P0D4N3-TMA

0046316

WESTINGHOUSE HANFORD COMPANY

Results of Analyses For:

GENERAL CHEMISTRY
Case No. 10-044
(TMA/Monrovia Work Order No. A4-10-044)

METALS
Case No. N4-10-102
(TMA/Waltham Work Order Nos. S4-10-160
& S4-10-161)

RECORD COPY

November 23, 1994

TMA Master Work Order No. N4-10-102

WESTINGHOUSE HANFORD COMPANY

Results of Analyses For:

GENERAL CHEMISTRY
CASE NO. 10-044
(TMA/ARLI Work Order # A4-10-044)

General Chemistry results are presented
for the following WHC LIQUID samples:

B0D4N6 B0D4P0

Norcal Work Order # N4-10-102

Thermo Analytical Inc.
160 Taylor Street
Monrovia, CA 91016
(818) 357-3247

Date submitted:

15

PAGE 1 TMA/Norcal CHAIN OF CUSTODY ORD # N4-10-102

RCVD: 10/24/94 DUE: 11/28/94 10/24/94 13:22:27 KEEP: 11/28/95 DISP: S

DASH	SAMPLE IDENTIFICATION		STORED	TESTS for FRACTIONS with work in DEPT: SU and CATEGORY		
01A-W	B0D4N6		UNFILTEREDARLI	WH043	WH128	WH131
01C-W	B0D4N6	MS	UNFILTEREDARLI	WH043		
01D-W	B0D4N6	DUP	UNFILTEREDARLI	WH043	WH128	WH131

RELEASED BY	DATE	TRANSFERRED TO	DATE	RECEIVED BY	DATE
Yamamoto	10/24/94	ARLI	10/24/94	[illegible]	10/25/94

PAGE 1 TMA/Norcal CHAIN OF CUSTODY ORD # N4-10-102

RCVD: 10/24/94 DUE: 11/28/94 10/25/94 14:33:29 KEEP: 11/28/95 DISP: S

DASH	SAMPLE IDENTIFICATION	STORED	TESTS for FRACTIONS with work in DEPT: SU and CATEGORY
~~01A-W-B0D4N6~~	~~UNFILTERED ARLI~~	~~WH043 WH128 WH131~~	4
~~01C-W-B0D4N6 MS~~	~~UNFILTERED ARLI~~	~~WH043~~	4
~~01D-W-B0D4N6 DUP~~	~~UNFILTERED ARLI~~	~~WH043 WH128 WH131~~	4
03A-W B0D4P0	UNFILTERED ARLI	WH043 WH128 WH131	

RELEASED BY	DATE	TRANSFERRED TO	DATE	RECEIVED BY	DATE
Yofamamoto	10/25/94	ARLI	10/25/94	[illegible]	10/26/94

000001

ARL1

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Data Turnaround: [ ] Priority [X] Normal

Collector: K. Cole	Company Contact: PH BUTCHER	Telephone No.: 509-376-4388
Project Designation: 200-BP-5	Sampling Location: 200 Areas	SAF No.: B94-036
Ice Chest No.: GWS-029	Field Logbook No.: FFL-1125	Method of Shipment: EMERY
Shipped To: TMA	Offsite Property No.: W95-0-0001-23	Bill of Lading/Air Bill No.: 1402135108

Possible Sample Hazards/Remarks:

Special Handling and/or Storage: COOL TO 4 DEGREES CENTIGRADE

SAMPLE ANALYSIS															
Preservative	HNO3<2	COOL 4	COOL 4	COOL 4	NaOH>12	HNO3 <2		HCL <2			HNO3<2				
Type of Container	P/G	G	P/G	P	P	G/P	G	G/P			P/G				
No. of Container(s)	1	1	1	2	1	6	1	1			1				
Volume	1000ml	500ml	250ml	250ml ~~500ml~~	1000ml	1000ml	500ml ~~250ml~~	1000ml			1000ml				
	METALS (see S. I. #1) UNFILTERED	IC ANIONS-F,Cl, SO4,NO2 PO4	ALKALINITY	TDS	CLP-CYANIDE	GROSS ALPHA/BETA, (see S. I. #2)	TRITIUM	Tc-99			METALS (see S. I. #3) FILTERED				

Sample No.	Matrix*	Date Sampled	Time Sampled														
BD D4N6	W	10/19/94	0847	X	X	X	X	X	X	X	X						
BD D4N7	W	10/19/94	0847									X					

CHAIN OF POSSESSION	Sign/Print Names	
Relinquished By: K. Cole / Date/Time: 10/19/94 1230	Received By: B. Wilkins / Date/Time: 1230 10-19-94	
Relinquished By: B. Wilkins / Date/Time: 0800 10-20-94	Received By: [signature] / Date/Time: 10-24-94 11:00AM	
Relinquished By / Date/Time	Received By / Date/Time	
Relinquished By / Date/Time	Received By / Date/Time	

SPECIAL INSTRUCTIONS

#1: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(UNFILTERED)
#2: GROSS ALPHA/BETA;GAMMA SCAN-Cs-137,Co-60,Ru-106;Pu238/239/240, Sr-90,TOTAL URANIUM
#3: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(FILTERED)

NOTE: DATA DELIVERABLE-STANDALONE

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
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

DISTRIBUTION: Original- Sample Yellow - Sampler

BC-6000-828 (12/92)

ARL1

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Data Turnaround: [ ] Priority [X] Normal

Collector: R.T.Zo	Company Contact: PH BUTCHER	Telephone No.: 509-376-6389
Project Designation: 200-BP-5	Sampling Location: 200 Areas	SAF No.: 894-036
Test No.: [illegible]	Field Logbook No.: EFL 1020	Method of Shipment: EMERY
Shipped To: TMA	Offsite Property No.: W95-0-0001-JU	Bill of Lading/Air Bill No.: ~~140213517~~ 520302591

Possible Sample Hazards/Remarks

Special Handling and/or Storage: COOL TO 4 DEGREES CENTIGRADE

Sample No.	Matrix*	Date Sampled	Time Sampled	HNO3<2	COOL 4	COOL 4	COOL 4	NaOH>12	HNO3 <2		HCl <2			HNO3<2				
Preservative				HNO3<2	COOL 4	COOL 4	COOL 4	NaOH>12	HNO3 <2		HCl <2			HNO3<2				
Type of Container				P/G	G	P/G	P	P	G/P	Gs	G/P			P/G				
No. of Container(s)				1	1	1	1	1	6	1	1			1				
Volume				1000ml	500ml	250ml	500ml	1000ml	1000ml	250ml	1000ml			1000ml				
SAMPLE ANALYSIS				METALS (see S.I. #1) UNFILTERED	IC ANIONS-F,Cl, SO4,NO2 PO4	ALKALINITY	TDS	CLP-CYANIDE	GROSS ALPHA/BETA, (see S.I. #2)	TRITIUM	Tc-99			METALS (see S.I. #3) FILTERED				
50 D4P0	W	10-21-94	0920	X	X	X	X	X	X	X	X							
80 D4P1	W	10-21-94	0920											X				

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By: [signature] R.T.Zo	Date/Time: 1045 10-21-94	Received By: [signature] BUTCHER	Date/Time: 1045 10-21-94
Relinquished By: [signature] BUTCHER	Date/Time: 0840 10-24-94	Received By: [signature]	Date/Time: 10-25-94 12:50
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

#1: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(UNFILTERED)
#2: GROSS ALPHA/BETA;GAMMA SCAN-Cs-137,Co-60,Ru-106;Pu238/239/240, Sr-90,TOTAL URANIUM
#3: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(FILTERED)

NOTE: DATA DELIVERABLE-STANDALONE

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
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

DISTRIBUTION: Original- Sample Yellow - Sampler

BC-6000-828 (12-92)

SAMPLE LOG-IN SHEET

LAB NAME: THA/ARLI WHC PAGE 1 OF 1

RECEIVED BY (PRINT NAME): NEIL McCRATY LOG-IN-DATE 10/25/94

RECEIVED BY (SIGNATURE): Neil McCraty

ICE CHEST NO. SML453

REMARKS:

		CORRESPONDING			
		EPA SAMPLE #	SAMPLE TAG #	ASSIGNED LAB #	REMARKS: CONDITION OF SAMPLE SHIPMENT, ETC
		D0D4N6		A4U044	GOOD
1. Custody Seal(s)	Present/Absent* Intact/Broken				
2. Custody Seal Nos:	N/A				
3. Chain of Custody Records	Present/Absent*				
4. Traffic Reports or Packing List	Present/Absent*				
5. Air bill	Air bill/Sticker Present/Absent*				
6. Air bill No.:	9552158976				
7. Sample Tags	Present/Absent*				
8. Sample Tags Numbers	N/A Listed/Not Listed on Chain of Custody				
9. Sample Condition:	Intact/Broken*/Leaking				
10. Does information on custody records, traffic reports, and sample tags agree	Yes/No*				
11. Date Received at Lab:	10/25/94				
12. Temp of ice chest	3 °C				
13. Time Received:	0930				

SAMPLE TRANSFER

Fraction: N/A

Area #:

By:

On:

* Contact SMO and attach record of resolution

Reviewed By: M. Parrish

Date 11/11/94

Logbook No N/A

Logbook Page No

FORM DC 1

SAMPLE LOG-IN SHEET

LAB NAME: THA/ARLI — PAGE 1 OF 1

RECEIVED BY (PRINT NAME): Nicole Roth — LOG-IN-DATE 10/26/94

RECEIVED BY (SIGNATURE): Nicole Roth

ICE CHEST NO. #39

		CORRESPONDING EPA SAMPLE #	CORRESPONDING SAMPLE TAG #	CORRESPONDING ASSIGNED LAB #	REMARKS: CONDITION OF SAMPLE SHIPMENT, ETC
REMARKS:					
1. Custody Seal(s)	Present/Absent* Intact/Broken	BOD4P0		A410044	Good
2. Custody Seal Nos:	NA				
3. Chain of Custody Records	Present/Absent*				
4. Traffic Reports or Packing List	Present/Absent*				
5. Air bill	Air bill/Sticker Present/Absent*				
6. Air bill No.:	5552158906				
7. Sample Tags	Present/Absent*				
8. Sample Tags Numbers	Listed/Not Listed on Chain of Custody				
9. Sample Condition	Intact/Broken*/Leaking				
10. Does information on custody records, traffic reports, and sample tags agree	Yes/No*				
11. Date Received at Lab:	10/26/94				
12. Temp of ice chest	2° °C				
13. Time Received:	9:30				
SAMPLE TRANSFER					
Fraction:	NA				
Area #:					
By:					
On:					

10/26/94

* Contact SMO and attach record of resolution

Reviewed By: Nicole Roth — Logbook No.: NA

Date: Nov. 11, 1994 — Logbook Page No.: 1

FORM DC-1

FEDERAL EXPRESS

USE THIS AIRBILL FOR SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO AND ALL OTHER U.S. LOCATIONS
QUESTIONS? CALL 800-238-5355 TOLL FREE.

AIRBILL PACKAGE TRACKING NUMBER 9552158976

4125M. 9552158976

RECIPIENT'S COPY

1 Date 10-24-94

From (Your Name) Please Print: SAMPLE CONTROL
Your Phone Number (Very Important): (818) 235-2633
Company: TMA/NORCAL
Department/Floor No.:
Street Address: 4030 WRIGHT AVE
City: RICHMOND State: CA ZIP Required: 94804

2 To (Recipient's Name) Please Print: NEIL MCELRATH
Recipient's Phone Number (Very Important): (818) 357-2217
Company: TMA/AKLI
Department/Floor No.:
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes): 160 TAYLOR STREET
City: MONROVIA State: CA. ZIP Required: 91016

YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice): 2340-6406

H IF HOLD AT FEDEX LOCATION, Print FEDEX Address Here
Street Address:
City: State: ZIP Required:

3 PAYMENT 1 [X] Bill Sender 2 [ ] Bill Recipient's FedEx Acct. No. 3 [ ] Bill 3rd Party FedEx Acct. No. 4 [ ] Bill Credit Card 5 [ ] Cash/Check

4 SERVICES (Check only one box)

Priority Overnight
11 [X] OTHER PACKAGING
16 [ ] FEDEX LETTER*
12 [ ] FEDEX PAK*
13 [ ] FEDEX BOX
14 [ ] FEDEX TUBE

Standard Overnight
51 [ ] OTHER PACKAGING
56 [ ] FEDEX LETTER*
52 [ ] FEDEX PAK*
53 [ ] FEDEX BOX
54 [ ] FEDEX TUBE

Economy Two-Day
30 [ ] ECONOMY*

Government Overnight
46 [ ] GOVT LETTER
41 [ ] GOVT PACKAGE

Freight Service
70 [ ] OVERNIGHT FREIGHT**
80 [ ] TWO-DAY FREIGHT**

5 DELIVERY AND SPECIAL HANDLING (Check services required)

Weekday Service
1 [ ] HOLD AT FEDEX LOCATION WEEKDAY
2 [X] DELIVER WEEKDAY

Saturday Service
31 [ ] HOLD AT FEDEX LOCATION SATURDAY
3 [ ] DELIVER SATURDAY
9 [ ] SATURDAY PICK-UP

Special Handling
4 [ ] DANGEROUS GOODS
6 [ ] DRY ICE
12 [ ] HOLIDAY DELIVERY

6 PACKAGES | WEIGHT | YOUR DECLARED VALUE
1 | 32
Total | Total | Total

DIM SHIPMENT (Chargeable Weight) lbs
L x W x H

Emp. No. Date
[ ] Cash Received
[ ] Return Shipment
[ ] Third Party [ ] Chg. To Dest. [ ] Chg. To Hold
Street Address
City State Zip
Received By: X
Date/Time Received Fedex Employee Number

Federal Express Use
Base Charges
Declared Value Charge
Other 1
Other 2
Total Charges

REVISION DATE 3/94
PART #117704 FREEM 4/94
FORMAT #158
158
© 1992-93 FEDEX PRINTED IN U.S.A.

7 Release Signature

BEST AVAILABLE COPY

FEDERAL EXPRESS

USE THIS AIRBILL FOR SHIPMENTS within the continental U.S., Alaska and Hawaii
USE THE INTERNATIONAL AIRWAYBILL FOR SHIPMENTS to other countries

QUESTIONS? CALL 800-238-5355 TOLL FREE

AIRBILL PACKAGE TRACKING NUMBER 9552158906

4125M 9552158906

SENDER'S FEDERAL EXPRESS ACCOUNT NUMBER 1 0941-5760-9 Date 10-25-94

From (Your Name) Please Print: SAMPLE CONTROL
Your Phone Number (Very Important): 510-235-2633
Company: TMA/NORCAL
Department/Floor No.
Street Address: 2030 WRIGHT AVE
City: RICHMOND State: CA ZIP Required: 9 4 8 0 4

To (Recipient's Name) Please Print: 2 NEIL S. MCELRATH
Recipient's Phone Number (Very Important): 818 357-3247
Company: TMA/ARLI
Department/Floor No.
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zips)
160 TAYLOR STREET
City: MONROVIA State: CA ZIP Required: 91016

YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice)
2340-6406

H IF HOLD AT FEDEX LOCATION Print FEDEX Address Here
Street Address
City State ZIP Required

3 PAYMENT 1 [X] Bill Sender 2 [ ] Bill Recipient's FedEx Acct. No. 3 [ ] Bill Third Party FedEx Account Number below
[ ] Cash [ ] Check Acct./Credit Card No.

4 SERVICES (Check only one box)

Priority Overnight	Standard Overnight
1 [X] OTHER PACKAGING	51 [ ] OTHER PACKAGING
10 [ ] FEDEX LETTER*	56 [ ] FEDEX LETTER*
11 [ ] FEDEX PAK*	52 [ ] FEDEX PAK*
[ ] FEDEX BOX	53 [ ] FEDEX BOX
13 [ ] FEDEX TUBE	54 [ ] FEDEX TUBE
Economy Two-Day	Government Overnight
[ ] ECONOMY*	16 [ ] GOVT LETTER
	17 [ ] GOVT PACKAGE

Freight Service
[ ] OVERNIGHT FREIGHT** [ ] TWO-DAY FREIGHT**

5 DELIVERY AND SPECIAL HANDLING (Check services required)
Warehouse Service
[X] DELIVER WEEKDAY
Saturday Service
[ ] HOLD AT FEDEX LOCATION WEEKDAY
[ ] DELIVER SATURDAY
[ ] SATURDAY PICK UP
(CHECK EXCLUSIVE)
[ ] DANGEROUS GOODS
[ ] DRY ICE

6 1 18
TOTAL SHIPMENT (Actual Weight) lbs.
1 18
X

Emp. No. Date
[ ] On Account
[ ] Recipient Charges
[ ] Third Party
Street Address
City Date
Delivered By
X
Date/Time Delivered Employee Number

Federal Express Use
Base Charges
Declared Value Charge
Other
Other 2
Total Charges

REVISION DATE 3/94
158

7 Recipient's Signature

DESTINATION COPY

BEST AVAILABLE COPY

TMA/ARI
Thermo Analytical Inc.

