No N/A
- RPD Values Acceptable? *see note ②* Yes No N/A
- Transcription/Calculation Errors? Yes No N/A

Comments: ② The duplicate for carbon-14 was outside control limits. Data qualification was applied to the associated sample BODM27: "J"

9. Field QC Samples N/A

Field duplicate sample(s) analyzed? Yes No N/A

Field duplicate RPD values acceptable? Yes No N/A

Field split sample(s) analyzed? *see note ③* Yes No N/A

Field split RPD values acceptable? Yes No N/A

Performance audit sample(s) analyzed? Yes No N/A

Performance audit sample results acceptable? Yes No N/A

Comments: ③ Sample BODM25 is the field split of sample BODM07. Sample BODM27 is the field split of sample BODLX1. A comparison of the split results will be made in the final summary report.

10. Holding Times

Are sample holding times acceptable? Yes No N/A

Comments: See attached Holding Time Summary.

11. Results and Detection Limits (Levels D & E) N/A

Results reported for all required sample analyses? Yes No N/A

Results supported in raw data? Yes No N/A

Results Acceptable? Yes No N/A

Transcription/Calculation errors? Yes No N/A

MDA's meet required detection limits? Yes No N/A

Transcription/calculation errors? Yes No N/A

Comments: _____

LK3604.WK1

Gross Alpha		
HEIS No.:	B0DM25	B0DM27
Detector	D1	D3
Lab ID:	L3604-5	L3628-5
Aliquot:	2.50E-01	2.50E-01
Net counts:	6	21
Bkg counts:	4.3	3.5
Spl count time:	100	100
Bkg count time:	100	100
EFFIC:	0.110	0.105
Calc.:	0.3	3.0
Rptd:	0.3	3.0
MDA calc:	2.0	2.0
MDA rptd:	2.0	2.0

Gross Beta		
HEIS No.:	B0DM25	B0DM27
Detector	D1	D3
Lab ID:	L3604-5	L3628-5
Aliquot:	2.50E-01	2.50E-01
Net counts:	1454	207
Bkg counts:	100.6	102.1
Spl count time:	100	100
Bkg count time:	100	100
a into b X TALK:	0.258	0.261
EFFIC:	0.405	0.405
Calc.:	60.2	4.5
Rptd:	60.1	4.5
MDA calc:	2.2	2.2
MDA rptd:	2.2	2.2

Tritium		
HEIS No.	B0DM25	B0DM27
Lab ID	L3604-9	L3628-9
Aliquot, L	0.01	0.01
Gross counts, Blank	20.6	20.6
smpl, CPM	8.69	4.70
bkgd CPM	0.80	0.80
Count time	20	20
Efficiency, smpl	0.189	0.190
Efficiency, blank	0.187	0.187
Result, calc.	1880	925
Result, rptd.	1890	930
MDA, calc.	254	254
MDA, rptd.	250	250

LK3604.WK1

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LK3604.WK1

Carbon 14		
HEIS No.	BODM25	BODM27
Lab ID	L3604-7	L3628-5
Aliquot, L	0.01	0.02
Gross counts, Blank	45.5	57.6
smpl, CPM	3.88	10.17
bkgd CPM	1.73	2.03
Count time	25	20
Efficiency, smpl	0.629	0.719
Efficiency, blank	0.629	0.706
Result, calc.	154	255
Result, rptd.	154	255
MDA, calc.	90	56
MDA, rptd.	95	51

Isotopic Uranium		
HEIS No.	BODM25	BODM27
Lab ID	L3604-7	L3628-5
Aliquot, L	0.3	0.3
Net counts tracer	844.3	899.3
DPM Tracer	10.2	10.2
U-233/4 Net cnt smpl	67.0	105.0
Efficiency	0.214	0.206
Yield	0.807	0.892
Count time, blank	1440.0	1440.0
DPM, blank	0.020	0.021
-233/4 Result, calc.	1.22	1.79
U-233/4 Result, rptd	1.22	1.79
U-233/4 MDA, calc.	0.16	0.16
U-233/4 MDA, rptd.	0.16	0.11
U-235 Net cnt smpl	12.0	18.3
U-235 Result, calc	0.22	0.31
U-235 Result, rptd	0.22	0.31
U-235 MDA, calc	0.16	0.16
U-235 MDA, rptd	0.12	0.11
U-238 Net cnt smpl	51.3	87.3
U-238 Result, calc	0.93	1.49
U-238 Result, rptd	0.93	1.49
U-238 MDA, calc	0.16	0.16
U-238 MDA, rptd	0.13	0.11

LK3604.WK1

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HOLDING TIME SUMMARY

SDG: LK3604-LAS VALIDATOR: A. Jensen DATE: 3/6/95 PAGE 1 OF 1

COMMENTS:

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
BOD M25	Alpha Spec	1/6/95	N/A	1/21/95	N/A	≤ 180	NONE
BOD M27	↓	1/11/95		↓			
BOD M25	Gross α/B	1/6/95		1/20/95			
BOD M27	↓	1/11/95		↓			
BOD M25	Carbon-14	1/6/95		1/24/95			
BOD M27	↓	1/11/95	✓	2/7/95	✓		
BOD M25	Tritium	1/6/95	1/20/95	1/23/95	≤ 7		
BOD M27	↓	1/11/95	↓	1/24/95	↓	↓	↓

B-1

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MHC-SD-EN-SPP-002, Rev. 2

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LOCKHEED ANALYTICAL SERVICES
RADIOCHEMISTRY ANALYTES

QC Data Summary for Sample Duplicate Analysis

Analyte	Batch ID	Client ID	LAL ID	Date Analyzed	Sample Result	Error 2 sigma	Duplicate Result	Error 2 sigma	RER	RPD	Q
C-14	18034	BODM25	L3604-9	01/24/95	154	83.3	192	85.9	0.22	22	
C-14	18400	BODM27	L3628-9	02/06/95	255	56.7	26.8	42.3	2.31	162	*
Gross alpha	18036	BODM25	L3604-5	01/20/95	0.28	1.03	0.69	1.28	0.18	85	
Gross beta	18036	BODM25	L3604-5	01/20/95	60.1	4.56	62.6	4.71	0.27	4	
U-234	18037	BODM27	L3628-5	01/21/95	1.79	0.36	1.31	0.27	0.77	31	
U-235	18037	BODM27	L3628-5	01/21/95	0.31	0.15	0.04	0.04	1.39	156	*
U-238	18037	BODM27	L3628-5	01/21/95	1.49	0.33	1.27	0.26	0.37	16	
H3	18039	BODM25	L3604-9	01/23/95	1886	355	1760	349	0.18	7	

The duplicate for Carbon-14, analyzed on 2/6/95, is outside control limits. Data qualification is applied to the associated sample BODM27: "J"

af 3/6/95

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