START 9613420.0597

LK3604-LAS
189
2

0043549

Lockheed Analytical Services

APR 1996
RECEIVED
EDMC

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

FEB 1995
RECEIVED
Data
Log In

ANALYTICAL DATA REPORT

FOR

METALS, ANIONS, TURBIDITY,
AND RADIOCHEMISTRY

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

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.:	0110596/01-13596
	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
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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 CO_2 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 CO_2 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.

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

9613420.0606

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	PR	Due Date
L3604-1	B0DM25	06-JAN-95	10-JAN-95		14-FEB-95
TEMP 4					
Location: 156TMP-3					
Water 1 S SCREENING		Hold:05-JUL-95			
L3604-2	B0DM25	06-JAN-95	10-JAN-95		14-FEB-95
TEMP 2					
Location: 156TMP-3					
Water 1 S CLP FURNACE		Hold:05-JUL-95			
Water 1 S CLP ICP		Hold:05-JUL-95			
L3604-3	B0DM25	06-JAN-95	10-JAN-95		14-FEB-95
TEMP 4					
Location: 156TMP-3					
Water 1 S 300.0 CHLORIDE		Hold:03-FEB-95			
Water 1 S 300.0 FLUORIDE		Hold:03-FEB-95			
Water 1 S 300.0 NITRATE		Hold:08-JAN-95			
Water 1 S 300.0 NITRITE		Hold:08-JAN-95			
Water 1 S 300.0 PHOSPHATE		Hold:08-JAN-95			
Water 1 S 300.0 SULFATE		Hold:03-FEB-95			
L3604-4	B0DM25	06-JAN-95	10-JAN-95		14-FEB-95
TEMP 4					
Location: 156TMP-3					
Water 1 S 180.1 TURBIDITY		Hold:08-JAN-95			
L3604-5	B0DM25	06-JAN-95	10-JAN-95		14-FEB-95
TEMP 2					
Location: 156TMP-3					
Water 1 S GR ALP/BETA LAL-0060		Hold:05-JUL-95			
L3604-6	B0DM25	06-JAN-95	10-JAN-95		14-FEB-95
TEMP 2					
Location: 156TMP-3					
L3604-7	B0DM25	06-JAN-95	10-JAN-95		14-FEB-95
TEMP 4					
Location: 156TMP-3					
Water 1 S U-ISOTOPIC LAL-0108		Hold:05-JUL-95			
L3604-8	B0DM25	06-JAN-95	10-JAN-95		14-FEB-95
TEMP 2					
Location: 156TMP-3					

040596

9613420.0607

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	PR	Due Date
L3604-9	B0DM25	06-JAN-95	10-JAN-95		14-FEB-95
TEMP 2					
Location: 156TMP-3					
Water 1 S C-14 LAL-0209		Hold:05-JUL-95			
Water 1 S TRITIUM(H3) LAL-0066		Hold:05-JUL-95			
L3604-10	B0DM26	06-JAN-95	10-JAN-95		14-FEB-95
TEMP 2					
Location: 156TMP-3					
Filt H20 15 S CLP FURNACE		Hold:05-JUL-95			
Filt H20 15 S CLP ICP		Hold:05-JUL-95			
L3604-11	REPORT TYPE	10-JAN-95	10-JAN-95		14-FEB-95
Location:					
Water 1 S EDD - DISK DEL.					
Water 1 S INORG TYPE 4A RPT					

Signature: Paul C. Davis

Date: 1-10-95

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST L3604

Page 1 of 1

Data Turnaround: [ ] Priorty [X] 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.: GWS-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		
Special Handling and/or Storage: Maintain between 2 C and 4 C.		

SAMPLE ANALYSIS	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							
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							
Volume	1L	500mL	250mL	1L	1L	20mL		1L							

Sample No.	Matrix*	Date Sampled	Time Sampled														
B0DM25	W	1/6/95	1104	X	X	X	X	X	X								
B0DM26	W	1/6/95 1/4 AJS	~~1/6~~ 1104								X						

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By: AJ Simpson / AJ Simpson KS 1/4/95	Date/Time: 1/6/95 1400	Received By: ERC / B.W. Hatten	Date/Time: 1400 1-6-95
Relinquished By: ERC / B.W. Hatten	Date/Time: 0845 1-9-95	Received By	Date/Time
Relinquished By	Date/Time	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 Frig #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	Title	Date/Time
	L L Miller	Sample Custodian	1-10-95 / 0830

FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

DISTRIBUTION: Original- Sample Yellow - Sampler

BC-6000-828 (12/92)

9613420.0608

9613420.0609

AMPLE STATUS REPORT FOR N 4255. RAD SCREEN 69970-68 TIME: 1/ 9/95 7:58
DISPATCHED: 12/28/94 13:15 SAMPLE HAS NOT BEEN SLURPED PAGE 1
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	XR5443

END OF REPORT

PRESS ANY KEY TO CONTINUE

BODM25
BODM26

MU059

9613420.0610

MESSAGE CONFIRMATION

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

SESSION NO.= 391

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 [X] No [ ]
3. Custody Seals dated and signed? Yes [X] No [ ]
4. Chain of Custody record is taped on inside of cooler lid? Yes [X] No [ ]
5. Vermiculite/packing material is: Wet [ ] Dry [X] _____
6. Each sample is in a plastic bag? Yes [X] No [ ] _____
7. Number of sample containers in cooler: 10
8. Samples have:
   - ____ tape
   - ____ hazard labels
   - X custody seals
   - ____ appropriate sample labels
9. Samples are:
   - X in good condition
   - ____ leaking
   - ____ broken
   - ____ have air bubbles
   - ____ other
10. Coolant Present? Yes [X] 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 CRAVIS Paul Davis Date/Time 1-10-95 8:30 Am

010596

9613420.0612

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 ommited.

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

Login Chain of Custody Report			
1. Are the Collect, Receive , and Due dates correct for every sample?	X		
2. Have appropriate sample comments been included? (e.g., MS/MSD designation, comments from the client concerning method modifications)			N/A

Sample Receiving Checklist			
1. Are any discrepancies between the chain of custody and the login noted? (e.g., client IDs different on chains of custody and bottle labels, samples not sent, samples lost from breakage)			N/A

Primary review signature	Date	Secondary review signature	Date
[signature]	1-10-95	[signature]	1-10-95

Lockheed Analytical Services
Sample Receiving Checklist

Client Name: Westing House - Hanford Job No. L3604 Cooler ID: N/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 PLD		
	~~X~~ 1-10-95		

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		N/A	
are samples bi-phasic (if so, indicate sample ID'S):		N/A	

MISCELLANEOUS ITEMS

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

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*

version 2.0 (11/11/94)