RADIATION DOSE RATE SURVEY FORM

Date 10/25/94 COMPANY TMA RICHMOND WHC OTHER ORD # 955215 [illegible]

Surveyor's Name [illegible]

Model No. HP-210 / ESP-1 Model No. AC-3-7 / ESP-1

Serial Nos. 710289 / 02619 Serial Nos. 407726 / 02628

Calibration Date 5/17/94 Calibration Date 4/12/94

Instrument Calibration Factor 28.4% Instrument Calibration Factor 19.3%

Sample	Location	HP-210 CPM	HP-210 Factor	HP-210 DPM	AC-3-7 CPM	AC-3-7 Factor	AC-3-7 DPM	Spillage or Breakage?	Activity, nCi/mL or nCi/g
Background		34			0				
Consistency		7,350	25.4%		5,130	18.7%			
Smears									
SMC453		30			2				
LIVESTING HOUSE	REPORT:			15K pCi/gram = Non Rad					
			@ 10/25/94						

All OK ✓ 10/25 Approved [illegible]

Comments: VICTOREEN SURVEY = <2 UnRem/hr

Not OK Date 10/25/94

TMA/ARI
Thermo Analytical Inc.

RADIATION DOSE RATE SURVEY FORM

Date 12/26/94 COMPANY TMA Richmond (WHC) OTHER ORD # 9552158906

Surveyor's Name [illegible]

Model No. HP-210 / ESP-1 Model No. AC-3-7 / ESP-1

Serial Nos. 710289 / 02619 Serial Nos. 407726 / 02628

Calibration Date 5/17/94 Calibration Date 9/12/94

Instrument Calibration Factor 25.4% Instrument Calibration Factor [illegible]

Sample	Location	HP-210 CPM	HP-210 Factor	HP-210 DPM	AC-3-7 CPM	AC-3-7 Factor	AC-3-7 DPM	Spillage or Breakage?	Activity, nCi/mL or nCi/g
Background		49			1				
Consistency		[illegible]	27.5%		5,080	18.5%			
Smears:									
#39		47			0				
WESTINGHOUSE		REPORT		<50	pCi/g =		RSO	NON RAD	

Comments: VICTOREEN SURVEY: 120 μRem/hr

All OK ✓ Approved [illegible]

Not OK Date 12/26/94

GENERAL CHEMISTRY RESULTS

CASE NO. 10-044

Sample #s:

B0D4N6 B0D4P0

CASE NARRATIVE

The relative percent difference between sample B0D4N6 and its duplicate analysis was 22.2%. The high RPD is due to the very low Fluoride concentration relative to the difference between the sample and the duplicate.

The holding time was exceeded for the analysis of pH. Careful review of the QC analysis indicates that the data is reliable.

No other problems were encountered during sample analysis. All QC results were acceptable.

Maureen Parrish 11/15/96

Maureen Parrish

TMA Inc. REPORT Work Order # A4-10-044

Received: 10/24/94 11/14/94 16:48:56

REPORT TO
Westinghouse Hanford Company
345 Hills
Richland, WA 99352

ATTEN Ms. Briana Colley

CLIENT WHC SAMPLES 1
COMPANY Westinghouse Hanford Company
FACILITY

WORK ID SAF # B94-036
TAKEN By Westinghouse Staff
TRANS By Fed Ex # 9552158976 &
TYPE Water
P.O. # N4-10-102-SU-AR
INVOICE under separate cover

PREPARED BY
Thermo Analytical, Inc.
180 Taylor Street
Monrovia, CA 91016

ATTEN Ms. Carole Harris
PHONE 818-357-3247

Maureen Parrish
CERTIFIED BY

CONTACT MKP

This report is for the sole and exclusive use of the client to whom it is addressed and represents only those samples herein described. Samples not destroyed in testing are retained a maximum of 30 days unless otherwise requested.

SAMPLE IDENTIFICATION

01 B0D4N6
01 B0D4N6 MS
01 B0D4N6 Duplicate
01 B0D4N6
01 B0D4N6 Duplicate
01 B0D4N6
01 B0D4N6 Duplicate
02 Lab Blank
02 LCS
03 B0D4P0

TEST CODES and NAMES used on this workorder

ALK	Alkalinity
CL	Chloride
F W	Fluoride in Water
NO2	Nitrite (Liquids)
PO4 L	Phosphate in Liquids
SO4 W	Sulfate (in Waters)
TDS	Dissolved Solids
WCCLPL	Anions & Wet Chem.
WCLCS	Lab Control Sample Summary
WCQCD	Quality Control Summary
WCQCS	Quality Control Summary

TMA Inc. REPORT Work Order # A4-10-044

Received: 10/24/94

Results by Sample

SAMPLE ID B0D4N6 FRACTION 01A TEST CODE WCCLPL NAME Anions & Wet Chem.

Date & Time Collected 10/19/94 08:47:00 Category

ANIONS AND WET CHEMISTRY - LIQUIDS

ANALYSIS	METHOD	RESULT	UNITS	LIMIT
Chloride	300.0	20.0	mg/L	4.0
Fluoride	300.0	0.5	mg/L	0.1
Phosphate	300.0	<0.4	mg/L	0.4
Sulfate	300.0	108	mg/L	20
Nitrite Nitrogen	300.0	<0.1	mg/L	0.1

FORM I

TMA Inc. REPORT Work Order # A4-10-044

Received: 10/24/94

Results by Sample

SAMPLE ID B0D4N6 FRACTION 01D TEST CODE WCCLPL NAME Anions & Wet Chem.

Date & Time Collected 10/19/94 08:47:00 Category

ANIONS AND WET CHEMISTRY - LIQUIDS

ANALYSIS	METHOD	RESULT	UNITS	LIMIT
Alkalinity	310.1	114	mg/L	1

FORM I

TMA Inc. REPORT Work Order # A4-10-044

Received: 10/24/94

Results by Sample

SAMPLE ID B0D4N6 FRACTION 01P TEST CODE WCCLPL NAME Anions & Wet Chem.

Date & Time Collected 10/19/94 08:47:00 Category

ANIONS AND WET CHEMISTRY - LIQUIDS

ANALYSIS	METHOD	RESULT	UNITS	LIMIT
Tot. Dissolved Solids	160.1	427	mg/L	5

FORM I

TMA Inc. REPORT Work Order # 94-10-044 000018

Received: 10/24/94

Results by Sample

SAMPLE ID B01MP0 FRACTION 03A TEST CODE WCCLPL NAME Anions & Wet Chem.

Date & Time Collected 10/21/94 09:20:00 Category

ANIONS AND WET CHEMISTRY - LIQUIDS

ANALYSIS	METHOD	RESULT	UNITS	LIMIT
Chloride	300.0	19.3	mg/L	2.0
Fluoride	300.0	0.3	mg/L	0.1
Phosphate	300.0	<0.4	mg/L	0.4
Sulfate	300.0	176	mg/L	10
Nitrite Nitrogen	300.0	<0.1	mg/L	0.1

FORM I

TMA Inc. REPORT Work Order # A4-10-044

Received: 10/24/94 Results by Sample

SAMPLE ID B0D4P0 FRACTION 03B TEST CODE WCCLPL NAME Anions & Wet Chem.

Date & Time Collected 10/21/94 09:20:00 Category

ANIONS AND WET CHEMISTRY - LIQUIDS

ANALYSIS	METHOD	RESULT	UNITS	LIMIT
Alkalinity	310.1	100	mg/L	2

FORM I

TMA Inc. REPORT Work Order # A4-10-044

Received: 10/24/94

Results by Sample

SAMPLE ID B0D4P0 FRACTION 03C TEST CODE WCCLPL NAME Anions & Wet Chem.

Date & Time Collected 10/21/94 09:20:00 Category

ANIONS AND WET CHEMISTRY - LIQUIDS

ANALYSIS	METHOD	RESULT	UNITS	LIMIT
Tot. Dissolved Solids	160.1	666	mg/L	5

FORM I

TMA
Thermo Analytical Inc.

300 Second Avenue
Post Office Box 521
Waltham, MA 02254-0521
(617) 890-7200
FAX (617) 890-3883

NOV 1994
RECEIVED
Data
Log In

November 22, 1994

TMA/Richmond
2030 Wright Avenue
Richmond, CA 94804
Attention: Dan Stuermer

Quality Control Narrative

Scope
Two water samples were submitted to TMA/Waltham on October 25 and 26, 1994 from TMA/Richmond. The samples were analyzed for the elements listed on the chain of custody. The analysis was performed under TMA/Waltham work order S410161.

Methodology
The samples were prepared, analyzed and reported in accordance with the USEPA Contract Laboratory Program Statement of Work ILM02. Bismuth was analyzed by flame atomic absorption spectroscopy.

Discussion
All quality control requirements were met for the samples with no exceptions.

Please feel free to call if there are any questions concerning the data package.

Respectfully submitted,

TMA/WALTHAM

Steven Provencal

Steven R. Provencal
Metals Supervisor

RECORD COPY

12-21-94

WESTINGHOUSE/HANFORD

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-02-0039

Lab Code: SKINER Case No.: N4-10-102 SAS No.: SDG No.: B0D4N6

SOW No.: ILM02.1

SAMPLE NUMBER:	Lab Sample ID.
B0D4N6	10161-01S
B0D4N6D	10161-01S2
B0D4N6S	10161-01DS
B0D4P0	10161-02S

Were ICP interelement corrections applied?	Yes/No	YES
Were ICP background corrections applied?	Yes/No	YES
If yes-were raw data generated before application of background corrections?	Yes/No	NO

Comments:

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

Signature: Steven Provencal Name: Steven R. Provencal

Date: 11/22/94 Title: Metals Supervisor

SAMPLE NUMBER:

INORGANIC ANALYSIS DATA SHEET

B0D4N6

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D2-0039

Lab Code: SKINER Case No.: N4-10-102SAS No.: SDG No.: B0D4N6

Matrix (soil/water): WATER Lab Sample ID: 10161-01S

Level (low/med): LOW Date Received: 10/25/94

% Solids: 0.0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	16.6	U		P
7440-70-2	Calcium	58300			P
7439-89-6	Iron	38.8	B		P
7439-95-4	Magnesium	16600			P
7439-96-5	Manganese	0.90	U		P
7440-09-7	Potassium	7760			P
7782-49-2	Selenium	8.5			P
7440-23-5	Sodium	25300			P
	Cyanide	58.0			CA
7440-21-3	Silicon	17400			P
7440-69-9	Bismuth	387	U		A

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

WESTINGHOUSE/HANFORD
1

SAMPLE NUMBER:

INORGANIC ANALYSIS DATA SHEET

B0D4P0

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-02-0039

Lab Code: SKINER Case No.: N4-10-102SAS No.: SDG No.: B0D4N6

Matrix (soil/water): WATER Lab Sample ID: 10161-02S

Level (low/med): LOW Date Received: 10/25/94

% Solids: 0.0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	115	B		P
7440-70-2	Calcium	88900			P
7439-89-6	Iron	554			P
7439-95-4	Magnesium	26900			P
7439-96-5	Manganese	9.9	B		P
7440-09-7	Potassium	10100			P
7782-49-2	Selenium	11.2			P
7440-23-5	Sodium	41200			P
	Cyanide	164			CA
7440-21-3	Silicon	16300			P
7440-69-9	Bismuth	387	U		A

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

TMA
Thermo Analytical Inc.

300 Second Avenue
Post Office Box 521
Waltham, MA 02254-0521
(617) 890-7200
FAX (617) 890-3883

November 22, 1994

TMA/Richmond
2030 Wright Avenue
Richmond, CA 94804
Attention: Dan Stuermer

Quality Control Narrative

Scope
Two water samples were submitted to TMA/Waltham on October 25 and 26, 1994 from TMA/Richmond. The samples were analyzed for the elements listed on the chain of custody. The analysis was performed under TMA/Waltham work order S410160.

Methodology
The samples were prepared, analyzed and reported in accordance with the USEPA Contract Laboratory Program Statement of Work ILM02. Bismuth was analyzed by flame atomic absorption spectroscopy.

Discussion
All quality control requirements were met for the samples with no exceptions.

Please feel free to call if there are any questions concerning the data package.

Respectfully submitted,

TMA/WALTHAM

Steven Provencal

Steven R. Provencal
Metals Supervisor

RECORD COPY

1 Approved 12-21-94

WESTINGHOUSE/HANFORD

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-02-0039

Lab Code: SKINER Case No.: N4-10-102 SAS No.: SDG No.: B0D4N7

SOW No.: ILM02.1

SAMPLE NUMBER:	Lab Sample ID.
B0D4N7	10160-01S
B0D4N7D	10160-01S2
B0D4N7S	10160-01DS
B0D4P1	10160-02S

Were ICP interelement corrections applied?	Yes/No	YES
Were ICP background corrections applied?	Yes/No	YES
If yes-were raw data generated before application of background corrections?	Yes/No	NO

Comments:

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

Signature: Steven Provencal Name: Steven R. Provencal

Date: 11/22/94 Title: Metals Supervisor

SAMPLE NUMBER:

B0D4N7

INORGANIC ANALYSIS DATA SHEET

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-02-0039

Lab Code: SKINER Case No.: N4-10-102SAS No.: SDG No.: B0D4N7

Matrix (soil/water): WATER Lab Sample ID: 10160-01S

Level (low/med): LOW Date Received: 10/25/94

% Solids: 0.0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	16.6	U		P
7440-70-2	Calcium	59400			P
7439-89-6	Iron	60.6	B		P
7439-95-4	Magnesium	16900			P
7439-96-5	Manganese	0.90	U		P
7440-09-7	Potassium	7630			P
7782-49-2	Selenium	8.3			P
7440-23-5	Sodium	26000			P
	Cyanide				NR
7440-21-3	Silicon	18700			P
7440-69-9	Bismuth	387	U		A

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

SAMPLE NUMBER:

INORGANIC ANALYSIS DATA SHEET

B0D4P1

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D2-0039

Lab Code: SKINER Case No.: N4-10-102SAS No.: SDG No.: B0D4N7

Matrix (soil/water): WATER Lab Sample ID: 10160-02S

Level (low/med): LOW Date Received: 10/25/94

% Solids: 0.0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	16.6	U		P
7440-70-2	Calcium	87100			P
7439-89-6	Iron	91.5	B		P
7439-95-4	Magnesium	26300			P
7439-96-5	Manganese	0.90	U		P
7440-09-7	Potassium	10000			P
7782-49-2	Selenium	13.1			P
7440-23-5	Sodium	41900			P
	Cyanide				NR
7440-21-3	Silicon	17000			P
7440-69-9	Bismuth	387	U		A

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

TMA
Thermo Analytical Inc.

300 Second Avenue
Post Office Box 521
Waltham, MA 02254-0521
(617) 890-7200
FAX (617) 890-3883

RECORD COPY

NOV 1994
RECEIVED
Data
Log In

November 17, 1994

TMA/NORCAL
2030 Wright Avenue
Richmond, CA 94804
Attention: Dan Stuermer

Quality Control Narrative

Scope
One (1) water sample was submitted to TMA/Waltham on October 20, 1994 from TMA/Norcal. The sample was analyzed for the elements specified on the chain of custody. The analysis was performed under TMA/Waltham work order S410139.

Methodology
The sample was prepared, analyzed and reported in accordance with the USEPA Contract Laboratory Program ILM02. Bismuth was analyzed by flame atomic absorption spectroscopy.

Discussion
All quality control requirements were met for the sample with no exceptions.

Please feel free to call if there are any questions concerning the data package.

Respectfully submitted,

TMA/WALTHAM
Steven R. Provencal
Steven R. Provencal
Metals Supervisor

12-21-94

WESTINGHOUSE/HANFORD

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D2-0039

Lab Code: SKINER Case No.: N4-10-082 SAS No.: SDG No.: B0D4N3

SOW No.: ILM02.1

SAMPLE NUMBER:	Lab Sample ID.
B0D4N3	10139-01S
B0D4N3D	10139-01S2
B0D4N3S	10139-01DS

Were ICP interelement corrections applied?	Yes/No	YES
Were ICP background corrections applied?	Yes/No	YES
If yes-were raw data generated before application of background corrections?	Yes/No	NO

Comments:

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

Signature: Steven Provencal Name: Steven R. Provencal

Date: 11/17/94 Title: Metals Supervisor

SAMPLE NUMBER:

INORGANIC ANALYSIS DATA SHEET

B0D4N3

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-02-0039

Lab Code: SKINER Case No.: N4-10-082SAS No.: SDG No.: B0D4N3

Matrix (soil/water): WATER Lab Sample ID: 10139-01S

Level (low/med): LOW Date Received: 10/20/94

% Solids: 0.0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	46.4	B		P
7440-70-2	Calcium	30100			P
7439-89-6	Iron	24.6	B		P
7439-95-4	Magnesium	9010			P
7439-96-5	Manganese	2.4	B		P
7440-09-7	Potassium	8490			P
7782-49-2	Selenium	3.9	B		P
7440-23-5	Sodium	22100			P
	Cyanide				NR
7440-21-3	Silicon	27700			P
7440-69-9	Bismuth	387	U		A

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

002

TMA
Thermo Analytical Inc.

300 Second Avenue
Post Office Box 521
Waltham, MA 02254-0521
(617) 890-7200
FAX (617) 890-3883

RECORD COPY

NOV 1994
RECEIVED
Date
Log In

November 17, 1994

TMA/NORCAL
2030 Wright Avenue
Richmond, CA 94804
Attention: Dan Stuermer

Quality Control Narrative

Scope
One (1) water sample was submitted to TMA/Waltham on October 20, 1994 from TMA/Norcal. The sample was analyzed for the elements specified on the chain of custody. The analysis was performed under TMA/Waltham work order S410138.

Methodology
The sample was prepared, analyzed and reported in accordance with the USEPA Contract Laboratory Program ILM02. Bismuth was analyzed by flame atomic absorption spectroscopy.

Discussion
All quality control requirements were met for the sample with the following exceptions.

The ICP serial dilution for potassium exceeded the control limit requirements.

Please feel free to call if there are any questions concerning the data package.

Respectfully submitted,

TMA/WALTHAM

Steven R. Provencal
Metals Supervisor

1 for 12/21/94

WESTINGHOUSE/HANFORD

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D2-0039

Lab Code: SKINER Case No.: N4-10-082 SAS No.: SDG No.: B0D4N2

SOW No.: ILM02.1

SAMPLE NUMBER:	Lab Sample ID.
B0D4N2	10138-01S
B0D4N2D	10138-01S2
B0D4N2S	10138-01DS

Were ICP interelement corrections applied?	Yes/No	YES
Were ICP background corrections applied?	Yes/No	YES
If yes-were raw data generated before application of background corrections?	Yes/No	NO

Comments:

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

Signature: Steven Provencal Name: Steven R. Provencal

Date: 11/17/94 Title: Metals Supervisor

WESTINGHOUSE/HANFORD
1

SAMPLE NUMBER:

INORGANIC ANALYSIS DATA SHEET

B0D4N2

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D2-0039

Lab Code: SKINER Case No.: N4-10-082SAS No.: SDG No.: B0D4N2

Matrix (soil/water): WATER Lab Sample ID: 10138-01S

Level (low/med): LOW Date Received: 10/20/94

% Solids: 0.0

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

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	16.6	U		P
7440-70-2	Calcium	28900			P
7439-89-6	Iron	132			P
7439-95-4	Magnesium	8430			P
7439-96-5	Manganese	0.90	U		P
7440-09-7	Potassium	7720		E	P
7782-49-2	Selenium	3.1	B		P
7440-23-5	Sodium	21000			P
	Cyanide	39.5			CA
7440-21-3	Silicon	26000			P
7440-69-9	Bismuth	387	U		A

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

002

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Data Turnaround: [ ] Priority [X] Normal

Collector: A.J. SIMPSON	Company Contact: PH BUTCHER	Telephone No.: 509-376-4388
Project Designation: 200-BP-5	Sampling Location: 200 Areas	SAF No.: B96-036
Ice Chest No.: Dumby	Field Logbook No.: EFL-1125	Method of Shipment: EMERY
Shipped To: TMA	Offsite Property No.: W95-0-0001-17	Bill of Lading/Air Bill No.: 1402135416
Possible Sample Hazards/Remarks		

Preservative	HNO3<2	COOL 4	COOL 4	COOL 4	NaOH>12	HNO3 <2		HCl <2			HNO3<2				
Type of Container	P/G	G	P/G	P	P	G/P	G	G/P			P/G				
No. of Container(s)	1	1	1	1	1	6	1	1			1				
Volume	1000ml	500ml	250ml	500ml	1000ml	1000ml	250ml	1000ml			1000ml				
SAMPLE ANALYSIS	METALS (see S.I. #1) UNFILTERED	IC ANIONS-F,Cl, SO4,NO2 PO4	ALKALINITY	TDS	CLP-CYANIDE	GROSS ALPHA/BETA, (see S.I. #2)	TRITIUM	Tc-99			METALS (see S.I. #3) FILTERED				

Special Handling and/or Storage: COOL TO 4 DEGREES CENTIGRADE

Sample No.	Matrix*	Date Sampled	Time Sampled													
BQ D4N2	W	10/14/94	0932	X	X	X	X	X	X	X	X					
BQ D4N3	W	10/14/94	0932									X				

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
K. Rice	10/14/94 1345	Butcher	10-14-94 1345
Butcher	10/17/94 0840		10-18-94 11:00
			10/20/94 900

SPECIAL INSTRUCTIONS
#1: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(UNFILTERED)
#2: GROSS ALPHA/BETA;GAMMA SCAN-Cs-137,Co-60,Ru-106;Pu238/239/240, Sr-90,TOTAL URANIUM
#3: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(FILTERED)

NOTE: DATA DELIVERABLE-STANDALONE

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

FINAL SAMPLE DISPOSITION: Disposal Method | Disposed By | Date/Time

DISTRIBUTION: Original - Sample Yellow - Sampler

BC-6000-828 (12/92)

WESTINGHOUSE HANFORD COMPANY

Results of Analyses For:

GENERAL CHEMISTRY
CASE NO. 10-035
(TMA/ARLI Work Order # A4-10-035)

General Chemistry results are presented
for the following WHC LIQUID sample:

B0D4N2

Norcal Work Order # N4-10-082

Thermo Analytical Inc.
160 Taylor Street
Monrovia, CA 91016
(818) 357-3247

Date submitted:

11 15

PAGE 1 TRA/Norcal CHAIN OF CUSTODY ORD # N4-10-082

RCVD: 10/18/94 DUE: 11/22/94 10/18/94 13:15:40 KEEP: 11/22/95 DISP: S

DASH	SAMPLE IDENTIFICATION		STORED	TESTS for FRACTIONS with work in DEPT: SU and CATEGORY		
01A-W	B0D4N2	UNFILTERED	ARLI	WH043	WH128	WH131
01C-W	B0D4N2 MS	UNFILTERED	ARLI	WH043		
01D-W	B0D4N2 DUP	UNFILTERED	ARLI	WH043	WH128	WH131

RELEASED BY	DATE	TRANSFERRED TO	DATE	RECEIVED BY	DATE
Yamamoto	10/18/94	ARLI	10/18/94	[illegible]	10/14/94

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Data Turnaround: [ ] Priority [X] Normal

Collector: AJ Simpson	Company Contact: PH BUTCHER	Telephone No.: 509-376-4385
Project Designation: 200-BP-5	Sampling Location: 200 Areas	BAF No.: B94-036
ce Chart No.: Ovmby	Field Logbook No.: EFL-1125	Method of Shipment: FEDEX
Shipped To: TMA	Offsite Property No.: W95-0-0001-17	Bill of Lading/Air Bill No.: 1402135416
Possible Sample Hazards/Remarks		

Preservative	HNO3<2	COOL 4	COOL 4	COOL 4	NaOH>12	HNO3 <2		HCl <2			HNO3<2				
Type of Container	P/G	G	P/G	P	P	G/P		GS	G/P		P/G				
No. of Container(s)	1	1	1	1	1	6		1	1		1				
Volume	1000ml	500ml	250ml	500ml	1000ml	1000ml		250ml	1000ml		1000ml				
SAMPLE ANALYSIS	METALS (see S. I. #1) UNFILTERED	IC ANIONS-F,Cl, SO4,NO2 PO4	ALKALINITY	TDS	CLP-CYANIDE	GROSS ALPHA/BETA, (see S. I. #2)		TRITIUM	Tc-99		METALS (see S. I. #3) FILTERED				

Sample No.	Matrix*	Date Sampled	Time Sampled														
BC D4N2	W	10/14/94	0932	X	X	X	X	X	X	X	X						
BC D4N3	W	10/14/94	0932									X					

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By	Date/Time	Received By	Date/Time
[signature]	10/14/94 1345	[signature] BWilson	1345 10-14-94
Relinquished By	Date/Time	Received By	Date/Time
[signature] BWilson	0840 10/15/94	[signature]	10-18-94 11:00
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

#1: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(UNFILTERED)
#2: GROSS ALPHA/BETA;GAMMA SCAN-Cs-137,Co-60,Ru-106;Pu238/239/240, Sr-90,TOTAL URANIUM
#3: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(FILTERED)

NOTE: DATA DELIVERABLE-STANDALONE

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
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

DISTRIBUTION: Original Sample Yellow - Sampler

BC-0000-828 (12/92)

9500063

SAMPLE LOG IN SHEET

LAB NAME: TMA/ART 1 PAGE 1 OF 1

RECEIVED BY (PRINT NAME): [illegible] LOG-IN DATE: 10/19/94

RECEIVED BY (SIGNATURE): [illegible]

ICE CHEST NO. ART 1

REMARKS:

		EPA SAMPLE #	CORRESPONDING SAMPLE TAG #	CORRESPONDING ASSIGNED LAB #	REMARKS CONDITION OF SAMPLE SHIPMENT ETC
		B0D4U2	10/19/94		
1. Custody Seal(s)	Present/Absent* Intact/Broken	B0D4N2		A410035	Good
2. Custody Seal Nos:	N/A				
3. Chain of Custody Records	Present/Absent*				
4. Traffic Reports or Packing List	Present/Absent*				
5. Air bill	Air bill/Sticker Present/Absent*				
6. Air bill No.	9552159910				
7. Sample Tags	Present/Absent*				
8. Sample Tags Numbers	N/A Listed/Not Listed on Chain of Custody				
9. Sample Condition	Intact/Broken*/Leaking				
10. Does information on custody records, traffic reports, and sample tags agree	Yes/No*				
11. Date Received at Lab:	10/19/94				
12. Temp of ice chest	0 °C				
13. Time Received:	0930				

SAMPLE TRANSFER

Fraction: N/A

Area #:

By:

On:

* Contact SMO and attach record of resolution

Reviewed By: Maureen Parrish

Date: 11/11/94

Logbook No: N/A

Logbook Page No:

FORM DC 1

OVERNIGHT DELIVERY

Signature Security Service.

00004A

Contractor	OFF-SITE PROPERTY CONTROL	CONTROL NO. (To be obtained from PROPERTY MANAGEMENT)
WHC		WN95-0-0001-17

PART I - TO BE COMPLETED BY ORIGINATOR

Department	Section	Unit
ER Eng Support	Field & Analytical Supp	ER Field Sampling

The following items are to be shipped from ☒ Contractor ☐ Vendor

Routing ☐ Prepaid ☐ Collect

Shipped to
Company TMA/NORCAL
Address 2030 Wright Ave
City Richmond, CA 94804
State Zip Code
Country

Off-site Custodian

On-site Custodian Payroll No.

Qty.	Property No.	Description (include Manufacture Name, Model, Serial No.)	Acquisition Cost
	1 70 lbs	Sample #: B0D4N2 B0D4N3 Cooler ID: GUMBY Polycooler with groundwater samples packed in wet ice and vermiculite	N/A
	1 lbs	Sample #: Cooler ID: Polycooler with groundwater samples packed in wet ice and vermiculite	N/A

☐ Classified ☐ Unclassified ☐ Shipped Under DOE Contract ☐ Shipped Under Contractor's Use Permit Contract

Necessity for the off-site use of this property Sampling supports RI/FS work in the 200 AOIA

☐ Required for Project Work. List Project No. 200-BP-5

☐ Business Trip

☐ Off-site Assignment

☐ Shipment to Subcontractor. List Subcontract No.

☐ Other (Please specify)

Bill of lading # 140213 5116

CERTIFICATION OF THE RADIATION MONITORING RELEASE MUST BE SECURED THE SAME DAY THAT MATERIAL IS DELIVERED TO SHIPPING.

RM Clearance for Public Release	RM Survey No.	Date
K Kmud	OFF-C132	10.17.94

Location of and Contact for Property (Name/Phone No./Bldg./Area)
P. H. Butcher (509) 376-4388

Date Ready for Shipment	Cost Code to be Charged	Approximate Date This Property will be Returned
10-17-94	~~88410~~ PL531 TF 3072	

Originated By	Date	Authorized By	Date
B.T WHITTEN	10-17-94	[signature]	10-17-94
Property Representative Signature	**Date**	**Property Management Approval**	**Date**
		[signature]	[illegible]

PART II - TO BE COMPLETED BY SHIPPING

Authorized Shipping Signature	Date
[signature]	[illegible]

DISTRIBUTION (AFTER FINAL SIGNATURES)

White - Property Management Yellow - Shipping Green - Accounts Payable Pink - Originator Goldenrod - Property Management

54-3000-479 (01/94)

000005

FEDERAL EXPRESS

USE THIS AIRBILL FOR SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO AND NON-U.S. LOCATIONS
QUESTIONS? CALL 800-238-5355 TOLL FREE

AIRBILL PACKAGE TRACKING NUMBER 9552158910

4125M 9552158910

SENDER'S FEDERAL EXPRESS ACCOUNT NUMBER: 1 0941-5760-9

Date: 10-18-94

From (Your Name) Please Print: SAMPLE CONTROL

Your Phone Number (very important): 510-235-2633

Department/Floor No.

Company: TMA/NORCAL

Street Address: 2030 WRIGHT AVE

City: RICHMOND State: CA ZIP (Required): 94804

To (Recipient's Name) Please Print: 2 NEIL S. MCELRATH 818 357-3247

Recipient's Phone Number (very important)

Department/Floor No.

Company: TMA/ARLI

Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes): 160 TAYLOR STREET

City: MONROVIA State: CA ZIP (Required): 91016

YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice): 2340-6406

H HOLD AT FEDEX LOCATION Print FedEx Address Here
Street Address
City State ZIP

3 PAYMENT: (1) X Bill Sender (2) Bill Recipient's FedEx Acct. No. (3) Bill Third Party FedEx Acct. No.
Credit Card No. Exp. Date

4 SERVICES (Check only one box)

Priority Overnight: 1 X OTHER PACKAGING; FEDEX LETTER*; FEDEX PAK*; FEDEX BOX; FEDEX TUBE

Standard Overnight: 51 OTHER PACKAGING; 56 FEDEX LETTER*; 52 FEDEX PAK*; 57 FEDEX BOX; 53 FEDEX TUBE

Economy Two-Day: ECONOMY*

Economy Overnight: Freight Service; OVERNIGHT FREIGHT*

5 DELIVERY AND SPECIAL HANDLING (Check services required)

Weekday Service: 2 X FEDEX WEEKDAY; HOLD AT FEDEX LOCATION WEEKDAY

Saturday Service: 3 FEDEX SATURDAY; HOLD AT FEDEX LOCATION SATURDAY

Sunday Pick-Up

Special Handling

6 Weight: 18 Total: 18 (Actual or Dimensional Weight)

Emp. No. Date

X

REVISION DATE 5/94

158

7

DESTINATION COPY

BEST AVAILABLE COPY

IMMARC
Thermo Analytical Inc.

RADIATION DOSE RATE SURVEY FORM

Date 10/14/94 COMPANY T&M Services (WHC) OTHER ORD # 4553215 8910

Surveyor's Name Nora McEntee

Model No. HP-210 / ESP-1 Model No. AC-3-7 / ESP-1

Serial Nos. 710289 / 02619 Serial Nos. 407726 / 02628

Calibration Date 5/12/94 Calibration Date 9/12/94

Instrument Calibration Factor 28.4% Instrument Calibration Factor 19.3%

Sample	Location	HP-210 CPM	HP-210 Factor	HP-210 DPM	AC-3-7 CPM	AC-3-7 Factor	AC-3-7 DPM	Spillage or Breakage?	Activity, nCi/mL or nCi/g
Background		46			2				
Consistency		7,400	28.6%		5,070	18.5%			
Smears:									
ART 1		413			0				
WESTINGHOUSE REDOXES			<50 pCi/g		= Non Rad				
		(PL)	10/14/94						

All OK ✓ Approved (PL)

Not OK Date 10/14/94

Comments: VICINITY SURVEY ALL SAMPLES <20 μRem/hr

GENERAL CHEMISTRY RESULTS

CASE NO. 10-035

Sample #:

B0D4N2

CASE NARRATIVE

No problems were encountered during sample analysis.
All QC results were acceptable.

Maureen Parrish 11/15/94

Maureen Parrish

TMA Inc. REPORT Work Order # A4-10-035

Received: 10/18/94 11/14/94 16:48:38

REPORT TO: Westinghouse Hanford Company
345 Hills
Richland, WA 99352

ATTEN: Ms. Briana Colley

CLIENT: WHC SAMPLES: 4
COMPANY: Westinghouse Hanford Company
FACILITY:

WORK ID: SAF # B94-036
TAKEN: By Westinghouse Staff
TRANS: By Fed Ex # 9552158910
TYPE: Water
P.O. #: N4-10-082-SU-AR
INVOICE: under separate cover

PREPARED BY: Thermo Analytical, Inc.
160 Taylor Street
Monrovia, CA 91016

ATTEN: Ms. Carole Harris
PHONE: 818-357-3247

Maureen Parrish
CERTIFIED BY

CONTACT: MKP

This report is for the sole and exclusive use of the client to whom it is addressed and represents only those samples herein described. Samples not destroyed in testing are retained a maximum of 30 days unless otherwise requested.

SAMPLE IDENTIFICATION

01 BOD4N2
01 BOD4N2 MS
01 BOD4N2 Duplicate
01 BOD4N2
01 BOD4N2 Duplicate
01 BOD4N2
01 BOD4N2 Duplicate
02 Lab Blank
02 LCS

TEST CODES and NAMES used on this workorder

ALK	Alkalinity
CL	Chloride
F W	Fluoride in Water
NO2	Nitrite (Liquids)
PO4 L	Phosphate in Liquids
SO4 W	Sulfate (in Waters)
TDS	Dissolved Solids
WCCLPL	Anions & Wet Chem.
WCLCS	Lab Control Sample Summary
WCQCD	Quality Control Summary
WCQCS	Quality Control Summary

TMA Inc. REPORT Work Order # A4-10-035

Received: 10/18/94 Results by Sample

SAMPLE ID B0D4N2 FRACTION 01A TEST CODE WCCLPL NAME Anions & Wet Chem.

Date & Time Collected 10/14/94 09:32:00 Category

ANIONS AND WET CHEMISTRY - LIQUIDS

ANALYSIS	METHOD	RESULT	UNITS	LIMIT
Chloride	300.0	9.9	mg/L	2.0
Fluoride	300.0	0.1	mg/L	0.1
Phosphate	300.0	<0.4	mg/L	0.4
Sulfate	300.0	20	mg/L	10
Nitrite Nitrogen	300.0	<0.1	mg/L	0.1

FORM I

TMA Inc. REPORT Work Order # A4-10-035

Received: 10/18/94

Results by Sample

SAMPLE ID B0D4N2 FRACTION 01D TEST CODE WCCLPL NAME Anions & Wet Chem.