9613420.0613

C110596

9613420.0614

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

Client Sample Number	LAL Sample Number	SDG Number	Matrix	Method
BODM25	L3604-1		Water	SCREENING
	L3604-2		Water	CLP FURNACE
	L3604-2		Water	CLP ICP
	L3604-3		Water	300.0 CHLORIDE
	L3604-3		Water	300.0 FLUORIDE
	L3604-3		Water	300.0 NITRATE
	L3604-3		Water	300.0 NITRITE
	L3604-3		Water	300.0 PHOSPHATE
	L3604-3		Water	300.0 SULFATE
	L3604-4		Water	180.1 TURBIDITY
	L3604-5		Water	GR ALP/BETA LAL-0
	L3604-7		Water	U-ISOTOPIC LAL-01
	L3604-9		Water	C-14 LAL-0209
	L3604-9		Water	TRITIUM(H3) LAL-0
BODM26	L3604-10		Filt H20	CLP FURNACE
	L3604-10		Filt H20	CLP ICP
REPORT TYPE	L3604-11		Water	EDD - DISK DEL
	L3604-11		Water	INORG TYPE 4A RPT

C110596

9613420.0615

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	PR	Due Date
L3628-1	BODM27	11-JAN-95	13-JAN-95		17-FEB-95
temp 4					
Location: 157					
Water 1	S SCREENING	Hold:10-JUL-95			
L3628-2	BODM27	11-JAN-95	13-JAN-95		17-FEB-95
temp 4					
Location: 157					
Water 1	S CLP FURNACE	Hold:10-JUL-95			
Water 1	S CLP ICP	Hold:10-JUL-95			
L3628-3	BODM27	11-JAN-95	13-JAN-95		17-FEB-95
temp 4					
Location: 157					
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	BODM27	11-JAN-95	13-JAN-95		17-FEB-95
temp 4					
Location: 157					
Water 1	S 180.1 TURBIDITY	Hold:13-JAN-95			
L3628-5	BODM27	11-JAN-95	13-JAN-95		17-FEB-95
temp 4					
Location: 157					
Water 1	S GR ALP/BETA LAL-0060	Hold:10-JUL-95			
Water 1	S U-ISOTOPIC LAL-0108	Hold:10-JUL-95			
L3628-6	BODM27	11-JAN-95	13-JAN-95		17-FEB-95
temp 4					
Location: 157					
L3628-7	BODM27	11-JAN-95	13-JAN-95		17-FEB-95
temp 4					
Location: 157					
L3628-8	BODM27	11-JAN-95	13-JAN-95		17-FEB-95
temp 4					
Location: 157					

22

0113596

9613420.0616

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	PR	Due Date
L3628-9	BODM27	11-JAN-95	13-JAN-95		17-FEB-95
temp 4					
Location: 157					
Water 1 S C-14 LAL-0209		Hold:10-JUL-95			
Water 1 S TRITIUM(H3) LAL-0066		Hold:10-JUL-95			
L3628-10	BODM28	11-JAN-95	13-JAN-95		17-FEB-95
temp 4					
Location: 157					
Filt H20 15 S CLP FURNACE		Hold:10-JUL-95			
Filt H20 15 S CLP ICP		Hold:10-JUL-95			
L3628-11	REPORT TYPE	13-JAN-95	13-JAN-95		17-FEB-95
Location:					
Water 1 S EDD - DISK DEL.					
Water 1 S INORG TYPE 4A RPT					

Signature: [illegible] 2:

Date: 1-13-95

0113596

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Date Turnaround: [ ] Priorty [X] Normal

L3628

Collector: K.D. 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.: B94-125
Ice Chest No.: ER-20	Field Logbook No.: EFL-1154	Method of Shipment: Federal Express
Shipped To: Lockheed	Offsite Property No.: W95-0-161-26	Bill of Lading/Air Bill No.: 2904616373
Possible Sample Hazards/Remarks		
Special Handling and/or Storage: Maintain between 2 C and 4 C.		

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							
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							
Volume	1L	500mL	250mL	1L	1L	20mL		1L							

Sample No.	Matrix*	Date Sampled	Time Sampled	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							
B0DM27	W	01/11/95	1003	X	X	X	X	X	X									
B0DM28	W	01/11/95	1003								X							

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By: K.D. Lee, K.D. Lee	Date/Time: 1/11/95 1310	Received By: ERC, B. Wilkins	Date/Time: 1310 1-11-95
Relinquished By: ERC, B. Wilkins	Date/Time: 0815 1-12-95	Received By	Date/Time
Relinquished By	Date/Time	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: M. Miller	Title: Sample Custodian	Date/Time: 1-13-95 / 0915
FINAL SAMPLE DISPOSITION	Disposal Method: 27	Disposed By	Date/Time

DISTRIBUTION: Original- Sample Yellow - Sampler

BC-6000-828 (12/92)

9613420.0617

0113596

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	XR5443

END OF REPORT

BODM27
BODM28
1-12-95
BW

0113596

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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 ommiued.

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

Login Chain of Custody Report		
1. Are the Collect, Receive , and Due dates correct for every sample?	X	
2. Have appropriate sample comments been included? (e.g., MS/MSD designation, comments from the client concerning method modifications)	X	

Sample Receiving Checklist		
1. Are any discrepancies between the chain of custody and the login noted? (e.g., client IDs different on chains of custody and bottle labels, samples not sent, samples lost from breakage)		NA

M Miller 1-13-95 [signature]

Primary review signature Date Secondary review signature Date

2E

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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 [X] No [ ]
3. Custody Seals dated and signed? Yes [X] No [ ]
4. Chain of Custody record is taped on inside of cooler lid? Yes [X] No [ ]
5. Vermiculite/packing material is: Wet [ ] Dry [X] _____
6. Each sample is in a plastic bag? Yes [X] No [ ] _____
7. Number of sample containers in cooler: 10
8. Samples have:
   - ____ tape
   - ____ hazard labels
   - X custody seals
   - X appropriate sample labels
9. Samples are:
   - X in good condition
   - ____ leaking
   - ____ broken
   - ____ have air bubbles
   - ____ other
10. Coolant Present? Yes [X] 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 4616 373 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 L. Miller [signature] 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	X		
chain of custody present	X		
blue ice (or equiv.) present/frozen	X		
rad survey completed	X		

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

MISCELLANEOUS ITEMS			
	Yes	No	* Comments/Discrepancies
samples with short holding times	X		Nitrate / Nitrite
samples to subcontract		X	

ADDITIONAL COMMENTS/DISCREPANCIES

Completed by / date: MMsilla 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*

version 2.0 (11/11/94)

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

Client Sample Number	LAL Sample Number	SDG Number	Matrix	Method
BODM27	L3628-1		Water	SCREENING
	L3628-2		Water	CLP FURNACE
	L3628-2		Water	CLP ICP
	L3628-3		Water	300.0 CHLORIDE
	L3628-3		Water	300.0 FLUORIDE
	L3628-3		Water	300.0 NITRATE
	L3628-3		Water	300.0 NITRITE
	L3628-3		Water	300.0 PHOSPHATE
	L3628-3		Water	300.0 SULFATE
	L3628-4		Water	180.1 TURBIDITY
	L3628-5		Water	GR ALP/BETA LAL-0
	L3628-5		Water	U-ISOTOPIC LAL-01
	L3628-9		Water	C-14 LAL-0209
	L3628-9		Water	TRITIUM(H3) LAL-0
BODM28	L3628-10		Filt H20	CLP FURNACE
	L3628-10		Filt H20	CLP ICP
REPORT TYPE	L3628-11		Water	EDD - DISK DEL
	L3628-11		Water	INORG TYPE 4A RPT

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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:

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:

FORM I - IN

9613420.0625

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:

FORM I - IN

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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:

FORM I - IN

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

Date Collected: 06-JAN-95

Matrix: Water

LAL Sample ID: L3604-5

Date Received: 10-JAN-95

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: BODM25 | 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: 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

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

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Golder Associates Inc.

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

RECORD COPY

Golder Associates

MAR 1995
RECEIVED
Validation
Log In

March 7, 1995

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

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

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:

SAF#	Project	Data Package	Analyses
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

Christina I. Jensen
Task Manager

Enclosures

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

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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

9613420.0636

RECORD COPY

MEMORANDUM

MAR 1995
RECEIVED
Validation
Log In

TO: 100-KR-4 Round 7 Groundwater Project QA Record 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* BODM27*	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.

by Master DP File Number

for LOCKHEED Laboratory

HEIS Samp Number	Client Sample Number	Master DP File Number	DP Sequence Number	Project	Y N VOA	Y N SEMI VOA	Y N PEST/PCB	Y N WETCHEM	Y N METALS	COMMENTS	Y N RADCHEM	Date OSM Rcvd DP
BODM25	field Split of BODM01	LK3604		100-KR-4	N	N	N	Y 2/16/95	Y 2/16/95	01/10/95 - SAF-B94-125	Y 2/16/95	2/16/95
BODM26	field Split	LK3604		100-KR-4	N	N	N	N	Y 2/16/95	01/10/95 - SAF-B94-125	N	2/16/95
BODM27	field split of BODLX1	LK3604		100-KR-4	N	N	N	Y 2/16/95	Y 2/16/95	01/13/95 - SAF-B94-125	Y 2/16/95	2/16/95
BODM28	FieldSplit	LK3604		100-KR-4	N	N	N	N	Y 2/16/95	01/13/95 - SAF-B94-125	N	2/16/95

Total Samples Requested -- 4

Total Samples Complete -- 4

Data Entry Dor
DP DRa 3-8-95
DataTrac
3-9-95

9613420.0637

Validation Rcvd 3-8-95

9613420.0638
RECORD COPY

MEMORANDUM

TO: 100-KR-4 Round 7 Groundwater Project QA Record 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* 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.

Revised 3/16/95

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.

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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

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

DATA QUALIFICATION SUMMARY - FORM B-7

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

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ATTACHMENT 3

QUALIFIED DATA SUMMARY and ANNOTATED LABORATORY REPORTS

Validated Data Summary, Data Package: LK3604-LAS

	Samp#	BODM25		BODM27	
	Date	1-6-95		1-11-95	
	Location	SPLIT 1		SPLIT 2	
	Depth	---		---	
	Type	WATER		WATER	
	Comments	SPLIT		SPLIT	
Parameter	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 aj
3/6/95

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

DATA QUALIFICATION SUMMARY - FORM B-7

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

Revised 3/17/95

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: BODM25 | 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 aj 3/6/95

RAD DATA REPORT (ra01)

Bechtel Hanford, Inc. * Richland, WA

Bechtel Hanford Project (Project BECHTEL-HANFORD)

Client Sample ID: BODM25 | 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 cy 3/6/95

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 3/6/95

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. J	57.	51.		pCi/L
H-3	24-JAN-95	TRITIUM(H3) LAL-0066_18039	930	280	250		pCi/L

verified cy 3/6/95

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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
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 CO_2 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 CO_2 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.

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

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST L3604

Page 1 of 1

Data Turnaround: [ ] Priorty [X] 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.: GWS-046	Field Logbook No.: EFL-1160	Method of Shipment: Federal Express
Shipped To: Lockheed	Offsite Property No.: W95-O-161-9	Bill of Lading/Air Bill No.: 2904615971
Possible Sample Hazards/Remarks		
Special Handling and/or Storage: Maintain between 2 C and 4 C.		

Sample No.	Matrix*	Date Sampled	Time Sampled	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							
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							
Volume				1L	500mL	250mL	1L	1L	20mL		1L							
BODM25	W	1/6/95	1104	X	X	X	X	X	X									
BODM26	W	1/6/95	1104								X							

SAMPLE ANALYSIS

017

CHAIN OF POSSESSION	Sign/Print Names	Date/Time		Date/Time
Relinquished By	RJ Simpson	1/6/95 1400	Received By	ERC B. Whitten 1400 1-6-95
Relinquished By	ERC B. Whitten	1-9-95 0845	Received By	
Relinquished By			Received By	
Relinquished By			Received By	

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 Fr. 6 #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: M Miller	Title: Sample Custodian	Date/Time: 1-10-95 / 0830
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: [ ] Priorty [X] Normal

L3628

Collector: K.D. 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.: B94-125
Ice Chest No.: ER-20	Field Logbook No.: EFL-1154	Method of Shipment: Federal Express
Shipped To: Lockheed	Offsite Property No.: W95-0-161-26	Bill of Lading/Air Bill No.: 2904616373

Possible Sample Hazards/Remarks:

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

SAMPLE ANALYSIS																
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								
Volume	1L	500mL	250mL	1L	1L	20mL		1L								
	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													
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		
Relinquished By: K.D. Lee / Kitty Lee	Date/Time: 1/11/95 1310	Received By: ERC / B. Wahlen	Date/Time: 1310 1-11-95
Relinquished By: ERC / B. Wahlen	Date/Time: 0815 1-12-95	Received By:	Date/Time:
Relinquished By:	Date/Time:	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: M. Miller	Title: Sample Custodian	Date/Time: 1-13-95 / 0915
FINAL SAMPLE DISPOSITION	Disposal Method: N	Disposed By:	Date/Time:

9613420.0655

9613420.0656

ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E

PROJECT: 100-KR-4 Rnd 7 6420.		DATA PACKAGE: LK3604-LAS
VALIDATOR: A. Jensen	LAB: Lockheed	DATE: 3/6/95
CASE:		SDG:

ANALYSES PERFORMED

☒ Gross Alpha/Beta	☐ Strontium-90	☐ Technetium-99	☒ Alpha Spectroscopy	☐ Gamma Spectroscopy	
☐ Total Uranium	☐ Radium-22	☒ Tritium	☒ 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) see 3/10/95

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:

Revised 3/10/95

021

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"

022

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:

023

LK3604.WK1

Gross Alpha		
HEIS No.:	BODM25	BODM27
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.:	BODM25	BODM27
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.	BODM25	BODM27
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

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 Nt 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

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
BODM25	Alpha Spec	1/6/95	N/A	1/21/95	N/A	≤ 180	NONE
BODM27	↓	1/11/95		↓			
BODM25	Gross α/β	1/6/95		1/20/95			
BODM27	↓	1/11/95		↓			
BODM25	Carbon-14	1/6/95		1/24/95			
BODM27	↓	1/11/95	↓	2/7/95	↓		
BODM25	Tritium	1/6/95	1/20/95	1/23/95	≤ 7		
BODM27	↓	1/11/95	↓	1/24/95	↓	↓	↓

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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

aj 3/6/95

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RECORD COPY

MEMORANDUM

MAR 1995
RECEIVED
Validation
Log In

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

FR: Heidi Gregerson, Golder Associates Inc. HRG

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.