Date & Time Collected 10/14/94 09:32:00 Category

ANIONS AND WET CHEMISTRY - LIQUIDS

ANALYSIS	METHOD	RESULT	UNITS	LIMIT
Alkalinity	310.1	106	mg/L	2

FORM I

TMA Inc. REPORT Work Order # A4-10-035

Received: 10/18/94

Results by Sample

SAMPLE ID B0D4N2 FRACTION 01P TEST CODE WCCLPL NAME Anions & Wet Chem.

Date & Time Collected 10/14/94 09:32:00 Category

ANIONS AND WET CHEMISTRY - LIQUIDS

ANALYSIS	METHOD	RESULT	UNITS	LIMIT
Tot. Dissolved Solids	160.1	256	mg/L	5

FORM I

TMA
Thermo Analytical Inc.

TMA/Norcal
[illegible] Wright Avenue
P.O. Box [illegible]
Richmond, CA 94804-0030
[illegible]

DEC 1994
RECEIVED
Data
Log In

December 16, 1994

Ms. Doris Ayres
Bechtel Hanford Company
345 Hills Street, Room 22A
Richland, WA 99352

Ref: TMA/Richmond N4-10-084-7417

RECORD COPY

Dear Ms. Ayres:

Enclosed is the data report for the two liquid samples designated as SAF B94-036, received at TMA/Richmond on October 18, 1994. Results are given for gross alpha, gross beta, tritium, strontium-90, technetium-99, total uranium, isotopic plutonium, and gamma scan analyses.

The data package is paginated 1 through 358.

Please call if you have any questions concerning this data.

Sincerely,

N. Joseph Verville

N. Joseph Verville
Program Manager
TMA/Richmond

NJV

Enclosure: Data Package

TMA/Richmond

Report N4-10-084-7417
Sample Delivery Group 7417

Westinghouse Hanford Company
P.O. MBH-SVV-069262

Case Narrative

December 16, 1994

1.0 GENERAL

TMA/Richmond Sample Delivery Group 7417 is comprised of the two liquid samples designated as SAF B94-036 delivered under field logbook No. EFL-1125.

2.0 ANALYSIS NOTES

2.1 Gross Alpha Analyses

The relative percent difference in the results for sample B0D4N2 and the duplicate analysis was 200%, greater than the 3σ limit of 83%. The original and duplicate samples were recounted and the results confirmed.

2.2 Gross Beta Analyses

No problems were encountered with the analyses.

2.3 Tritium Analyses

No problems were encountered with the analyses.

2.4 Strontium-90 Analyses

No problems were encountered with the analyses.

2.5 Technetium-99 Analyses

All samples , except the reagent blank were counted for less than the required 50 minutes and as a result the sample MDA's were greater than the RDL. Both samples and the laboratory control sample contained technetium activity much greater than the RDL therefore the elevated MDA's are not considered a problem. The recovery for the laboratory control sample was 83%, outside the 3σ limit of 84-116%, but within the Westinghouse Hanford guidelines of 80-120%.

2.6 Total Uranium Analyses

No problems were encountered with the analyses.

2.7 Isotopic Plutonium Analyses

Sample B0D4N2 was counted for less than the required 700 minutes. The sample MDA was less than the RDL despite the short count time.

2.8 Gamma Scan Analyses

The MDA's for cobalt-58, iron-59, and europium-155 were greater than the RDL's.

TMA/RICHMOND

SAMPLE DELIVERY GROUP 7417

DATA SHEET

N410084-01

B0D4N2

SDG 7417 Client Westinghouse Hanford
Contact N. Joseph Verville Contract MBH-SVV-069262

Lab sample id N410084-01 Client sample id B0D4N2
Dept sample id 7417-001 Location/Matrix 200 Areas LIQUID
Received 10/18/94 Collected 10/14/94
Custody/SAF no EFL-1125 B94-036

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Gross Alpha	Alpha	31	5.2	2	3		80A
Gross Beta	Beta	790	11	3	4		80B
Tritium	10028-17-8	770	220	300	400		H
Strontium 90	10098-97-2	-0.17	0.14	0.2	2	U	Y
Technetium 99	14133-76-7	1200	45	9	5		TC
Total Uranium (ug/L)	7440-61-1	1.5	0.22	0.01	0.1		U_T
Plutonium 238	13981-16-3	0.017	0.026	0.05	0.05	U	PU
Plutonium 239/240		0.004	0.017	0.04	0.05	U	PU
GAMMA SCAN ANALYTES		U					
Sodium 22	13966-32-0	U		10		U	GAM
Potassium 40	13966-00-2	U		200		U	GAM
Manganese 54	13966-31-9	U		10		U	GAM
Iron 59	14596-12-4	U		30	30	U	GAM
Cobalt 58	13981-38-9	U		10	20	U	GAM
Cobalt 60	10198-40-0	36	13		20		GAM
Niobium 94	14681-63-1	U		10		U	GAM
Ruthenium 103	13968-53-1	U		20		U	GAM
Ruthenium 106	13967-48-1	U		100		U	GAM
Tin 113	13966-06-8	U		10		U	GAM
Cesium 134	13967-70-9	U		10		U	GAM
Cesium 137	10045-97-3	U		10	20	U	GAM
Cerium 144	14762-78-8	U		60		U	GAM
Europium 152	14683-23-9	U		20	40	U	GAM
Europium 154	15585-10-1	U		20	40	U	GAM
Europium 155	14391-16-3	U		30	40	U	GAM
Radium 226	13982-63-3	U		20		U	GAM
Radium 228	15262-20-1	U		50		U	GAM
Thorium 228	14274-82-9	U		20		U	GAM

Lab id TMANC
Protocol WHC-HASM-1
Version Ver 1.0
Form DVD-DS
Version 3.04
Report date 12/16/94

TMA/RICHMOND

SAMPLE DELIVERY GROUP 7417

N410084-01

DATA SHEET, cont

B0D4N2

SDG	7417	Client	Westinghouse Hanford
Contact	N. Joseph Verville	Contract	MBH-SVV-069262
Lab sample id	N410084-01	Client sample id	B0D4N2
Dept sample id	7417-001	Location/Matrix	200 Areas LIQUID
Received	10/18/94	Collected	10/14/94
		Custody/SAF no	EFL-1125 B94-036

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Thorium 232	7440-29-1	U		50		U	GAM

Lab id	TMANC
Protocol	WHC-HASM-1
Version	Ver 1.0
Form	DVD-DS
Version	3.04
Report date	12/16/94

N410084-02

TMA/RICHMOND

SAMPLE DELIVERY GROUP 7417

DATA SHEET

B0D4N6

SDG 7417
Contact N. Joseph Verville
Client Westinghouse Hanford
Contract MBH-SVV-069262

Lab sample id N410084-02
Dept sample id 7417-002
Received 10/24/94
Client sample id B0D4N6
Location/Matrix 200 Areas LIQUID
Collected 10/19/94
Custody/SAF no EFL-1125 B94-036

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Gross Alpha	Alpha	5.2	3.6	2	3		80A
Gross Beta	Beta	460	8.3	2	4		80B
Tritium	10028-17-8	610	250	300	400		H
Strontium 90	10098-97-2	0	0.41	0.2	2	U	Y
Technetium 99	14133-76-7	690	39	7	5		TC
Total Uranium (ug/L)	7440-61-1	2.4	0.36	0.01	0.1		U_T
Plutonium 238	13981-16-3	-0.004	0.011	0.03	0.05	U	PU
Plutonium 239/240		0.002	0.008	0.02	0.05	U	PU
GAMMA SCAN ANALYTES		U					
Sodium 22	13966-32-0	U		10		U	GAM
Potassium 40	13966-00-2	U		200		U	GAM
Manganese 54	13966-31-9	U		10		U	GAM
Iron 59	14596-12-4	U		40	30	U	GAM
Cobalt 58	13981-38-9	U		10	20	U	GAM
Cobalt 60	10198-40-0	21	14		20		GAM
Niobium 94	14681-63-1	U		10		U	GAM
Ruthenium 103	13968-53-1	U		20		U	GAM
Ruthenium 106	13967-48-1	U		100		U	GAM
Tin 113	13966-06-8	U		20		U	GAM
Cesium 134	13967-70-9	U		10		U	GAM
Cesium 137	10045-97-3	U		10	20	U	GAM
Cerium 144	14762-78-8	U		70		U	GAM
Europium 152	14683-23-9	U		30	40	U	GAM
Europium 154	15585-10-1	U		20	40	U	GAM
Europium 155	14391-16-3	U		30	40	U	GAM
Radium 226	13982-63-3	U		30		U	GAM
Radium 228	15262-20-1	U		60		U	GAM
Thorium 228	14274-82-9	U		20		U	GAM

Lab id TMANC
Protocol WHC-HASM-1
Version Ver 1.0
Form DVD-DS
Version 3.04
Report date 12/16/94

N410084-02

TMA/RICHMOND

SAMPLE DELIVERY GROUP 7417

DATA SHEET, cont

B0D4N6

SDG	7417	Client	Westinghouse Hanford
Contact	N. Joseph Verville	Contract	MBH-SVV-069262
Lab sample id	N410084-02	Client sample id	B0D4N6
Dept sample id	7417-002	Location/Matrix	200 Areas LIQUID
Received	10/24/94	Collected	10/19/94
		Custody/SAF no	EFL-1125 B94-036

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Thorium 232	7440-29-1	U		60		U	GAM

Lab id	TMANC
Protocol	WHC-HASM-1
Version	Ver 1.0
Form	DVD-DS
Version	3.04
Report date	12/16/94

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Data Turnaround: ☐ Priorty ☒ Normal

Collector: AJ SIMPSON	Company Contact: PH BUTCHER	Telephone No.: 509-376-4388
Project Designation: 200-BP-5	Sampling Location: 200 Areas	SAF No.: B94-036
Ice Chest No.: Gumby	Field Logbook No.: FFL-1125	Method of Shipment: EMERY
Shipped To: TMA	Offsite Property No.: W95-C-CCC1-17	Bill of Lading/Air Bill No.: 1402135416
Possible Sample Hazards/Remarks		

SAMPLE ANALYSIS																
			Preservative	HNO3<2	COOL 4	COOL 4	COOL 4	NaOH>12	HNO3 <2		HCl <2			HNO3<2			
			Type of Container	P/G	G	P/G	P	P	G/P	Gs	G/P			P/G			
			No. of Container(s)	1	1	1	1	1	6	1	1			1			
Special Handling and/or Storage: COOL TO 4 DEGREES CENTIGRADE			Volume	1000ml	500ml	250ml	500ml	1000ml	1000ml	250ml	1000ml			1000ml			
				METALS (see S. I. #1) UNFILTERED	IC ANIONS-F,Cl, SO4,NO2 PO4	ALKALINITY	TDS	CLP-CYANIDE	GROSS ALPHA/BETA, (see S. I. #2)	TRITIUM	Tc-99			METALS (see S. I. #3) FILTERED			
Sample No.	Matrix*	Date Sampled	Time Sampled														
BO D4N2	W	10/14/94	0932	X	X	X	X	X	X	X	X						
BO D4N3	W	10/14/94	0932											X			

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By	Date/Time	Received By	Date/Time
K Wolfe	10/14/94 1345	Butcher	10-14-94 1345
Relinquished By	Date/Time	Received By	Date/Time
Butcher	10/17/94 0840		10-18-94 11:00
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

#1: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(UNFILTERED)
#2: GROSS ALPHA/BETA;GAMMA SCAN-Cs-137,Co-60,Ru-106;Pu238/239/240, Sr-90,TOTAL URANIUM
#3: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(FILTERED)

NOTE: DATA DELIVERABLE-STANDALONE

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
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

DISTRIBUTION: Original- Sample Yellow - Sampler

BC-6000-828 (12/92)

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Data Turnaround: [ ] Priorty [X] Normal

Collector: K. O Lee	Company Contact: PH BUTCHER	Telephone No.: 509-376-4388
Project Designation: 200-BP-5	Sampling Location: 200 Areas	SAF No.: 894-036
Ice Chest No.: CWS 029	Field Logbook No.: FEL-1125	Method of Shipment: EMERY
Shipped To: TMA	Offsite Property No.: W95-0-0001-83	Bill of Lading/Air Bill No.: 1402135108
Possible Sample Hazards/Remarks		

Preservative	HNO3<2	COOL 4	COOL 4	COOL 4	NaOH>12	HNO3 <2		HCl <2			HNO3<2				
Type of Container	P/G	G	P/G	P	P	G/P	Gs	G/P			P/G				
No. of Container(s)	1	1	1	2 + 1	1	6	1	1			1				
Volume	1000ml	500ml	250ml	250ml 500ml	1000ml	1000ml	250ml	1000ml			1000ml				
SAMPLE ANALYSIS	METALS (see S. I. #1) UNFILTERED	IC ANIONS-F,Cl, SO4,NO2 PO4	ALKALI-NITY	TDS	CLP-CYANIDE	GROSS ALPHA/BETA, (see S. I. #2)	TRITIUM	Tc-99			METALS (see S. I. #3) FILTERED				0 50

Special Handling and/or Storage: COOL TO 4 DEGREES CENTIGRADE

Sample No.	Matrix*	Date Sampled	Time Sampled													
80 D4N6	W	10/19/94	0547	X	X	X	X	X	X	X	X					
80 D4N7	W	10/19/94	0547									X				

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By	Date/Time	Received By	Date/Time
K. O Lee	10/19/94 1230	B. Ashton	10-19-94 1230
Relinquished By	Date/Time	Received By	Date/Time
B. Ashton	10-20-94 0800	[illegible]	10-24-94 11:00AM
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

#1: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(UNFILTERED)
#2: GROSS ALPHA/BETA;GAMMA SCAN-Cs-137,Co-60,Ru-106;Pu238/239/240, Sr-90,TOTAL URANIUM
#3: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(FILTERED)

NOTE: DATA DELIVERABLE-STANDALONE

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
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

DISTRIBUTION: Original- Sample Yellow - Sampler

BC-6000-828 (12/92)

OVERNIGHT DELIVERY

Signature Security Service

Contractor	OFF-SITE PROPERTY CONTROL	CONTROL NO. (To be obtained from PROPERTY MANAGEMENT)
WHC		W75-0-0001-17

PART I - TO BE COMPLETED BY ORIGINATOR

Department	Section	Unit
ER Eng Support	Field & Analytical Supp	ER Field Sampling

The following items are to be shipped from ☒ Contractor ☐ Vendor

Routing ☐ Prepaid ☐ Collect

Shipped to: TMA/NORCAL Company: 2030 Wright Ave Address: Richmond, CA 94804 City / State / Zip Code Country	Off-site Custodian On-site Custodian / Payroll No.

Qty.	Property No.	Description (include Manufacture Name, Model, Serial No.)	Acquisition Cost
	1 76 lbs	Sample #: ISCD4N2 ISCD4N3 Cooler ID: GUMBY Polycooler with groundwater samples packed in wet ice and vermiculite	N/A
	1 lbs	~~Sample #:~~ ~~Cooler ID:~~ ~~Polycooler with groundwater samples packed in wet ice and vermiculite~~	N/A

☐ Classified ☐ Unclassified ☐ Shipped Under DOE Contract ☐ Shipped Under Contractor's Use Permit Contract

Necessity for the off-site use of this property: Sampling supports RI/FS work in the 200 AREA

☐ Required for Project Work. List Project No. 200-UR-1

☐ Business Trip

☐ Off-site Assignment

☐ Shipment to Subcontractor. List Subcontract No. _____

☐ Other (Please specify) _____

Bill of lading # 140 313 5116

CERTIFICATION OF THE RADIATION MONITORING RELEASE MUST BE SECURED THE SAME DAY THAT MATERIAL IS DELIVERED TO SHIPPING.

RM Clearance for Public Release	RM Survey No.	Date
[illegible]	CF-132	[illegible]

Location of and Contact for Property (Name/Phone No./Bldg./Area): P. H. Butcher (509) 376-4388

Date Ready for Shipment	Cost Code to be Charged	Approximate Date This Property will be Returned
10-17-94	11531	

Originated By	Date	Authorized By	Date
B.T. WHITTEN	10-17-94	[illegible]	10-17-94
Property Representative Signature	**Date**	**Property Management Approval**	**Date**

PART II - TO BE COMPLETED BY SHIPPING

Authorized Shipping Signature	Date
O 51	

DISTRIBUTION (AFTER FINAL SIGNATURES)

White - Property Management Yellow - Shipping Green - Accounts Payable Pink - Originator Goldenrod - Property Management

54-3000-479 (01/94)

OVERNIGHT DELIVERY

Contractor	OFF-SITE PROPERTY CONTROL	CONTROL NUMBER (To be obtained from PROPERTY MANAGEMENT) W95-0-0001-23

PART I – TO BE COMPLETED BY ORIGINATOR

Department	Section	Unit
The following items are to be shipped from	☐ Contractor	☐ Vendor
Routing	☐ Contractor	☐ Vendor

Shipped to	Off site Custodian
TIM NORCIA [illegible] Wright [illegible] Richmond, [illegible]	Full Title

Quantity	Description (Include Serial and any Government Tag Numbers)	Original Cost
1	BODING 600 IN7	
81	GWS 029	
1		

☐ Classified ☐ Unclassified ☐ Shipped Under DOE Contract ☐ Shipped Under Contractor's Use Permit Contract

Necessity for the Off-Site Use of this Property

ACC - AREA

140215 5108

CERTIFICATION OF THE RADIATION MONITORING RELEASE MUST BE SECURED THE SAME DAY THAT MATERIAL IS DELIVERED TO SHIPPING.

RM Clearance for Public Release	RM Survey No	Date
Location of Property (Area & Bldg.)	Contact	Phone 376-4398
Date Ready for Shipment ~~10-28-94~~ 10-20-94	Cost Code to be Charged PL531 ITF 2072	Approximate Date This Property will be Returned
Originated By R.T. WHITFEN	Date 10-20-94	Authorized By [signature] Date 10-20-94
Signature and Name of Property Control	Custodian Date	Property Management Approval Date

PART II – TO BE COMPLETED BY SHIPPING

Signature of Recipient	Return Order No	Date Issued	Purchase Order No	Date Issued
Date [illegible]	0 52			

DISTRIBUTION

By Originator	Shipping Operation – Sign all Copies and Forward to:
White, Green, Yellow, Pink – Property Management Goldenrod – Retain	White – Property Management Yellow – Retain Green – Property Control Custodian (Issuing Office) Pink – Originator

54-3000-479 (09/89)

FORM OF PAYMENT

Check ☐ CR ☐ Account ☐

Bill to Shipper ☐ Bill to Consignee ☐ Third Party Billing ☐

E

EMERY WORLDWIDE

A CF Company

SERVICES

Express ☐ Same Day ☐ Standard Plus ☐ Business Documents ☐

☒ AM ☐ PM Preferred ☐ Customs Clearance ☐

☒ Second Day ☐ Standard ☐ Delivery ☐

Date 10/20/94 Origin 140213510 8

From

WESTINGHOUSE SHIPPING DEPT (509) 376-6665
U.S. DEPARTMENT OF ENERGY C/O

Canada ☐

To

TMA/NORCAL

TMA/NORCAL

2030 Wright Ave.

Richmond, CA USA

Hold for Pick Up ☐ Canada ☐

Tariff Dest | Gateway

$

EMERY WORLDWIDE will accept Consignee's check with all risks being assumed by Shipper, including but not limited to non-payment, fraud and misrepresentation

Customer's Reference Numbers

PL531/ITE2072/W95-0-0001-23

E Consignee's Account Number 94804

Declared Value $

Description	Pcs	L	W	H	Total Pieces	Total Weight
Cooler ID#GWS 029	1	21	16	16	1	81

Remarks

OVERNIGHT DELIVERY
SECURE SECURITY SERVICE

Zip Ship ☐

For shipments within the 50 United States Shipper has the option to check this box and, by checking agrees that the Zip Ship conditions, described in the area to the right, apply.

Mark of Entry Parking Area

9X12 ☐ 12X15 ☐

International Shipments

Free Domicile ☐ Commodity Code

Third Party Account Number mandatory for Third Party Billing E Third Party Account Number

International Customs Value

International Insurance

Base Charge

Total Transportation Charges

Other Charges Advance or Origin ☐ $

1 OF 1 PIECES / WEIGHT

PSC 13:48 20 OCT 9

140 213 510 8

94804 -CA-PM

1-OAK

SERVICE AM

FORM OF PAYMENT

Check ☐ Cash ☐ FCCCD ☐

Bill to Shipper [X] Bill to Consignee ☐ Third Party Billing ☐

E

EMERY WORLDWIDE

A CF Company

SERVICES

Express ☐ Business Documents ☐
Same Day ☐ Standard Plus ☐ Customs Clearance ☐
[X] AM ☐ PM Preferred ☐
Second Day ☐ Standard ☐ Delivery ☐

Date 10/12/94 Origin 140213541 6

From
WESTINGHOUSE SHIPPING DEPT. (509) 376-6665
U.S. DEPARTMENT OF ENERGY C/O

Canada ☐

To
TMA/NORCAL
TMA/NORCAL
2030 WRIGHT AVENUE
RICHMOND CA USA

Hold for Pick Up ☐ Canada ☐

Tariff Dest | Gateway

$

EMERY WORLDWIDE will accept Consignee's check with all risks being assumed by Shipper, including but not limited to non-payment, fraud and misrepresentation

Customer's Reference Numbers
495-0-0001-17 PL531/ITE2072

E Consignee's Account Number 94804

Description	Dimensions Pcs	L	W	H	Total Pieces	Total Weight
SAMPLE7POLYCOOLER COOLER ID: GUMBY GROUNDWATER SAMPLES	1				1	76#

FOR INFORMATION OR RATES CALL 1-800-44-EMERY

Declared Value $

Remarks
OVERNIGHT DELIVERY

Zip Ship ☐
For shipments within the 50 United States Shipper has the option to check this box and, by checking agrees that the Zip Ship conditions, described in the area to the right, apply.

Mark if Emery Packaging 9X12 ☐ 12X15 ☐

International Shipments
Free Domicile ☐ Commodity Code

Third Party Account Number mandatory for Third Party Billing. E Third Party Account Number

International Customs Value | International Insurance

Base Charge

Total Transportation Charges

Other Charges Advance at Origin ☐ OC AO $

EMERY WORLDWIDE

1 OF 1 PIECES / 76 WEIGHT

PSC 13:03 17 OCT
140 213 541 6

94804 -CA-PM
1-OAK

SERVICE AM

0 54 0

TMA
Thermo Analytical Inc.

TMA/Norcal
2030 Wright Avenue
P. O. Box 4040
Richmond, CA 94804-0040
(510) 235-2633 Fax No (510) 235-0438

December 15, 1994

Ms. Doris Ayres
Bechtel Hanford Company
345 Hills Street, Room 22A
Richland, WA 99352

Ref: TMA/Richmond N4-10-106-7418

RECORD COPY

Dear Ms. Ayres:

Enclosed is the data report for the single water sample designated as SAF B94-036, received at TMA/Richmond on October 25, 1994. Results are given for gross alpha, gross beta, tritium, strontium-90, technetium-99, total uranium, plutonium-239/240, and gamma scan analyses.

The data package is paginated 1 to 100, 101A to 101T, and 102 through 275.

Please call if you have any questions concerning this data.

Sincerely,

N. Joseph Verville

N. Joseph Verville
Program Manager
TMA/Richmond

RECORD COPY

NJV

Enclosure: Data Package

TMA/Richmond

Report N4-10-106-7418
Sample Delivery Group 7418

Bechtel Hanford Company
P.O. MBH-SVV-069262

Case Narrative

December 15, 1994

1.0 GENERAL

TMA/Richmond Sample Delivery Group 7418 is comprised of one water sample designated as SAF B94-036. Delivered under field logbook No. EFL-1020. There was no unique Chain-of-Custody ID provided.

Seven 1 L poly bottles, and one 250 mL amber glass bottle containing the samples were received for analyses.

2.0 ANALYSIS NOTES

2.1 Gross Alpha Analyses

No problems were encountered with the analyses.

2.2 Gross Beta Analyses

The relative percent difference in the results for the sample and its duplicate analysis was 45%, greater than the 3σ total limit of 33%.

2.3 Tritium Analyses

No problems were encountered with the analyses.

2.4 Strontium-90 Analyses

No problems were encountered with the analyses.

2.5 Technetium-99 Analyses

The MDA's of the sample, the laboratory control sample, and the duplicate analysis were greater than the RDL due to short count times. The MDA of the reagent blank was less than the RDL. Given the activities of the laboratory control sample and the sample itself the elevated MDA's are not considered a problem.

2.6 Total Uranium Analyses

No problems were encountered with the analyses.

2.7 Plutonium-239/240 Analyses

The MDA of the laboratory control sample was slightly greater than the RDL however, given the level of activity in the LCS the elevated MDA is not considered a problem.

2.0 ANALYSIS NOTES (cont.)

2.8 Gamma Scan Analyses

The MDA's of iron-59, cobalt-58, and europium-155 were greater than the RDL.

N410106-01

TMA/RICHMOND

SAMPLE DELIVERY GROUP 7418

DATA SHEET

B0D4P0

SDG 7418 Client Westinghouse Hanford
Contact N. Joseph Verville Contract MBH-SVV-069262

Lab sample id N410106-01 Client sample id B0D4P0
Dept sample id 7418-001 Location/Matrix 200 Areas LIQUID
Received 10/25/94 Collected 10/21/94
Chain of custody id EFL-1020

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Gross Alpha	Alpha	70	7.9	2	3		80A
Gross Beta	Beta	1200	14	2	4		80B
Tritium	10028-17-8	4500	330	300	400		H
Strontium 90	10098-97-2	-0.002	0.35	0.3	2	U	Y
Technetium 99	14133-76-7	3400	120	20	5		TC
Total Uranium (ug/L)	7440-61-1	3.4	0.51	0.01	0.1		U_T
Plutonium 238	13981-16-3	-0.004	0.018	0.03	0.05	U	PU
Plutonium 239/240		-0.001	0.006	0.02	0.05	U	PU
GAMMA SCAN ANALYTES		U					
Sodium 22	13966-32-0	U		10		U	GAM
Potassium 40	13966-00-2	U		200		U	GAM
Manganese 54	13966-31-9	U		10		U	GAM
Iron 59	14596-12-4	U		40	30	U	GAM
Cobalt 58	13981-38-9	U		10	20	U	GAM
Cobalt 60	10198-40-0	61	19		20		GAM
Niobium 94	14681-63-1	U		10		U	GAM
Ruthenium 103	13968-53-1	U		20		U	GAM
Ruthenium 106	13967-48-1	U		100		U	GAM
Tin 113	13966-06-8	U		20		U	GAM
Cesium 134	13967-70-9	U		10		U	GAM
Cesium 137	10045-97-3	U		10	20	U	GAM
Cerium 144	14762-78-8	U		60		U	GAM
Europium 152	14683-23-9	U		30	40	U	GAM
Europium 154	15585-10-1	U		20	40	U	GAM
Europium 155	14391-16-3	U		40	40	U	GAM
Radium 226	13982-63-3	U		30		U	GAM
Radium 228	15262-20-1	U		60		U	GAM
Thorium 228	14274-82-9	U		20		U	GAM

Lab id TMANC
Protocol WHC-HASM-1
Version Ver 1.0
Form DVD-DS
Version 3.04
Report date 12/14/94

TMA/RICHMOND

SAMPLE DELIVERY GROUP 7418

N410106-01

DATA SHEET, cont

B0D4P0

SDG 7418 Client Westinghouse Hanford
Contact N. Joseph Verville Contract MBH-SVV-069262

Lab sample id N410106-01 Client sample id B0D4P0
Dept sample id 7418-001 Location/Matrix 200 Areas LIQUID
Received 10/25/94 Collected 10/21/94
Chain of custody id EFL-1020

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Thorium 232	7440-29-1	U		60		U	GAM

Lab id TMANC
Protocol WHC-HASM-1
Version Ver 1.0
Form DVD-DS
Version 3.04
Report date 12/14/94

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Data Turnaround: [ ] Priority [X] Normal

Collector: A Rizzo	Company Contact: PH BUTCHER	Telephone No.: 509-376-4388
Project Designation: 200-BP-5	Sampling Location: 200 Areas	SAF No.: B96-036
Ice Chest No.: GWS-130	Field Logbook No.: EFL 1020	Method of Shipment: EMERY
Shipped To: TMA	Offsite Property No.: W95-0-0001-30	Bill of Lading/Air Bill No.: ~~1403135174~~ 520302591 BW 10-24-94
Possible Sample Hazards/Remarks		
Special Handling and/or Storage: COOL TO 4 DEGREES CENTIGRADE		

Sample No.	Matrix*	Date Sampled	Time Sampled	METALS (see S.I. #1) UNFILTERED	IC ANIONS-F,Cl,SO4,NO2 PO4	ALKALINITY	TDS	CLP-CYANIDE	GROSS ALPHA/BETA, (see S.I. #2)	TRITIUM	Tc-99			METALS (see S.I. #3) FILTERED				
Preservative				HNO3<2	COOL 4	COOL 4	COOL 4	NaOH>12	HNO3 <2		HCl <2			HNO3<2				
Type of Container				P/G	G	P/G	P	P	G/P	Gs	G/P			P/G				
No. of Container(s)				1	1	1	1	1	6	1	1			1				
Volume				1000ml	500ml	250ml	500ml	1000ml	1000ml	250ml	1000ml			1000ml				
80 D4P0	W	10-21-94	0920	X	X	X	X	X	X	X	X							
80 D4P1	W	10-21-94	0920											X				

8 of 8

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
AG Rizzo	10-24-95 1045	B.Butcher	10-24-94 1045
B.Butcher	10-24-94 0840		10-25-94 12:50

SPECIAL INSTRUCTIONS

#1: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(UNFILTERED)
#2: GROSS ALPHA/BETA;GAMMA SCAN-Cs-137,Co-60,Ru-106;Pu238/239/240, Sr-90,TOTAL URANIUM
#3: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(FILTERED)

NOTE: DATA DELIVERABLE-STANDALONE

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

FINAL SAMPLE DISPOSITION: Disposal Method | Disposed By | Date/Time

DISTRIBUTION: Original- Sample Yellow - Sampler

BC-6000-828 (12/92)

DON'T SAY IT --- *Write It!*

DATE: March 13, 1995

TO: B0D4N2-TMA

FROM: Pat Reich H4-14

Telephone: 372-2785

cc:

SUBJECT: DATA VALIDATION REPORT FOR 200-BP-5, Round 2, Groundwater Sampling Project

The Final Validation Report for the following data packages is filed in B0D4N2-TMA:

W0260-QES
W0250-QES
W0258-QES
W0272-QES
W0267-QES
B0D4Q9-TMA
B0D4N2-TMA

Pat Reich
Sample Management

2/06/95

Data Validation Check List

for Project 200-BP-5

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
B0D4N2	Held split of BCD4L5	B0D4N2		TMA/NORCAL	N	N	N	Y 11/21/94	Y 11/21/94	10/18/94 - SAF-B94-036	Y 12/19/94	12/19/94
B0D4N3	[illegible]	B0D4N2		TMA/NORCAL	N	N	N	N	Y 11/21/94	10/18/94 - SAF-B94-036	N	11/21/94
B0D4N6	[illegible] BCD4L4	B0D4N2		TMA/NORCAL	N	N	N	Y 11/25/94	Y 11/25/94	10/24/94 - SAF-B94-036	Y 12/19/94	12/19/94
B0D4N7	[illegible] BCD4L5	B0D4N2		TMA/NORCAL	N	N	N	N	Y 11/25/94	10/24/94 - SAF-B94-036	N	11/25/94
B0D4P0	Held split of BCD4K6	B0D4N2		TMA/NORCAL	N	N	N	Y 11/25/94	Y 11/25/94	10/25/94 - SAF-B94-036	Y 12/19/94	12/19/94
B0D4P1	[illegible] BCD4K1	B0D4N2		TMA/NORCAL	N	N	N	N	Y 11/25/94	10/25/94 - SAF-B94-036	N	11/25/94

Data Entry Complete: DP [illegible] 1-1-95

DATATRAC [illegible]
2/6/95

Validation Rcvd [illegible]

Golder Associates Inc.

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

FEB 1995
RECEIVED
Validation
Log In

Golder Associates

February 3, 1995

Our ref: 943-1610.062.0400
94-1610/O/217

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

RECORD COPY

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
94-036	200BP5 Rnd 2 Groundwater	B0D4N2-TMA	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:\environs\wbc\dv\dptrun.ltr

RECORD COPY

MEMORANDU

TO: 200-BP-5 Round 2 Groundwater Project QA Reco February 1, 1995

FR: Anne Jensen, Golder Associates Inc. aj

RE: RADIOCHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE BOD4N2-TMA (943-1610.062 4N2RAD.BP5)

INTRODUCTION

This memo presents the results of data validation on data package BOD4N2-TMA prepared by Thermo Analytical Incorporated. Sample information is provided in the following table.

SAMPLE ID	COMMENTS	ANALYSIS	MEDIA
B0D4N2	FIELD SPLIT	RADIOCHEMISTRY	WATER
BOD4N6*	FIELD SPLIT		WATER
BOD4P0	FIELD SPLIT	SEE ATTACHMENT 4	WATER
* - Indicates sample results which were 100% recalculated.			

Data validation was conducted to level D in accordance with the WHC statement of work (WHC 1994) 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, with the exception of the minor deficiencies noted below.

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, with the exception of the minimum detectable activity (MDA) which exceeded the required detection limit (RDL) for technetium-99, iron-59, cobalt-58 and europium-155, as noted in the laboratory case narrative. There is no detection limit requirement for iron-59 and cobalt-58. No qualification is required in accordance with the data validation procedures.

The MDA could not be verified by recalculation for plutonium-238, therefore associated nondetect results for samples BOD4N2 and BOD4N6 have been qualified as estimated (UJ). Attachments 2 and 5 provide a summary of samples affected, data qualifications applied and supporting documentation.

Completeness. The data package was complete for all requested analyses. Three samples were validated in this data package with a total of twenty-seven 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.

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 Duplicate

- The duplicate relative percent differences (RPD) for gross alpha and gross beta were unacceptable. Attachments 2 and 5 provide a summary of data qualifications applied and supporting documentation.

FIELD QC

- Sample BOD4N2 was identified as the field split of sample BOD4G0. A comparison of the results is not available at this time, but will be included in the final data summary.

- Sample BOD4N6 was identified as the field split of sample BOD4L4. A comparison of the results is not available at this time, but will be included in the final data summary.

- Sample BOD4P0 was identified as the field split of sample BOD4K6. A comparison of the results is not available at this time, but will be included in the final data summary.

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).