Data Package ID: LK3604-LAS Analysis: INORGANICS

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 ABS 3/10/95

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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 1 OF 1
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

	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	
Parameter	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		12.500	
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 ~~J~~ 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

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Comments:

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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	Q
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	U
7439-92-1	Lead	2.0	U		F	
7439-95-4	Magnesium	9320			P	
7439-96-5	Manganese	1.0	~~B~~		P	U
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	U
7440-66-6	Zinc	2.0	U		P	

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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	UJ 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

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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	Q
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	U
7440-48-4	Cobalt	7.0	U		P	
7440-50-8	Copper	3.0	U		P	
7439-89-6	Iron	6.6	~~B~~		P	U
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	~~UJ~~ UJ HRG 3/7/95
7440-22-4	Silver	4.0	~~U~~		P	~~UJ~~ UJ HRG 3/7/95
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	

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Comments:

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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**

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 [X] Normal

L3628

Collector: K.D 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.: B94-125
Ice Chest No.: ER-20	Field Logbook No.: EFL-1154	Method of Shipment: Federal Express
Shipped To: Lockheed	Offsite Property No.: W95-0-161-26	Bill of Lading/Air Bill No.: 2904616373
Possible Sample Hazards/Remarks		
Special Handling and/or Storage: Maintain between 2 C and 4 C.		

SAMPLE ANALYSIS																
			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							
			Volume	1L	500mL	250mL	1L	1L	20mL		1L							
				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															
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		
Relinquished By: K.D. Lee	Date/Time: 1/11/95 1310	Received By: ERC B. Wilhite	Date/Time: 1310 1-11-95
Relinquished By: ERC B. Wilhite	Date/Time: 0815 1-12-95	Received By:	Date/Time:
Relinquished By:	Date/Time:	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	Title	Date/Time
	M Miller	Sample Custodian	1-13-95 / 0915

FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time
	24		

9613420.0680

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST L3604

Page 1 of 1

Data Turnaround: [ ] Priorty [X] 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.: GWS-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		
Special Handling and/or Storage: Maintain between 2 C and 4 C.		

SAMPLE ANALYSIS																	
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							
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														
B0DM25	W	1/6/95	1104	X	X	X	X	X	X								
B0DM26	W	1/6/95 1/4 AJS	1104								X						

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By: AJ SIMPSON / AG Simpson	Date/Time: 1/6/95 1400	Received By: ERC / Bwhitten	Date/Time: 1400 1-6-95
Relinquished By: ERC / Bwhitten	Date/Time: 0845 1-9-95	Received By:	Date/Time:
Relinquished By:	Date/Time:	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 Fr.g #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: MMiller	Title: Sample Custodian	Date/Time: 1-10-95 / 0830
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

9513420.0681

9813420.0682

ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 100 KR4 Rnd 7 GH2O			DATA PACKAGE: LK3604-LAS		
VALIDATOR: H. GREGERSON		LAB: Lockheed		DATE: 3/2/95	
CASE:			SDG:		

ANALYSES PERFORMED					
☒ CLP/ICP	☒ CLP/GFAA	☐ CLP/Hg	☐ CLP/Cyanide	☐	☐
☐ SW-846/ICP	☐ SW-846/GFAA	☐ SW-846/Hg	☐ SW-846 Cyanide	☐	☐

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:

019

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

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

Comments:

4. BLANKS

Were ICB and CCB checks performed for all applicable analyses? Yes No N/A
Are ICB and CCB results acceptable? . . . . . Yes No 1. N/A
Were preparation blanks analyzed? . . . . . Yes No N/A
Are preparation blank results acceptable? . . . . . Yes No 2. 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~~ Hg were detected in the CCB. Associated samples were qualified, see supporting da
2. Zn was detected in the prep. blank. Associated samples were qualified, see supporting documentation.

5. ACCURACY

Were spike samples analyzed? . . . . . Yes No 1. 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.

020

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

6. PRECISION

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

Are laboratory duplicate samples RPD values acceptable? . . . . Yes No N/A

Were ICP serial dilution samples analyzed? . . . . . Yes No N/A

Are ICP serial dilution %D values acceptable? . . . . . Yes No N/A

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

Are field split RPD values acceptable? . . . . . Yes No N/A 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:

021

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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
BOOM25	ICP Metals	1/6/95		2/2/95		27	none
BOOM26	ICP Metals	1/6/95				27	
BOOM27	ICP Metals	1/11/95				22	
BOOM28	ICP Metals	1/11/95				22	
BOOM25	GFAA As	1/6/95		1/23/95		17	
BOOM26		1/6/95		1/20/95		14	
BOOM27		1/11/95				9	
BOOM28		1/11/95				9	
BOOM25	GFAA Pb	1/6/95				14	
BOOM26		1/6/95				14	
BOOM27		1/11/95				9	
BOOM28		1/11/95				9	
BOOM25	GFAA Se	1/6/95				14	
BOOM26		1/6/95				14	
BOOM27		1/11/95				9	
BOOM28		1/11/95				9	

HOLDING TIME SUMMARY

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

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
BODM25	GFAATI	1/6/95		1/20/95		14	none
BODM26	↓	1/6/95		1/20/95		14	↓
BODM27	↓	1/11/95		1/20/95		9	↓
BODM28	↓	1/11/95		1/20/95		9	↓

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)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	PBW110WHT Preparation Blank	C	M
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

ILMO3.0

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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) 1	C	2	C	3	C	Prepa-ration Blank	C	M
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

BOOM27

FORM III - IN

ILM03.0

9513420.0690

ACCURACY DATA SUMMARY

SDG: LK3604-LAS	VALIDATOR: S. Schildt	DATE: 3/16/95	PAGE 1 OF 1	
COMMENTS: Analytical Spikes				
SAMPLE ID	COMPOUND	% RECOVERY	SAMPLE(S) AFFECTED	QUALIFIER REQUIRED
BODM28	Se	80%	BODM28	UJ

original 3/16/95 0.25

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RECORD COPY

MEMORANDUM

MAR 1995 RECEIVED Validation Log In

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

FR: Heidi Gregerson, Golder Associates Inc. HRG

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

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

DATA QUALIFICATION SUMMARY - FORM B-7

SDG: LK3604-LAS	REVIEWER: H. Gregerson	DATE: 3-2-95	PAGE 1 OF 1
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