- Gamma scan results that were less than the MDA were only reported as "U" on the laboratory results forms, therefore results were elevated to the MDA and 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.

aj replaced 2/9/95

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.

ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

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

DATA QUALIFICATION SUMMARY - FORM B-7

SDG: BOD4N2-TMA	REVIEWER: A. JENSEN	DATE: 2-01-95	PAGE 1 OF 1
COMMENTS: RADIOCHEMISTRY			
COMPOUND/ANALYTE	QUALIFIER	SAMPLES AFFECTED	REASON
GROSS ALPHA	J	ALL	DUPLICATE RPD WAS OUTSIDE CONTROL LIMITS
GROSS BETA	J	BOD4P0	DUPLICATE RPD WAS OUTSIDE CONTROL LIMITS
PLUTONIUM-238	UJ	BOD4N2 BOD4N6	MDA COULD NOT BE VERIFIED BY RECALCULATION

ATTACHMENT 3

QUALIFIED DATA SUMMARY and ANNOTATED LABORATORY REPORTS

Validated Data Summary, Data Package: B0D4N2-TMA

	Samp#	B0D4N2		B0D4N6		B0D4P0	
	Date	10-14-94		10-19-94		10-21-94	
	Location	299-E33-12		699-53-55C		699-52-54	
	Depth	---		---		---	
	Type	WATER		WATER		WATER	
	Comments	SPLIT		SPLIT		SPLIT	
Parameter	Units	Result	Q	Result	Q	Result	Q
GROSS ALPHA	pCi/L	31.000	J	5.200	J	70.000	J
GROSS BETA	pCi/L	790.000		460.000		1200.000	J
TRITIUM	pCi/L	770.000		610.000		4500.000	
STRONTIUM-90	pCi/L	-0.170	U	0.000	U	-0.002	U
TECHNETIUM-99	pCi/L	1200.000		690.000		3400.000	
TOTAL URANIUM	UG/L	1.500		2.400		3.400	
PLUTONIUM-238	pCi/L	0.017	UJ	-0.004	UJ	-0.004	U
PLUTONIUM-239/240	pCi/L	0.004	U	0.002	U	-0.001	U
SODIUM-22	pCi/L	10.000	U	10.000	U	10.000	U
POTASSIUM-40	pCi/L	200.000	U	200.000	U	200.000	U
MANGANESE-54	pCi/L	10.000	U	10.000	U	10.000	U
IRON-59	pCi/L	30.000	U	40.000	U	40.000	U
COBALT-58	pCi/L	10.000	U	10.000	U	10.000	U
COBALT-60	pCi/L	36.000		21.000		61.000	
NIOBIUM-94	pCi/L	10.000	U	10.000	U	10.000	U
RUTHENIUM-103	pCi/L	20.000	U	20.000	U	20.000	U
RUTHENIUM-106	pCi/L	100.000	U	100.000	U	100.000	U
TIN-113	pCi/L	10.000	U	20.000	U	20.000	U
CESIUM-134	pCi/L	10.000	U	10.000	U	10.000	U
CESIUM-137	pCi/L	10.000	U	10.000	U	10.000	U
CERIUM-144	pCi/L	60.000	U	70.000	U	60.000	U
EUROPIUM-152	pCi/L	20.000	U	30.000	U	30.000	U
EUROPIUM-154	pCi/L	20.000	U	20.000	U	20.000	U
EUROPIUM-155	pCi/L	30.000	U	30.000	U	40.000	U
RADIUM-226	pCi/L	20.000	U	30.000	U	30.000	U
RADIUM-228	pCi/L	50.000	U	60.000	U	60.000	U
THORIUM-228	pCi/L	20.000	U	20.000	U	20.000	U
THORIUM-232	pCi/L	50.000	U	60.000	U	60.000	U

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

Verified 2-14-95

Revised 2-14-95

N410106-01

TMA/RICHMOND

SAMPLE DELIVERY GROUP 7418

DATA SHEET

B0D4P0

SDG 7418 — Client Westinghouse Hanford
Contact N. Joseph Verville — Contract MBH-SVV-069262

Lab sample id N410106-01 — Client sample id B0D4P0
Dept sample id 7418-001 — Location/Matrix 200 Areas LIQUID
Received 10/25/94 — Collected 10/21/94
Chain of custody id EFL-1020

ANALYTE	CAS NO	RESULT pCi/L	Q	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALIFIERS	TEST
Gross Alpha	Alpha	70	J	7.9	2	3		80A
Gross Beta	Beta	1200	J	14	2	4		80B
Tritium	10028-17-8	4500		330	300	400		H
Strontium 90	10098-97-2	-0.002	U	0.35	0.3	2	U	Y
Technetium 99	14133-76-7	3400		120	20	5		TC
Total Uranium (ug/L)	7440-61-1	3.4		0.51	0.01	0.1		U_T
Plutonium 238	13981-16-3	-0.004	U	0.018	0.03	0.05	U	PU
Plutonium 239/240		-0.001	U	0.006	0.02	0.05	U	PU
GAMMA SCAN ANALYTES		U						
Sodium 22	13966-32-0	U			10		U	GAM
Potassium 40	13966-00-2	U			200		U	GAM
Manganese 54	13966-31-9	U			10		U	GAM
Iron 59	14596-12-4	U			40	30	U	GAM
Cobalt 58	13981-38-9	U			10	20	U	GAM
Cobalt 60	10198-40-0	61		19		20		GAM
Niobium 94	14681-63-1	U			10		U	GAM
Ruthenium 103	13968-53-1	U			20		U	GAM
Ruthenium 106	13967-48-1	U			100		U	GAM
Tin 113	13966-06-8	U			20		U	GAM
Cesium 134	13967-70-9	U			10		U	GAM
Cesium 137	10045-97-3	U			10	20	U	GAM
Cerium 144	14762-78-8	U			60		U	GAM
Europium 152	14683-23-9	U			30	40	U	GAM
Europium 154	15585-10-1	U			20	40	U	GAM
Europium 155	14391-16-3	U			40	40	U	GAM
Radium 226	13982-63-3	U			30		U	GAM
Radium 228	15262-20-1	U			60		U	GAM
Thorium 228	14274-82-9	U			20		U	GAM

verified ag 2/1/95

Lab id TMANC
Protocol WHC-HASM-1
Version Ver 1.0
Form DVD-DS
Version 3.04
Report date 12/14/94

TMA/RICHMOND

SAMPLE DELIVERY GROUP 7418

N410106-01

DATA SHEET, cont

B0D4P0

SDG 7418 Client Westinghouse Hanford
Contact N. Joseph Verville Contract MBH-SVV-069262

Lab sample id N410106-01 Client sample id B0D4P0
Dept sample id 7418-001 Location/Matrix 200 Areas LIQUID
Received 10/25/94 Collected 10/21/94
Chain of custody id EFL-1020

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Thorium 232	7440-29-1	U		60		U	GAM

Lab id TMANC
Protocol WHC-HASM-1
Version Ver 1.0
Form DVD-DS
Version 3.04
Report date 12/14/94

N410084-02

TMA/RICHMOND

SAMPLE DELIVERY GROUP 7417

DATA SHEET

B0D4N6

SDG 7417 — Client Westinghouse Hanford
Contact N. Joseph Verville — Contract MBH-SVV-069262

Lab sample id N410084-02 — Client sample id B0D4N6
Dept sample id 7417-002 — Location/Matrix 200 Areas LIQUID
Received 10/24/94 — Collected 10/19/94
Custody/SAF no EFL-1125 B94-036

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALIFIERS	TEST
Gross Alpha	Alpha	5.2 J	3.6	2	3		80A
Gross Beta	Beta	460	8.3	2	4		80B
Tritium	10028-17-8	610	250	300	400		H
Strontium 90	10098-97-2	0 U	0.41	0.2	2	U	Y
Technetium 99	14133-76-7	690	39	7	5		TC
Total Uranium (ug/L)	7440-61-1	2.4	0.36	0.01	0.1		U_T
Plutonium 238	13981-16-3	-0.004 UJ	0.011	0.03	0.05	U	PU
Plutonium 239/240		0.002 U	0.008	0.02	0.05	U	PU
GAMMA SCAN ANALYTES		U					
Sodium 22	13966-32-0	U		10		U	GAM
Potassium 40	13966-00-2	U		200		U	GAM
Manganese 54	13966-31-9	U		10		U	GAM
Iron 59	14596-12-4	U		40	30	U	GAM
Cobalt 58	13981-38-9	U		10	20	U	GAM
Cobalt 60	10198-40-0	21	14		20		GAM
Niobium 94	14681-63-1	U		10		U	GAM
Ruthenium 103	13968-53-1	U		20		U	GAM
Ruthenium 106	13967-48-1	U		100		U	GAM
Tin 113	13966-06-8	U		20		U	GAM
Cesium 134	13967-70-9	U		10		U	GAM
Cesium 137	10045-97-3	U		10	20	U	GAM
Cerium 144	14762-78-8	U		70		U	GAM
Europium 152	14683-23-9	U		30	40	U	GAM
Europium 154	15585-10-1	U		20	40	U	GAM
Europium 155	14391-16-3	U		30	40	U	GAM
Radium 226	13982-63-3	U		30		U	GAM
Radium 228	15262-20-1	U		60		U	GAM
Thorium 228	14274-82-9	U		20		U	GAM

verified aj 2/1/95

~~0 23~~

Lab id TMANC
Protocol WHC-HASM-1
Version Ver 1.0
Form DVD-DS
Version 3.04
Report date 12/16/94

TMA/RICHMOND

SAMPLE DELIVERY GROUP 7417

N410084-02

DATA SHEET, cont

B0D4N6

SDG 7417 Client Westinghouse Hanford
Contact N. Joseph Verville Contract MBH-SVV-069262

Lab sample id N410084-02 Client sample id B0D4N6
Dept sample id 7417-002 Location/Matrix 200 Areas LIQUID
Received 10/24/94 Collected 10/19/94
Custody/SAF no EFL-1125 B94-036

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Thorium 232	7440-29-1	U		60		U	GAM

Lab id TMANC
Protocol WHC-HASM-1
Version Ver 1.0
Form DVD-DS
Version 3.04
Report date 12/16/94

TMA/RICHMOND

SAMPLE DELIVERY GROUP 7417

N410084-01

DATA SHEET

B0D4N2

SDG 7417 Client Westinghouse Hanford
Contact N. Joseph Verville Contract MBH-SVV-069262

Lab sample id N410084-01 Client sample id B0D4N2
Dept sample id 7417-001 Location/Matrix 200 Areas LIQUID
Received 10/18/94 Collected 10/14/94
Custody/SAF no EFL-1125 B94-036

ANALYTE	CAS NO	RESULT pCi/L	Q	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Gross Alpha	Alpha	31	J	5.2	2	3		80A
Gross Beta	Beta	790		11	3	4		80B
Tritium	10028-17-8	770		220	300	400		H
Strontium 90	10098-97-2	-0.17	U	0.14	0.2	2	U	Y
Technetium 99	14133-76-7	1200		45	9	5		TC
Total Uranium (ug/L)	7440-61-1	1.5		0.22	0.01	0.1		U_T
Plutonium 238	13981-16-3	0.017	UJ	0.026	0.05	0.05	U	PU
Plutonium 239/240		0.004	U	0.017	0.04	0.05	U	PU
GAMMA SCAN ANALYTES		U						
Sodium 22	13966-32-0	U			10		U	GAM
Potassium 40	13966-00-2	U			200		U	GAM
Manganese 54	13966-31-9	U			10		U	GAM
Iron 59	14596-12-4	U			30	30	U	GAM
Cobalt 58	13981-38-9	U			10	20	U	GAM
Cobalt 60	10198-40-0	36		13		20		GAM
Niobium 94	14681-63-1	U			10		U	GAM
Ruthenium 103	13968-53-1	U			20		U	GAM
Ruthenium 106	13967-48-1	U			100		U	GAM
Tin 113	13966-06-8	U			10		U	GAM
Cesium 134	13967-70-9	U			10		U	GAM
Cesium 137	10045-97-3	U			10	20	U	GAM
Cerium 144	14762-78-8	U			60		U	GAM
Europium 152	14683-23-9	U			20	40	U	GAM
Europium 154	15585-10-1	U			20	40	U	GAM
Europium 155	14391-16-3	U			30	40	U	GAM
Radium 226	13982-63-3	U			20		U	GAM
Radium 228	15262-20-1	U			50		U	GAM
Thorium 228	14274-82-9	U			20		U	GAM

verified aj 2/1/95

Lab id TMANC
Protocol WHC-HASM-1
Version Ver 1.0
Form DVD-DS
Version 3.04
Report date 12/16/94

TMA/RICHMOND

SAMPLE DELIVERY GROUP 7417

N410084-01

DATA SHEET, cont

B0D4N2

SDG	7417	Client	Westinghouse Hanford
Contact	N. Joseph Verville	Contract	MBH-SVV-069262
Lab sample id	N410084-01	Client sample id	B0D4N2
Dept sample id	7417-001	Location/Matrix	200 Areas LIQUID
Received	10/18/94	Collected	10/14/94
		Custody/SAF no	EFL-1125 B94-036

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Thorium 232	7440-29-1	U		50		U	GAM

Lab id	TMANC
Protocol	WHC-HASM-1
Version	Ver 1.0
Form	DVD-DS
Version	3.04
Report date	12/16/94

ATTACHMENT 4

LABORATORY NARRATIVE and CHAIN-OF-CUSTODY DOCUMENTATION

TMA/Richmond

Report N4-10-084-7417
Sample Delivery Group 7417

Westinghouse Hanford Company
P.O. MBH-SVV-069262

Case Narrative

December 16, 1994

1.0 GENERAL

TMA/Richmond Sample Delivery Group 7417 is comprised of the two liquid samples designated as SAF B94-036 delivered under field logbook No. EFL-1125.

2.0 ANALYSIS NOTES

2.1 Gross Alpha Analyses

The relative percent difference in the results for sample B0D4N2 and the duplicate analysis was 200%, greater than the 3σ limit of 83%. The original and duplicate samples were recounted and the results confirmed.

2.2 Gross Beta Analyses

No problems were encountered with the analyses.

2.3 Tritium Analyses

No problems were encountered with the analyses.

2.4 Strontium-90 Analyses

No problems were encountered with the analyses.

2.5 Technetium-99 Analyses

All samples , except the reagent blank were counted for less than the required 50 minutes and as a result the sample MDA's were greater than the RDL. Both samples and the laboratory control sample contained technetium activity much greater than the RDL therefore the elevated MDA's are not considered a problem. The recovery for the laboratory control sample was 83%, outside the 3σ limit of 84-116%, but within the Westinghouse Hanford guidelines of 80-120%.

2.6 Total Uranium Analyses

No problems were encountered with the analyses.

2.7 Isotopic Plutonium Analyses

Sample B0D4N2 was counted for less than the required 700 minutes. The sample MDA was less than the RDL despite the short count time.

2.8 Gamma Scan Analyses

The MDA's for cobalt-58, iron-59, and europium-155 were greater than the RDL's.

TMA/Richmond

Report N4-10-106-7418
Sample Delivery Group 7418

Bechtel Hanford Company
P.O. MBH-SVV-069262

Case Narrative

December 15, 1994

1.0 GENERAL

TMA/Richmond Sample Delivery Group 7418 is comprised of one water sample designated as SAF B94-036. Delivered under field logbook No. EFL-1020. There was no unique Chain-of-Custody ID provided.

Seven 1 L poly bottles, and one 250 mL amber glass bottle containing the samples were received for analyses.

2.0 ANALYSIS NOTES

2.1 Gross Alpha Analyses

No problems were encountered with the analyses.

2.2 Gross Beta Analyses

The relative percent difference in the results for the sample and its duplicate analysis was 45%, greater than the 3σ total limit of 33%.

2.3 Tritium Analyses

No problems were encountered with the analyses.

2.4 Strontium-90 Analyses

No problems were encountered with the analyses.

2.5 Technetium-99 Analyses

The MDA's of the sample, the laboratory control sample, and the duplicate analysis were greater than the RDL due to short count times. The MDA of the reagent blank was less than the RDL. Given the activities of the laboratory control sample and the sample itself the elevated MDA's are not considered a problem.

2.6 Total Uranium Analyses

No problems were encountered with the analyses.

2.7 Plutonium-239/240 Analyses

The MDA of the laboratory control sample was slightly greater than the RDL however, given the level of activity in the LCS the elevated MDA is not considered a problem.

TMA/Richmond
Report N4-10-106-7418
Sample Delivery Group 7418

Bechtel Hanford Company
P.O. MBH-SVV-069262

Case Narrative

December 15, 1994

2.0 ANALYSIS NOTES (cont.)

2.8 Gamma Scan Analyses
The MDA's of iron-59, cobalt-58, and europium-155 were greater than the RDL.

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Data Turnaround: [ ] Priority [X] Normal

Collector: A Rizzo	Company Contact: PH BUTCHER	Telephone No.: 509-376-4388
Project Designation: 200-BP-5	Sampling Location: 200 Areas	SAF No.: B94-036
Ice Chest No.: GWS-130	Field Logbook No.: EFL-1020	Method of Shipment: EMERY
Shipped To: TMA	Offsite Property No.: W95-0-0001-30	Bill of Lading/Air Bill No.: ~~140213517~~ 520302591 BW 10-24-94
Possible Sample Hazards/Remarks		
Special Handling and/or Storage: COOL TO 4 DEGREES CENTIGRADE		

	Preservative	HNO3<2	COOL 4	COOL 4	COOL 4	NaOH>12	HNO3 <2		HCl <2			HNO3<2				
	Type of Container	P/G	G	P/G	P	P	G/P	Gs	G/P			P/G				
	No. of Container(s)	1	1	1	1	1	6	1	1			1				
	Volume	1000ml	500ml	250ml	500ml	1000ml	1000ml	250ml	1000ml			1000ml				
SAMPLE ANALYSIS		METALS (see S. I. #1) UNFILTERED	IC ANIONS-F,Cl, SO4,NO2 PO4	ALKALI-NITY	TDS	CLP-CYANIDE	GROSS ALPHA/BETA, (see S. I. #2)	TRITIUM	Tc-99			METALS (see S. I. #3) FILTERED				

Sample No.	Matrix*	Date Sampled	Time Sampled														
B0 D4P0	W	10-21-94	0920	X	X	X	X	X	X	X	X						
B0 D4P1	W	10-21-94	0920									X					

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
A G Rizzo	10-21-94 1045	B. Butcher	10-21-94 1045
B. Butcher	10-24-94 0840		10-25-94 12:50

SPECIAL INSTRUCTIONS

#1: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(UNFILTERED)
#2: GROSS ALPHA/BETA;GAMMA SCAN-Cs-137,Co-60,Ru-106;Pu238/239/240, Sr-90,TOTAL URANIUM
#3: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(FILTERED)

NOTE: DATA DELIVERABLE-STANDALONE

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
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

DISTRIBUTION: Original- Sample Yellow - Sampler

BC-6000-82B (12/92)

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Data Turnaround: [ ] Priorty [X] Normal

Collector: A J SIMPSON	Company Contact: PH BUTCHER	Telephone No.: 509-376-4388
Project Designation: 200-BP-5	Sampling Location: 200 Areas	SAF No.: B94-036
Ice Chest No.: Oumby	Field Logbook No.: EFL-1125	Method of Shipment: EMERY
Shipped To: TMA	Offsite Property No.: W95-0-0001-17	Bill of Lading/Air Bill No.: 1402135416
Possible Sample Hazards/Remarks		

SAMPLE ANALYSIS																
			Preservative	HNO3<2	COOL 4	COOL 4	COOL 4	NaOH>12	HNO3 <2		HCl <2			HNO3<2		
			Type of Container	P/G	G	P/G	P	P	G/P	Gs	G/P			P/G		
			No. of Container(s)	1	1	1	1	1	6	1	1			1		
Special Handling and/or Storage: COOL TO 4 DEGREES CENTIGRADE			Volume	1000ml	500ml	250ml	500ml	1000ml	1000ml	250ml	1000ml			1000ml		
				METALS (see S. I. #1) UNFIL-TERED	IC ANIONS-F,Cl, SO4,NO2 PO4	ALKALI-NITY	TDS	CLP-CYANIDE	GROSS ALPHA/ BETA, (see S. I. #2)	TRITIUM	Tc-99			METALS (see S. I. #3) FILTER-ED		
Sample No.	Matrix*	Date Sampled	Time Sampled													
B0 D4N2	W	10/14/94	0932	X	X	X	X	X	X	X	X					
B0 D4N3	W	10/14/94	0932											X		

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By	Date/Time	Received By	Date/Time
K Lee			1345
K Lee	10/14/94 1345	BUTCHER	10-14-94
Relinquished By	Date/Time	Received By	Date/Time
BUTCHER	10 17 94 0840		10-18-94 11:00
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

#1: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(UNFILTERED)
#2: GROSS ALPHA/BETA;GAMMA SCAN-Cs-137,Co-60,Ru-106;Pu238/239/240, Sr-90,TOTAL URANIUM
#3: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(FILTERED)

NOTE: DATA DELIVERABLE-STANDALONE

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
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

DISTRIBUTION: Original- Sample Yellow - Sampler

BC-6000-828 (12/92)

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Data Turnaround: [ ] Priority [X] Normal

Collector: K.O. Lee	Company Contact: PH BUTCHER	Telephone No.: 509-376-4388
Project Designation: 200-BP-5	Sampling Location: 200 Areas	SAF No.: B94-036
Ice Chest No.: GWS 029	Field Logbook No.: TEFL-1125	Method of Shipment: EMERY
Shipped To: TMA	Offsite Property No.: W95-0-0001-23	Bill of Lading/Air Bill No.: 1402135108

Possible Sample Hazards/Remarks:

Sample No.	Matrix*	Date Sampled	Time Sampled	HNO3<2	COOL 4	COOL 4	COOL 4	NaOH>12	HNO3 <2		HCl <2			HNO3<2				
Type of Container				P/G	G	P/G	P	P	G/P	Gs	G/P			P/G				
No. of Container(s)				1	1	1	2	1	6	1	1			1				
Volume				1000ml	500ml	250ml	500ml	1000ml	1000ml	~~250ml~~ 500ml	1000ml			1000ml				
SAMPLE ANALYSIS				METALS (see S. I. #1) UNFILTERED	IC ANIONS-F,Cl, SO4,NO2 PO4	ALKALINITY	TDS	CLP-CYANIDE	GROSS ALPHA/BETA, (see S. I. #2)	TRITIUM	Tc-99			METALS (see S. I. #3) FILTERED				
BO DYN6	W	10/19/94	0547	X	X	X	X	X	X	X	X							
BO DYN7	W	10/19/94	0547											X				

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By: K.O. Lee	Date/Time: 10/19/94 1250	Received By: B Whitten	Date/Time: 1230 10-19-94
Relinquished By: B Whitten	Date/Time: 0800 10-20-94	Received By: [illegible]	Date/Time: 10-24-94 11:00AM
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

#1: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(UNFILTERED)
#2: GROSS ALPHA/BETA;GAMMA SCAN-Cs-137,Co-60,Ru-106;Pu238/239/240, Sr-90,TOTAL URANIUM
#3: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(FILTERED)

NOTE: DATA DELIVERABLE-STANDALONE

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
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

DISTRIBUTION: Original- Sample Yellow - Sampler

BC-6000-828 (12/92)

ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E

PROJECT: 200-BP-5	DATA PACKAGE: BOD4N2
VALIDATOR: A. Jensen / LAB: Thermo Analytical	DATE: 2/1/95
CASE:	SDG:

ANALYSES PERFORMED

☒ Gross Alpha/Beta	☒ Strontium-90	☒ Technetium-99	☒ Alpha Spectroscopy	☒ Gamma Spectroscopy	
☒ Total Uranium	☐ Radium-22	☒ Tritium	☐		

SAMPLES/MATRIX
BOD4N2
BOD4N6
BOD4PO / ALL 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? . . . . . Yes No N/A
Field blank(s) analyzed? . . . . . Yes No N/A
Field blank results acceptable? . . . . . Yes No N/A
Analytes detected in field blank(s)? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments:_____

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:_____

025

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 ① . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments: ① The RPD for gross alpha was outside control limits. Data qualification was applied to all three samples: "J". The RPD for gross beta was outside control limits. Data qualification was applied to sample B0S4P0: "J".

026

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 (2) . (Yes) No ~~(N/A)~~ 2/9/95
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: (2) A comparison of field 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? . . . See note (3) . . Yes (No) N/A
Transcription/calculation errors? . . . . See note (4) . . (Yes) No N/A

Comments: (3) The laboratory stated in the case narrative that the MDA's exceeded the RDL's for technetium-99, Iron-59, cobalt-58 and europium-155. There is no detection limit requirement for iron-59, or cobalt-58. Data qualification is not required.
(4) The MDA could not be verified by recalculation for Pu-238. Data qualification is applied to samples BOD4N6 and BOD4N2: "UJ".

revised 2/9/95

027

HOLDING TIME SUMMARY

SDG: BOD4N2 | VALIDATOR: A. Jensen | DATE: 2/01/94 | 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
BOD4N2	Gross Alpha	10/14/94	N/A	12/03/94	N/A	≤ 180	NONE
BOD4PO	↓	10/21/94	↓	12/01/94	↓	↓	↓
BOD4N2	Gross Beta	10/14/94	↓	12/03/94	↓	↓	↓
BOD4PO	↓	10/21/94	↓	12/01/94	↓	↓	↓
BOD4N2	Gamma	10/14/94	↓	11/15/94	↓	↓	↓
BOD4PO	↓	10/21/94	↓	11/16/94	↓	↓	↓
BOD4N2	Tritium	10/14/94	11/21/94	11/22/94	≤ 7	↓	↓
BOD4PO	↓	10/21/94	11/21/94	11/22/94	≤ 7	↓	↓
BOD4N2	Alpha spec	10/14/94	N/A	12/02/94	N/A	↓	↓
BOD4PO	↓	10/21/94	↓	12/07/94	↓	↓	↓
BOD4N2	Technetium-99	10/14/94	↓	11/22/94	↓	↓	↓
BOD4PO	↓	10/21/94	↓	11/22/94	↓	↓	↓
BOD4N2	Total Uranium	10/14/94	↓	11/30/94	↓	↓	↓
BOD4PO	↓	10/21/94	↓	11/30/94	↓	↓	↓
BOD4N2	Strontium	10/14/94	↓	11/29/94	↓	↓	↓
BOD4PO	↓	10/21/94	↓	11/30/94	↓	↓	↓

HOLDING TIME SUMMARY

SDG: BOD4N2 | VALIDATOR: A. Jensen | DATE: 2/01/94 | 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
BOD4N6	Gross Alpha	10/19/94	N/A	11/21/94	N/A	≤ 180	NONE
	Gross Beta			11/21/94			
	Gamma spec			11/15/94			
	Tritium		11/21/94	11/22/94	≤ 7		
	Alpha spec		N/A	11/28/94	N/A		
	Technetium-99			11/23/94			
	Total Uranium			11/30/94			
	Strontium			11/29/94			

Gross Alpha/Beta	
Sample ID	B0D4N6
Detector	2
Aliquot	0.30
Count time	100
Alpha cpm	1.09
Alpha, Bkgd	0.04
Alpha, Xtalk	0.006
Alpha, Eff	0.091
Alpha Result Calc.	5.1
Alpha Result Rptd.	5.2
Alpha MDA Calc.	2
Alpha MDA Rptd.	2
Beta cpm	124.39
Bkgd	1.41
Xtalk	0.311
Eff	0.41
Beta Result Calc.	451
Beta Result Rptd	455
Beta MDA Calc	2
Beta MDA rptd	2

Tritium	
Sample ID	B0D4N6
Detector	5
Gross Counts	293
Count Time	50
Sample Amount	0.01
Bkgd cpm	3.32
Decay Factor	0.99479
Detector Eff.	0.189
Yield	1
Result Calc.	609
Result Rptd	610
MDA Calc.	288
MDA Rptd.	300

Technetium 99	
Sample ID	B0D4N6
Detector	211
Aliquot	0.200
P-Factor	2.445
Yield	0.439
Days	33.703
Lambda	8.91E-09
Decay	1.0000
Net, cpm	54.770
Count, time	28.000
Bkg., cpm	0.400
Result, calc.	688
Result, rptd.	690
MDA, calc.	7
MDA, rptd.	7

Strontium 90	
Sample ID	B0D4N6
Detector	205
Bkg	0.4323
Count Time	400.000
Y90 cpm	0.000
Elapsed Time, days	40.550
Lambda	6.86E-05
Decay	0.9972
Yield	0.8242
PPT. corr.	1
Aliquot	1
Product	0.8219
C-zero	0.0000
P-Factor	1.859
Result, calc.	0.000
Result, rptd.	0.000
MDA, calc.	0.2
MDA, rptd.	0.2

Plutonium 238/239	
Sample ID	B0D4N6
Detector	63
Count time	1262.32
Corr, tracer dpm	39.6
Bkgd, count time	2322.33
Net, tracer counts	9496
Detector Eff	0.3873
Yield	0.490
Aliquot	1
Pu239, gross counts	3
Pu239, bkgd counts	2
Pu239 decay	1
Pu238, gross counts	3
Pu238, bkgd counts	5
Pu238 decay	0.9991
Pu239, Result calc.	0.002
Pu239, Result rptd	0.002
Pu239, MDA calc.	0.02
Pu239, MDA rptd.	0.02
Pu238, Result calc.	-0.004
Pu238, Result rptd.	-0.004
Pu238, MDA calc.	0.020
Pu238, MDA rptd	0.030

Total Uranium	Standard	Intensity			Calc	Rptd
	0.049	1970	Sample ID	Intens.	Result	Rslt
	0.156	3970	B0D4N2	35738	1.6	1.5
	0.521	12437	B0D4N6	56573	2.5	2.4
	0.976	22600	QC-LCS	55931	24	24
	2.603	59586	QC-BLANK	-119	-0.0	0.0
	4.881	109812	B0D4N2-D	36377	1.6	1.5
	16.27	238741				
Slope:	4.4E-05					

aj replaced 2/9/95

N410084-05

TMA/RICHMOND

SAMPLE DELIVERY GROUP 7417

DUPLICATE

B0D4N2

SDG 7417
Contact N. Joseph Verville
Client Westinghouse Hanford
Contract MBH-SVV-069262

DUPLICATE
Lab sample id N410084-05
Dept sample id 7417-005

ORIGINAL
Lab sample id N410084-01
Dept sample id 7417-001
Received 10/18/94

Client sample id B0D4N2
Location/Matrix 200 Areas LIQUID
Collected 10/14/94
Custody/SAF no EFL-1125 B94-036

ANALYTE	DUPLICATE pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST	ORIGINAL pCi/L	2σ ERR (COUNT)	MDA pCi/L	QUALI-FIERS	RPD %	3σ PROT TOT LIMIT
Gross Alpha	-0.32	3.0	2	3	U	80A	31	5.2	2		200	83
Gross Beta	820	11	2	4		80B	790	11	3		4	32
Tritium	440	170	300	400		H	770	220	300		55	72
Strontium 90	-0.016	0.28	0.2	2	U	Y	-0.17	0.14	0.2	U	-	
Technetium 99	1300	41	8	5		TC	1200	45	9		8	23
Total Uranium (ug/L)	1.5	0.23	0.01	0.1		U_T	1.5	0.22	0.01		0	38
Plutonium 238	-0.003	0.005	0.01	0.05	U	PU	0.017	0.026	0.05	U	-	
Plutonium 239/240	-0.003	0.005	0.01	0.05	U	PU	0.004	0.017	0.04	U	-	
GAMMA SCAN ANALYTES	U						U					
Sodium 22	U		10		U	GAM	U		10	U	-	
Potassium 40	U		300		U	GAM	U		200	U	-	
Manganese 54	U		10		U	GAM	U		10	U	-	
Iron 59	U		50	30	U	GAM	U		30	U	-	
Cobalt 58	U		20	20	U	GAM	U		10	U	-	
Cobalt 60	25	15		20		GAM	36	13			36	103
Niobium 94	U		20		U	GAM	U		10	U	-	
Ruthenium 103	U		20		U	GAM	U		20	U	-	
Ruthenium 106	U		100		U	GAM	U		100	U	-	
Tin 113	U		20		U	GAM	U		10	U	-	
Cesium 134	U		10		U	GAM	U		10	U	-	
Cesium 137	U		20	20	U	GAM	U		10	U	-	
Cerium 144	U		70		U	GAM	U		60	U	-	
Europium 152	U		30	40	U	GAM	U		20	U	-	
Europium 154	U		20	40	U	GAM	U		20	U	-	
Europium 155	U		40	40	U	GAM	U		30	U	-	
Radium 226	U		30		U	GAM	U		20	U	-	
Radium 228	U		60		U	GAM	U		50	U	-	
Thorium 228	U		20		U	GAM	U		20	U	-	

The RPD for gross alpha is outside the control limits. Data qualification is applied to samples B0D4N2 & B0D4N6: "J".

~~J 13~~

aj 2/1/95

Lab id TMANC
Protocol WHC-HASM-1
Version Ver 1.0
Form DVD-DUP
Version 3.04
Report date 12/16/94

N410106-04

TMA/RICHMOND

SAMPLE DELIVERY GROUP 7418

DUPLICATE

B0D4P0

SDG 7418
Contact N. Joseph Verville
Client Westinghouse Hanford
Contract MBH-SVV-069262

DUPLICATE
Lab sample id N410106-04
Dept sample id 7418-004

ORIGINAL
Lab sample id N410106-01
Dept sample id 7418-001
Received 10/25/94

Client sample id B0D4P0
Location/Matrix 200 Areas LIQUID
Collected 10/21/94
Chain of custody id EFL-1020

ANALYTE	DUPLICATE pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST	ORIGINAL pCi/L	2σ ERR (COUNT)	MDA pCi/L	QUALI-FIERS	RPD %	3σ PROT TOT LIMIT
Gross Alpha	46	8.2	2	3		80A	70	7.9	2		41	52
Gross Beta	1900	17	2	4		80B	1200	14	2		45	33
Tritium	4200	320	300	400		H	4500	330	300		7	27
Strontium 90	0	0.45	0.2	2	U	Y	-0.002	0.35	0.3	U	-	
Technetium 99	3700	57	10	5		TC	3400	120	20		8	22
Total Uranium (ug/L)	3.5	0.52	0.01	0.1		U_T	3.4	0.51	0.01		3	37
Plutonium 238	-0.009	0.006	0.02	0.05	U	PU	-0.004	0.018	0.03	U	-	
Plutonium 239/240	0	0.006	0.02	0.05	U	PU	-0.001	0.006	0.02	U	-	
GAMMA SCAN ANALYTES	U						U					
Sodium 22	U		20		U	GAM	U		10	U	-	
Potassium 40	U		200		U	GAM	U		200	U	-	
Manganese 54	U		10		U	GAM	U		10	U	-	
Iron 59	U		40	30	U	GAM	U		40	U	-	
Cobalt 58	U		10	20	U	GAM	U		10	U	-	
Cobalt 60	78	20		20		GAM	61	19			24	68
Niobium 94	U		10		U	GAM	U		10	U	-	
Ruthenium 103	U		20		U	GAM	U		20	U	-	
Ruthenium 106	U		100		U	GAM	U		100	U	-	
Tin 113	U		10		U	GAM	U		20	U	-	
Cesium 134	U		10		U	GAM	U		10	U	-	
Cesium 137	U		10	20	U	GAM	U		10	U	-	
Cerium 144	U		60		U	GAM	U		60	U	-	
Europium 152	U		20	40	U	GAM	U		30	U	-	
Europium 154	U		20	40	U	GAM	U		20	U	-	
Europium 155	U		30	40	U	GAM	U		40	U	-	
Radium 226	U		30		U	GAM	U		30	U	-	
Radium 228	U		60		U	GAM	U		60	U	-	
Thorium 228	U		20		U	GAM	U		20	U	-	

The RPD's for gross alpha and gross beta are outside the control limits. Data qualification is applied to sample B0D4P0: "J"

Lab id TMANC
Protocol WHC-HASM-1
Version Ver 1.0
Form DVD-DUP
Version 3.04
Report date 12/14/94

DUPLICATES
Page 1
SUMMARY DATA SECTION
Page 12

~~10~~ aj 2/1/95

N410106-04

TMA/RICHMOND

SAMPLE DELIVERY GROUP 7418

DUPLICATE, cont.