Validated Data Summary, Data Package: LK3604-LAS

	Samp#	BODM25		BODM27	
	Date	1-6-95		1-11-95	
	Location	SPLIT 1		SPLIT 2	
	Depth	---		---	
	Type	WATER		WATER	
	Comments	SPLIT		SPLIT	
Parameter	Units	Result	Q	Result	Q
TURBIDITY	NTU	0.190	J	0.370	
CHLORIDE	MG/L	5.200		11.000	
FLUORIDE	MG/L	0.380		0.340	
NITRATE	MG/L	3.600	J	3.400	
NITRITE	MG/L	0.010	UR	0.010	U
ORTHO-PHOSPHATE	MG/L	0.100	UR	0.100	U
SULFATE	MG/L	25.000		25.000	

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

Verified
HRG 3/3/95

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9613420.0699

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

HRG 3/2/95

~~298~~

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	U
Ortho Phosphate	mg/L	300.0	< 0.1	0.1		13-JAN-95	17936	L3628-3	U
Sulfate	mg/L	300.0	25.	0.1		13-JAN-95	17934	L3628-3	

HRG 3/2/95

~~299~~

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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: [ ] Priorty [X] 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.: GWS-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							
Volume	1L	500mL	250mL	1L	1L	20mL		1L							
SAMPLE ANALYSIS	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							

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

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

Relinquished By	Date/Time	Received By	Date/Time
RJ Simpson / RJS / AJ Simpson	1/6/95 1400	ERC / Rue White / B. White	1400 1-6-95
ERC / Rue White / B. White	0845 1-9-95		

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 Fr.G #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: M Miller	Title: Sample Custodian	Date/Time: 1-10-95 / 0830
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

9813420.0704

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Data Turnaround: [ ] Priorty [X] Normal

L3628

Collector: K.D. 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.: B94-125
Ice Chest No.: ER-20	Field Logbook No.: EFL-1154	Method of Shipment: Federal Express
Shipped To: Lockheed	Offsite Property No.: W95-0-161-26	Bill of Lading/Air Bill No.: 2904616373
Possible Sample Hazards/Remarks		

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

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							
Volume	1L	500mL	250mL	1L	1L	20mL		1L							
SAMPLE ANALYSIS	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							

015

Sample No.	Matrix*	Date Sampled	Time Sampled														
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	Date/Time	Received By	Date/Time
Relinquished By	K.D. Lee	1/11/95 1310	Received By: ERC B. Walter	1310 1-11-95
Relinquished By	ERC B. Walter	0815 1-12-95	Received By	
Relinquished By			Received By	
Relinquished By			Received By	

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	Title	Date/Time
	M Mills	Sample Custodian	1-13-95 / 0915

FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time
	2		

9813420.0705

2C113

9813420.0706

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

☒ Anions/IC	☐ TOC	☐ TOX	☐ TPH-418.1	Oil and Grease	Alkalinity
☐ Ammonia	☐ BOD/COD	☐ Chloride	☐ Chromium-VI	☐ pH	☐ NO_3/NO_2
☐ Sulfate	☐ TDS	☐ TKN	☐ Phosphate	☒ Turbidity	☐
☐	☐	☐	☐	☐	☐

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) N/A

Comments:

HRG 3/3/95

1. BODM25 holding times for NO_3, NO_2, PO_4, ~~turbe~~ and turbidity were exceeded. Qualification was applied, see supporting documentation.

017

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

018

GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

Comments:

1. BODM25 and BODM27 are both splits, however, their associated samples are not in this sample group, the RPDs 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.

019

HOLDING TIME SUMMARY

SDG: UK3604 - LAS	VALIDATOR: HEIDI GREGERSON	DATE: 3/2/95	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
BODM25	Anions	1/6/95	1/11/95	1/11/95	5	5	NO_2, NO_3, PO_4 UR J
↓	Turbidity	↓	1/10/95	1/10/95	4	4	J
BODM27	Anions	1/11/95	1/13/95	1/13/95	2	2	None
↓	Turbidity	↓	1/13/95	1/13/95	2	2	None

9813420.0710

4/06/95

Data Validation Check List

for Project 100-KR-4

BHI -00403
Rev. 00

HEIS Samp Number	Client Sample Number	Master DP File Number	DP Sequence Number	Laboratory	Y N VOA	Y N SEMI VOA	Y N PEST/PCB	Y N WETCHEM	Y N METALS	COMMENTS	Y N RADCHEM	Date OSM Rcvd DP
BODM25	split 1 of BODLX1 M07	LK3604		LOCKHEED	N	N	N	Y 2/16/95	Y 2/16/95	01/10/95 - SAF-B94-125	Y 2/16/95	2/16/95
BODM26	split 1 BODM08	LK3604		LOCKHEED	N	N	N	N	Y 2/16/95	01/10/95 - SAF-B94-125	N	2/16/95
BODM27	split 2 BODLX1	LK3604		LOCKHEED	N	N	N	Y 2/16/95	Y 2/16/95	01/13/95 - SAF-B94-125	Y 2/16/95	2/16/95
BODM28	split 2 BODLX2	LK3604		LOCKHEED	N	N	N	N	Y 2/16/95	01/13/95 - SAF-B94-125	N	2/16/95
BODLX5		W0355		QUANTERRA	N	N	N	Y 2/21/95	Y 2/21/95	01/05/95 - SAF-B94-125	Y 2/21/95	2/21/95
BODLX6		W0355		QUANTERRA	N	N	N	N	Y 2/21/95	01/05/95 - SAF-B94-125	N	2/21/95
BODLX7		W0355		QUANTERRA	N	N	N	Y 2/21/95	Y 2/21/95	01/04/95 - SAF-B94-125	Y 2/21/95	2/21/95
BODLX8		W0355		QUANTERRA	N	N	N	N	Y 2/21/95	01/04/95 - SAF-B94-125	N	2/21/95
BODLX9		W0355		QUANTERRA	N	N	N	Y 2/21/95	Y 2/21/95	01/05/95 - SAF-B94-125	Y 2/21/95	2/21/95
BODLY0		W0355		QUANTERRA	N	N	N	N	Y 2/21/95	01/05/95 - SAF-B94-125	N	2/21/95
BODLY1		W0355		QUANTERRA	N	N	N	Y 2/21/95	Y 2/21/95	01/04/95 - SAF-B94-125	Y 2/21/95	2/21/95

Validation Rcvd _____

9413170245

4/06/95

Data Validation Check List

for Project 100-KR-4

HEIS Samp Number	Client Sample Number	Master DP File Number	DP Sequence Number	Laboratory	Y N	VOA	Y N	SEMI VOA	Y N	PEST/PCB	Y N	WETCHEM	Y N	METALS	COMMENTS	Y N	RADCHEM	Date OSM Rcvd DP
BODLY2		W0355		QUANTERRA	N		N		N		N		Y	2/21/95	01/04/95 - SAF-B94-125	N		2/21/95
BODLY3		W0355		QUANTERRA	N		N		N		Y	2/21/95	Y	2/21/95	01/04/95 - SAF-B94-125	Y	2/21/95	2/21/95
BODLY4		W0355		QUANTERRA	N		N		N		N		Y	2/21/95	01/04/95 - SAF-B94-125	N		2/21/95
BODLY7		W0355		QUANTERRA	N		N		N		Y	2/21/95	Y	2/21/95	01/05/95 - SAF-B94-125	Y	2/21/95	2/21/95
BODLY8		W0355		QUANTERRA	N		N		N		N		Y	2/21/95	01/05/95 - SAF-B94-125	N		2/21/95
BODLY9		W0355		QUANTERRA	N		N		N		Y	2/21/95	Y	2/21/95	01/06/95 - SAF-B94-125	Y	2/21/95	2/21/95
BODLZ0		W0355		QUANTERRA	N		N		N		N		Y	2/21/95	01/06/95 - SAF-B94-125	N		2/21/95
BODLZ1		W0355		QUANTERRA	N		N		N		Y	2/21/95	Y	2/21/95	01/04/95 - SAF-B94-125	Y	2/21/95	2/21/95
BODLZ2		W0355		QUANTERRA	N		N		N		N		Y	2/21/95	01/04/95 - SAF-B94-125	N		2/21/95
BODLZ3		W0355		QUANTERRA	N		N		N		Y	2/21/95	Y	2/21/95	01/04/95 - SAF-B94-125	Y	2/21/95	2/21/95
BODLZ4		W0355		QUANTERRA	N		N		N		N		Y	2/21/95	01/04/95 - SAF-B94-125	N		2/21/95
BODLZ5		W0355		QUANTERRA	N		N		N		Y	2/21/95	Y	2/21/95	01/04/95 - SAF-B94-125	Y	2/21/95	2/21/95

Validation Rcvd _____

9513120.0712

4/06/95

Data Validation Check List

for Project 100-KR-4

HEIS Samp Number	Client Sample Number	Master DP File Number	DP Sequence Number	Laboratory	Y N	VOA	Y N	SEMI VOA	Y N	PEST/PCB	Y N	WETCHEM	Y N	METALS	COMMENTS	Y N	RADCHEM	Date OSM Rcvd DP
B0DLZ6		W0355		QUANTERRA	N		N		N		N		Y	2/21/95	01/04/95 - SAF-B94-125	N		2/21/95
B0DLZ9		W0362		QUANTERRA	N		N		N		Y	2/27/95	Y	2/27/95	01/11/95 - SAF-B94-125	Y	2/27/95	2/27/95
B0DM00		W0362		QUANTERRA	N		N		N		N		Y	2/27/95	01/11/95 - SAF-B94-125	N		2/27/95
B0DM01		W0362		QUANTERRA	N		N		N		Y	2/27/95	Y	2/27/95	01/09/95 - SAF-B94-125	Y	2/27/95	2/27/95
B0DM02		W0362		QUANTERRA	N		N		N		N		Y	2/27/95	01/09/95 - SAF-B94-125	N		2/27/95
B0DM03		W0362		QUANTERRA	N		N		N		Y	2/27/95	Y	2/27/95	01/09/95 - SAF-B94-125	Y	2/27/95	2/27/95
B0DM04		W0362		QUANTERRA	N		N		N		N		Y	2/27/95	01/09/95 - SAF-B94-125	N		2/27/95
B0DM05		W0362		QUANTERRA	N		N		N		Y	2/27/95	Y	2/27/95	01/09/95 - SAF-B94-125	Y	2/27/95	2/27/95
B0DM06		W0362		QUANTERRA	N		N		N		N		Y	2/27/95	01/06/95 - SAF-B94-125	N		2/27/95
B0DM07		W0362		QUANTERRA	N		N		N		Y	2/27/95	Y	2/27/95	01/09/95 - SAF-B94-125	Y	2/27/95	2/27/95
B0DM08		W0362		QUANTERRA	N		N		N		N		Y	2/27/95	01/09/95 - SAF-B94-125	N		2/27/95

Validation Rcvd _____

9603242.0707

4/06/95

Data Validation Check List

for Project 100-KR-4

HEIS Samp Number	Client Sample Number	Master DP File Number	DP Sequence Number	Laboratory	Y N -	VOA	Y N -	SEMI VOA	Y N -	PEST/PCB	Y N -	WETCHEM	Y N -	METALS	COMMENTS	Y N -	RADCHEM	Date OSM Rcvd DP
BODM09		W0362		QUANTERRA	N		N		N		Y	2/27/95	Y	2/27/95	01/09/95 - SAF-B94-125	Y	2/27/95	2/27/95
BODM10		W0362		QUANTERRA	N		N		N		N		Y	2/27/95	01/11/95 - SAF-B94-125	N		2/27/95
BODM11		W0362		QUANTERRA	N		N		N		Y	2/27/95	Y	2/27/95	01/06/95 - SAF-B94-125	Y	2/27/95	2/27/95
BODM12		W0362		QUANTERRA	N		N		N		N		Y	2/27/95	01/06/95 - SAF-B94-125	N		2/27/95
BODM17	TB	W0362		QUANTERRA	N		N		N		Y	2/27/95	Y	2/27/95	01/06/95 - SAF-B94-125	Y	2/27/95	2/27/95
BODM18	TB	W0362		QUANTERRA	N		N		N		N		Y	2/27/95	01/06/95 - SAF-B94-125	N		2/27/95
BODM21	split 104 BODM07 — field dup	W0362		QUANTERRA	N		N		N		Y	2/27/95	Y	2/27/95	01/09/95 - SAF-B94-125	Y	2/27/95	2/27/95
BODM22	f. dup of BODM08	W0362		QUANTERRA	N		N		N		N		Y	2/27/95	01/09/95 - SAF-B94-125	N		2/27/95
BODM23	field dup of BODLX1	W0362		QUANTERRA	N		N		N		Y	2/27/95	Y	2/27/95	01/12/95 - SAF-B94-125	Y	2/27/95	2/27/95
BODM24	f. dup of BODLX2	W0362		QUANTERRA	N		N		N		N		Y	2/27/95	01/12/95 - SAF-B94-125	N		2/27/95
BODLX1		W0374		QUANTERRA	N		N		N		Y	2/27/95	Y	2/27/95	01/12/95 - SAF-B94-125	Y	3/06/95	3/06/95

Validation Rcvd _____

9413420.0714

4/06/95

Data Validation Check List

for Project 100-KR-4

HEIS Samp Number	Client Sample Number	Master DP File Number	DP Sequence Number	Laboratory	Y N VOA	Y N SEMI VOA	Y N PEST/PCB	Y N WETCHEM	Y N METALS	COMMENTS	Y N RADCHEM	Date OSM Rcvd DP
B0DLX2		W0374		QUANTERRA	N	N	N	N	Y 2/27/95	01/12/95 - SAF-B94-125	N	2/27/95
B0DLX3		W0374		QUANTERRA	N	N	N	Y 2/27/95	Y 2/27/95	01/18/95 - SAF-B94-125	Y 3/06/95	3/06/95
B0DLX4		W0374		QUANTERRA	N	N	N	N	Y 2/27/95	01/18/95 - SAF-B94-125	N	2/27/95
B0DLY5		W0374		QUANTERRA	N	N	N	Y 2/27/95	Y 2/27/95	01/12/95 - SAF-B94-125	Y 3/06/95	3/06/95
B0DLY6		W0374		QUANTERRA	N	N	N	N	Y 2/27/95	01/12/95 - SAF-B94-125	N	2/27/95
B0DM13	EB	W0374		QUANTERRA	N	N	N	Y 2/27/95	Y 2/27/95	01/18/95 - SAF-B94-125	Y 3/06/95	3/06/95
B0DM14	EB	W0374		QUANTERRA	N	N	N	N	Y 2/27/95	01/18/95 - SAF-B94-125	N	2/27/95
B0DM15	EB	W0374		QUANTERRA	N	N	N	Y 2/27/95	Y 2/27/95	01/18/95 - SAF-B94-125	Y 3/06/95	3/06/95
B0DM16	EB	W0374		QUANTERRA	N	N	N	N	Y 2/27/95	01/18/95 - SAF-B94-125	N	2/27/95
B0DM19	TB	W0374		QUANTERRA	N	N	N	Y 2/27/95	Y 2/27/95	01/12/95 - SAF-B94-125	Y 3/06/95	3/06/95
B0DM20	TB	W0374		QUANTERRA	N	N	N	N	Y 2/27/95	01/12/95 - SAF-B94-125	N	2/27/95

Validation Rcvd _____

9413420.0215

4/06/95

Data Validation Check List

for Project 100-KR-4

HEIS Samp Number	Client Sample Number	Master DP File Number	DP Sequence Number	Laboratory	Y N VOA	Y N SEMI VOA	Y N PEST/PCB	Y N WETCHEM	Y N METALS	COMMENTS	Y N RADCHEM	Date OSM Rcvd DP
BODLZ7		W0387		QUANTERRA	N	N	N	Y 3/13/95	Y 3/13/95	01/18/95 - SAF-B94-125	Y 3/13/95	3/13/95
BODLZ8		W0387		QUANTERRA	N	N	N	N	Y 3/13/95	01/18/95 - SAF-B94-125	N	3/13/95

Data Entry Complete: DP [signature] 4/12/94

DATATRAC [signature]

4/12/94

Validation Rcvd _____

9613420.0716

9613420.0217

COPY

Golder Associates Inc.

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

Golder Associates

APR 1995
RECEIVED
Validation
Log In

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

Christina I. Jensen
Task Manager

Enclosures

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

9613420.0718

COPY

APR 1995
RECEIVED
Validation
Log In

BHI-00403
Rev. 00

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
0329dj1.rpt

9613420.0719

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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]
B0DM25	06-Jan-95	WATER	SPLIT	LK3604-LAS	SPLIT 1	D	X	X	X
B0DM26	06-Jan-95	WATER	SPLIT	LK3604-LAS	SPLIT 1	D	X		
B0DM27	11-Jan-95	WATER	SPLIT	LK3604-LAS	SPLIT 2	D	X*	X*	X*
B0DM28	11-Jan-95	WATER	SPLIT	LK3604-LAS	SPLIT 2	D	X		
B0DLX5	04-Jan-95	WATER		W0355-QES	199-K-18	D	X	X	X
B0DLX6	04-Jan-95	WATER		W0355-QES	199-K-18	A	X		
B0DLX7	03-Jan-95	WATER		W0355-QES	199-K-19	A	X	X	X
B0DLX8	03-Jan-95	WATER		W0355-QES	199-K-19	A	X		
B0DLX9	04-Jan-95	WATER		W0355-QES	199-K-20	A	X	X	X
B0DLY0	04-Jan-95	WATER		W0355-QES	199-K-20	A	X		
B0DLY1	03-Jan-95	WATER		W0355-QES	199-K-21	A	X	X	X
B0DLY2	03-Jan-95	WATER		W0355-QES	199-K-21	A	X		
B0DLY3	04-Jan-95	WATER		W0355-QES	199-K-21	A	X	X	X
B0DLY4	04-Jan-95	WATER		W0355-QES	199-K-21	A	X		
B0DLY7	04-Jan-95	WATER		W0355-QES	199-K-27	A	X	X	X
B0DLY8	04-Jan-95	WATER		W0355-QES	199-K-27	A	X		
B0DLY9	04-Jan-95	WATER		W0355-QES	199-K-30	A	X	X	X
B0DLZ0	04-Jan-95	WATER		W0355-QES	199-K-30	A	X		
B0DLZ1	04-Jan-95	WATER		W0355-QES	199-K-31	A	X	X	X
B0DLZ2	04-Jan-95	WATER		W0355-QES	199-K-31	A	X		
B0DLZ3	03-Jan-95	WATER		W0355-QES	199-K-32B	A	X	X	X
B0DLZ4	03-Jan-95	WATER		W0355-QES	199-K-32B	A	X		
B0DLZ5	03-Jan-95	WATER		W0355-QES	199-K-32A	A	X	X	X
B0DLZ6	03-Jan-95	WATER		W0355-QES	199-K-32A	A	X		
B0DLZ9	10-Jan-95	WATER		W0362-QES	199-K-34	D	X*	X*	X*
B0DM00	10-Jan-95	WATER		W0362-QES	199-K-34	D	X		
B0DM01	06-Jan-95	WATER		W0362-QES	199-K-35	D	X	X	X
B0DM02	06-Jan-95	WATER		W0362-QES	199-K-35	D	X*		
B0DM03	06-Jan-95	WATER		W0362-QES	199-K-36	D	X	X	X
B0DM04	06-Jan-95	WATER		W0362-QES	199-K-36	D	X		
B0DM05	10-Jan-95	WATER		W0362-QES	199-K-37	D	X	X	X
B0DM06	10-Jan-95	WATER		W0362-QES	199-K-37	D	X		
B0DM07	06-Jan-95	WATER		W0362-QES	699-70-68	D	X*	X*	X*
B0DM08	06-Jan-95	WATER		W0362-QES	699-70-68	D	X		
B0DM09	06-Jan-95	WATER		W0362-QES	699-78-62	D	X	X	X
B0DM10	06-Jan-95	WATER		W0362-QES	699-78-62	D	X		
B0DM11	05-Jan-95	WATER		W0362-QES	699-73-61	D	X*	X*	X*
B0DM12	05-Jan-95	WATER		W0362-QES	699-73-61	D	X		
B0DM17	10-Jan-95	WATER	TRIP BLANK	W0362-QES	199-K-34	D	X	X	X

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]
B0DM18	10-Jan-95	WATER	TRIP BLANK	W0362-QES	199-K-34	D	X		
B0DM21	06-Jan-95	WATER	FIELD DUPLICATE	W0362-QES	DUPLICATE 1	D	X		X
B0DM22	06-Jan-95	WATER	FIELD DUPLICATE	W0362-QES	DUPLICATE 1	D	X		
B0DM23	11-Jan-95	WATER	FIELD DUPLICATE	W0362-QES	DUPLICATE 2	D	X	X	X
B0DM24	11-Jan-95	WATER	FIELD DUPLICATE	W0362-QES	DUPLICATE 2	D	X		
B0DLX1	11-Jan-95	WATER		W0374-QES	199-K-11	D	X	X	X
B0DLX2	11-Jan-95	WATER		W0374-QES	199-K-11	D	X*		
B0DLX3	17-Jan-95	WATER		W0374-QES	199-K-13	D	X*	X*	X*
B0DLX4	17-Jan-95	WATER		W0374-QES	199-K-13	D	X		
B0DLY5	11-Jan-95	WATER		W0374-QES	199-K-23	D	X	X	X
B0DLY6	11-Jan-95	WATER		W0374-QES	199-K-23	D	X		
B0DM13	17-Jan-95	WATER	EQUIPMENT BLANK	W0374-QES	EQUIP BLANK 1	D	X	X	X
B0DM14	17-Jan-95	WATER	EQUIPMENT BLANK	W0374-QES	EQUIP BLANK 1	D	X		
B0DM15	17-Jan-95	WATER	EQUIPMENT BLANK	W0374-QES	EQUIP BLANK 2	D	X	X	X
B0DM16	17-Jan-95	WATER	EQUIPMENT BLANK	W0374-QES	EQUIP BLANK 2	D	X		
B0DM19	11-Jan-95	WATER	TRIP BLANK	W0374-QES	TRIP BLANK 2	D	X*	X*	X*
B0DM20	11-Jan-95	WATER	TRIP BLANK	W0374-QES	TRIP BLANK 2	D	X		
B0DLZ7	18-Jan-95	WATER		W0387-QES	199-K-33	D	X		X
B0DLZ8	18-Jan-95	WATER		W0387-QES	ITMO	A	X		

[1] M - Metals
C - General Chemistry
R - Radiochemistry

* - 100% Recalculation

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.

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5.0 REFERENCES

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

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

HC 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

	Samp#	BODLX1		BODLX2		BODLX3		BODLX4		BODLY5		BODLY6	
	Date	1-11-95		1-11-95		1-17-95		1-17-95		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		WATER		WATER		WATER		WATER		WATER	
	Comments												
Parameter	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	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	3.800	U	3.800	U	3.800	U	3.800	U	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	4.100	U	4.100	U	4.100	U	4.100	U	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	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	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	3.800	U	3.800	U	3.800	U	3.800	U	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	U	0.900	U	0.900	U	0.900	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

9613420.0745

	Samp#	BODLZ7		BODLZ8		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												
Parameter	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		7.700	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

9813420.0746

	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		WATER		WATER		WATER		WATER	
	Comments											EQUIPMENT BLANK	
Parameter	Units	Result	Q	Result	Q	Result	Q	Result	Q	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	32.800	U	32.800	U	32.800	U	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	3.800	U	3.800	U	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	4.100	U	4.100	U	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	
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	15.200	U	15.200	U	15.200	U	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	3.800	U	3.800	U	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	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

9613420.0748

	Samp#	B0DM20		B0DM21		B0DM22		B0DM24	
	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	
Parameter	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

9613420.0749

	Samp#	B0DLX5		B0DLX6		B0DLX7		B0DLX8		B0DLX9		B0DLY0	
	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												
Parameter	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

9613420.0750

	Samp#	BODLY1		BODLY2		BODLY3		BODLY4		BODLY7		BODLY8	
	Date	1-3-95		1-3-95		1-4-95		1-4-95		1-4-95		1-4-95	
	Location	199-K-21		199-K-21		199-K-21		199-K-21		199-K-27		199-K-27	
	Depth	---		---		---		---		---		---	
	Type	WATER		WATER		WATER		WATER		WATER		WATER	
	Comments												
Parameter	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

9813420.0751

	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		WATER		WATER		WATER		WATER		WATER	
	Comments												
Parameter	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	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	88.400	U	88.400	U	88.400	U	88.400	U	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	3.800	U	3.800	U	3.800	U	3.800	U	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	4.100	U	4.100	U	4.100	U	4.100	U	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	0.800	U	0.800	U	0.800	U	0.800	U	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	0.100	U	0.100	U	0.100	U	0.100	U	0.160	BJ
NICKEL	UG/L	15.200	U	15.200	U	15.200	U	15.200	U	15.200	U	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	1.000	U	1.000	U	1.000	U	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	11900.000		12300.000		14000.000		13600.000		6890.000		6810.000	
THALLIUM	UG/L	0.900	U	0.900	U	0.900	U	0.900	U	0.900	U	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

9613420.0752

Parameter	Samp# / Date / Location / Depth / Type / Comments	BODLZ5 1-3-95 199-K-32A --- WATER		BODLZ6 1-3-95 199-K-32A --- WATER		BODLZ9 1-10-95 199-K-34 --- WATER		BODM00 1-10-95 199-K-34 --- WATER		BODM01 1-6-95 199-K-35 --- WATER		BODM02 1-6-95 199-K-35 --- WATER	
	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	15.200	U	15.200	U	15.200	U	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

9613420.0763

	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	
Parameter	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

9613420.0754

9813420.0755

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
BARIUM	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

9813420.0764

APPENDIX C

General Chemistry Validated Data Summary Tables

	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												
Parameter	Units	Result	Q	Result	Q	Result	Q	Result	Q	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

9613420.0765

	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	
Parameter	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

9613420.0766

	Samp#	BODM21	
	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

9613420.0767

	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		WATER		WATER		WATER		WATER		WATER	
	Comments												
Parameter	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	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	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	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

9613420.0768

	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	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

9613420.0769

	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	
Parameter	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

9613420.0770

9613420.0771

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		B0DLX1		B0DM27			
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							

9613420.0776

APPENDIX E

Radiochemistry Validated Data Summary Tables

	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												
Parameter	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

9613420.0777

	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	
Parameter	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		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

9513420.0778

Parameter	Units	Result	Q
	Samp#	BODM21	
	Date	1-6-95	
	Location	DUPLICATE 1	
	Depth	---	
	Type	WATER	
	Comments	FIELD DUPLICATE	
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

9613420.0779

	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		WATER		WATER		WATER		WATER		WATER	
	Comments												
Parameter	Units	Result	Q	Result	Q	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

9613420.0780

	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	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

9613420.0781

	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	
Parameter	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

9613420.0782

9613420.0783

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							