B0D4P0

SDG 7418
Contact N. Joseph Verville
Client Westinghouse Hanford
Contract MBH-SVV-069262

DUPLICATE
Lab sample id N410106-04
Dept sample id 7418-004

ORIGINAL
Lab sample id N410106-01
Dept sample id 7418-001
Received 10/25/94

Client sample id B0D4P0
Location/Matrix 200 Areas LIQUID
Collected 10/21/94
Chain of custody id EFL-1020

ANALYTE	DUPLICATE pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST	ORIGINAL pCi/L	2σ ERR (COUNT)	MDA pCi/L	QUALI-FIERS	RPD %	3σ TOT	PROT LIMIT
Thorium 232	U		60		U	GAM	U		60	U	-		

QC 22106-22112 DUP #1

Lab id TMANC
Protocol WHC-HASM-1
Version Ver 1.0
Form DVD-DUP
Version 3.04
Report date 12/14/94

RECORD COPY

MEMORANDUM

FEB 1995

[redacted]

TO: 200-BP-5 Round 2 Groundwater Project QA Record January 30, 1995

FR: Anne Jensen, Golder Associates Inc. aj

RE: INORGANIC DATA VALIDATION SUMMARY FOR DATA PACKAGE BOD4N2-TMA (943-1610.062 4N2INO.BP5)

INTRODUCTION

This memo presents the results of data validation on data package BOD4N2-TMA prepared by Thermo Analytical Inc. Sample information is provided in the following table.

SAMPLE ID	COMMENTS	ANALYSIS	MEDIA
BOD4N2	FIELD SPLIT	SEE ATTACHMENT 4	WATER
BOD4N3	FIELD SPLIT		WATER
BOD4N6*	FIELD SPLIT		WATER
BOD4N7*	FIELD SPLIT		WATER
BOD4P0	FIELD SPLIT		WATER
BOD4P1	FIELD 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, with the exception of the minor deficiencies noted below.

Accuracy. Goals for accuracy were met, with the exception of the minor deficiencies noted 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. Six samples were validated in this data package with a total of sixty-three determinations reported, all of which were deemed valid. This results in a completeness of 100%, which meets the 90% objective of the work plan.

MAJOR DEFICIENCIES

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

MINOR DEFICIENCIES

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

Laboratory Blanks

- The initial calibration blank for aluminum was unacceptable. Attachments 2 and 5 provide a summary of the samples affected, data qualifications applied and supporting documentation.

- The preparation blanks for iron, aluminum and selenium were unacceptable. Attachments 2 and 5 provide a summary of samples affected, data qualifications applied and supporting documentation.

Matrix Spike Recovery

- The matrix spike recovery for silicon was unacceptable. Attachments 2 and 5 provide a summary of samples affected, data qualifications applied and supporting documentation.

Laboratory Control Sample Recovery

- The percent recovery for silicon in the laboratory control sample (LCS) was unacceptable. Attachments 2 and 5 provide a summary of the samples affected, data qualifications applied and supporting documentation.

ICP Serial Dilution

- The ICP serial dilution percent difference (%D) for potassium was unacceptable. Attachments 2 and 5 provide a summary of the samples affected, data qualifications applied and supporting documentation.

FIELD QC

- Samples BOD4N2/BOD4N3 were identified as the field splits of samples BOD4G0/BOD4G1 respectively. All relative percent differences (RPD's) were within control limits, with the exception of cyanide.

aj replaced 2/13/95

- Samples BOD4N6/BOD4N7 were identified as the field splits of samples BOD4L4/BOD4L5 respectively. All RPD's were within control limits.

- Samples BOD4P0/BOD4P1 were identified as the field splits of samples BOD4K6/BOD4K7 respectively. All RPD's were within control limits, with the exception of iron and potassium.

Data qualification is not required for field QC. Attachment 5 provides a summary of the results.

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.

cj replaced 2/13/95

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.

ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

DATA QUALIFICATION SUMMARY - FORM B-7

SDG:BOD4N2	REVIEWER: A. JENSEN	DATE: 1-30-95	PAGE 1 OF 1
COMMENTS: INORGANICS			
COMPOUND/ANALYTE	QUALIFIER	SAMPLES AFFECTED	REASON
ALUMINUM	U	BOD4P0	DETECTED IN CALIBRATION BLANK
ALUMINUM	U	BOD4N3	DETECTED IN PREPARATION BLANK
IRON	U	BOD4N3 BOD4N7 BOD4P1	DETECTED IN PREPARTATION BLANK
SELENIUM	J	BOD4N6 BOD4P0	DETECTED IN PREPARATION BLANK
POTASSIUM	J	BOD4N2	ICP SERIAL DILUTION %D OUTSIDE CONTROL LIMITS
SILICON	J	BOD4N7 BOD4P1	MATRIX SPIKE RECOVERY OUTSIDE CONTROL LIMITS
SILICON	J	BOD4N2 BOD4N3	LABORATORY CONTROL SAMPLE RECOVERY IS OUTSIDE CONTROL LIMITS

aj replaced 2/13/95

007

ATTACHMENT 3

QUALIFIED DATA SUMMARY and ANNOTATED LABORATORY REPORTS

Validated Data Summary, Data Package: B0D4N2-TMA

	Samp#	B0D4N2		B0D4N3		B0D4N6		B0D4N7		B0D4P0		B0D4P1	
	Date	10-14-94		10-14-94		10-19-94		10-19-94		10-21-94		10-21-94	
	Location	299-E33-12		299-E33-12		699-53-55C		699-53-55C		699-52-54		699-52-54	
	Depth	---		---		---		---		---		---	
	Type	WATER		WATER		WATER		WATER		WATER		WATER	
	Comments	SPLIT		SPLIT		SPLIT		SPLIT		SPLIT		SPLIT	
Parameter	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
ALUMINUM	UG/L	16.600	U	46.400	U	16.600	U	16.600	U	115.000	U	16.600	U
CALCIUM	UG/L	28900.000		30100.000		58300.000		59400.000		88900.000		87100.000	
IRON	UG/L	132.000		24.600	U	38.800	B	60.600	U	554.000		91.500	U
MAGNESIUM	UG/L	8430.000		9010.000		16600.000		16900.000		26900.000		26300.000	
MANGANESE	UG/L	0.900	U	2.400	B	0.900	U	0.900	U	9.900	B	0.900	U
POTASSIUM	UG/L	7720.000	J	8490.000		7760.000		7630.000		10100.000		10000.000	
SELENIUM	UG/L	3.100	B	3.900	B	8.500	J	8.300		11.200	J	13.100	
SODIUM	UG/L	21000.000		22100.000		25300.000		26000.000		41200.000		41900.000	
CYANIDE	UG/L	39.500		---		58.000		---		164.000		---	
SILICON	UG/L	26000.000	J	27700.000	J	17400.000		18700.000	J	16300.000		17000.000	J
BISMUTH	UG/L	387.000	U	387.000	U	387.000	U	387.000	U	387.000	U	387.000	U

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

replaced 2/13/95

008

verified 2/13/95

replaced 2/13/95

009

WESTINGHOUSE/HANFORD
1

SAMPLE NUMBER:

INORGANIC ANALYSIS DATA SHEET

B0D4N2

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D2-0039

Lab Code: SKINER Case No.: N4-10-082SAS No.: SDG No.: B0D4N2

Matrix (soil/water): WATER Lab Sample ID: 10138-01S

Level (low/med): LOW Date Received: 10/20/94

% Solids: 0.0

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

CAS No.	Analyte	Concentration	C	Q	M	Q
7429-90-5	Aluminum	16.6	U		P	
7440-70-2	Calcium	28900			P	
7439-89-6	Iron	132			P	
7439-95-4	Magnesium	8430			P	
7439-96-5	Manganese	0.90	U		P	
7440-09-7	Potassium	7720		E	P	J
7782-49-2	Selenium	3.1	B		P	
7440-23-5	Sodium	21000			P	
	Cyanide	39.5			CA	~~J~~ aj 2/9/95
7440-21-3	Silicon	26000			P	J
7440-69-9	Bismuth	387	~~U~~		A	~~UJ~~ V aj 2/13/95

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

verified gf 1/27/95

~~U02~~

revised 2/9/95

FORM I - IN ILM02.1

revised 2/15/95

WESTINGHOUSE/HANFORD
1

SAMPLE NUMBER:

INORGANIC ANALYSIS DATA SHEET

B0D4N3

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D2-0039

Lab Code: SKINER Case No.: N4-10-082SAS No.: SDG No.: B0D4N3

Matrix (soil/water): WATER Lab Sample ID: 10139-01S

Level (low/med): LOW Date Received: 10/20/94

% Solids: 0.0

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

CAS No.	Analyte	Concentration	C	Q	M	Q
7429-90-5	Aluminum	46.4	~~B~~		P	U
7440-70-2	Calcium	30100			P	
7439-89-6	Iron	24.6	~~B~~		P	U
7439-95-4	Magnesium	9010			P	
7439-96-5	Manganese	2.4	B		P	
7440-09-7	Potassium	8490			P	
7782-49-2	Selenium	3.9	B		P	
7440-23-5	Sodium	22100			P	
	Cyanide				NR	
7440-21-3	Silicon	27700			P	J
7440-69-9	Bismuth	387	~~U~~		A	~~UJ~~ U aj 2/13/95

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

verified aj 1/27/95

~~U02~~

~~Revised 2/9/95~~ aj

FORM I - IN ILM02.1

revised 2/13/95

INORGANIC ANALYSIS DATA SHEET

SAMPLE NUMBER: B0D4N6

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D2-0039

Lab Code: SKINER Case No.: N4-10-102SAS No.: SDG No.: B0D4N6

Matrix (soil/water): WATER Lab Sample ID: 10161-01S

Level (low/med): LOW Date Received: 10/25/94

% Solids: 0.0

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

CAS No.	Analyte	Concentration	C	Q	M	Q
7429-90-5	Aluminum	16.6	U		P	
7440-70-2	Calcium	58300			P	
7439-89-6	Iron	38.8	B		P	
7439-95-4	Magnesium	16600			P	
7439-96-5	Manganese	0.90	U		P	
7440-09-7	Potassium	7760			P	
7782-49-2	Selenium	8.5			P	J
7440-23-5	Sodium	25300			P	
	Cyanide	58.0			CA	~~B~~ aj 2/9/95
7440-21-3	Silicon	17400			P	
7440-69-9	Bismuth	387	~~B~~		A	~~B~~ U aj 2/13/95

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

verified aj 1/27/95

revised 2/9/95

revised 2/13/95

WESTINGHOUSE/HANFORD
1

SAMPLE NUMBER:

INORGANIC ANALYSIS DATA SHEET

BOD4N7

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D2-0039

Lab Code: SKINER Case No.: N4-10-102SAS No.: SDG No.: BOD4N7

Matrix (soil/water): WATER Lab Sample ID: 10160-01S

Level (low/med): LOW Date Received: 10/25/94

% Solids: 0.0

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

CAS No.	Analyte	Concentration	C	Q	M	Q
7429-90-5	Aluminum	16.6	U		P	
7440-70-2	Calcium	59400			P	
7439-89-6	Iron	60.6	~~B~~		P	U
7439-95-4	Magnesium	16900			P	
7439-96-5	Manganese	0.90	U		P	
7440-09-7	Potassium	7630			P	
7782-49-2	Selenium	8.3			P	
7440-23-5	Sodium	26000			P	
	Cyanide				NR	
7440-21-3	Silicon	18700			P	J
7440-69-9	Bismuth	387	~~B~~		A	~~U~~ U cy 3/13/95

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

verified cy 1/27/95

FORM I - IN ILM02.1 2

revised 3/13/95

WESTINGHOUSE/HANFORD
1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NUMBER:

B0D4P0

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D2-0039

Lab Code: SKINER Case No.: N4-10-102SAS No.: SDG No.: B0D4N6

Matrix (soil/water): WATER Lab Sample ID: 10161-02S

Level (low/med): LOW Date Received: 10/25/94

% Solids: 0.0

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

CAS No.	Analyte	Concentration	C	Q	M	Q
7429-90-5	Aluminum	115	~~B~~		P	U
7440-70-2	Calcium	88900			P	
7439-89-6	Iron	554			P	
7439-95-4	Magnesium	26900			P	
7439-96-5	Manganese	9.9	B		P	
7440-09-7	Potassium	10100			P	
7782-49-2	Selenium	11.2			P	J
7440-23-5	Sodium	41200			P	
	Cyanide	164			CA	~~J~~ aj 2/9/95
7440-21-3	Silicon	16300			P	
7440-69-9	Bismuth	387	~~B~~		A	~~UJ~~ U aj 3/13/95

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

verified aj 1/27/95

revised 2/9/95

FORM I - IN ILM02.1

WESTINGHOUSE/HANFORD
1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NUMBER:

B0D4P1

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D2-0039

Lab Code: SKINER Case No.: N4-10-102SAS No.: SDG No.: B0D4N7

Matrix (soil/water): WATER Lab Sample ID: 10160-02S

Level (low/med): LOW Date Received: 10/25/94

% Solids: 0.0

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

CAS No.	Analyte	Concentration	C	Q	M	Q
7429-90-5	Aluminum	16.6	U		P	
7440-70-2	Calcium	87100			P	
7439-89-6	Iron	91.5	~~B~~		P	U
7439-95-4	Magnesium	26300			P	
7439-96-5	Manganese	0.90	U		P	
7440-09-7	Potassium	10000			P	
7782-49-2	Selenium	13.1			P	
7440-23-5	Sodium	41900			P	
	Cyanide				NR	
7440-21-3	Silicon	17000			P	J
7440-69-9	Bismuth	387	~~U~~		A	~~U~~ U 2/13/95

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

verified 2/1/95

FORM I - IN ILM02.1 ~~3~~

Reviewed 2/13/95

ATTACHMENT 4

LABORATORY NARRATIVE and CHAIN-OF-CUSTODY DOCUMENTATION

TMA
Thermo Analytical Inc.

300 Second Avenue
Post Office Box 521
Waltham, MA 02254-0521
(617) 890-7200
FAX (617) 890-3883

NOV 1994 RECEIVED

November 22, 1994

TMA/Richmond
2030 Wright Avenue
Richmond, CA 94804
Attention: Dan Stuermer

Quality Control Narrative

Scope
Two water samples were submitted to TMA/Waltham on October 25 and 26, 1994 from TMA/Richmond. The samples were analyzed for the elements listed on the chain of custody. The analysis was performed under TMA/Waltham work order S410160.

Methodology
The samples were prepared, analyzed and reported in accordance with the USEPA Contract Laboratory Program Statement of Work ILM02. Bismuth was analyzed by flame atomic absorption spectroscopy.

Discussion
All quality control requirements were met for the samples with no exceptions.

Please feel free to call if there are any questions concerning the data package.

Respectfully submitted,

TMA/WALTHAM

Steven Provencal

Steven R. Provencal
Metals Supervisor

RECORD COPY

1 Amm 12-21-94

017

TMA
Thermo Analytical Inc.

300 Second Avenue
Post Office Box 521
Waltham, MA 02254-0521
(617) 890-7200
FAX (617) 890-3883

RECORD COPY

NOV 1994
RECEIVED
Data
Log In

November 17, 1994

TMA/NORCAL
2030 Wright Avenue
Richmond, CA 94804
Attention: Dan Stuermer

Quality Control Narrative

Scope
One (1) water sample was submitted to TMA/Waltham on October 20, 1994 from TMA/Norcal. The sample was analyzed for the elements specified on the chain of custody. The analysis was performed under TMA/Waltham work order S410139.

Methodology
The sample was prepared, analyzed and reported in accordance with the USEPA Contract Laboratory Program ILM02. Bismuth was analyzed by flame atomic absorption spectroscopy.

Discussion
All quality control requirements were met for the sample with no exceptions.

Please feel free to call if there are any questions concerning the data package.

Respectfully submitted,

TMA/WALTHAM

Steven R. Provencal
Metals Supervisor

TMA
Thermo Analytical Inc.

300 Second Avenue
Post Office Box 521
Waltham, MA 02254-0521
(617) 890-7200
FAX (617) 890-3883

November 22, 1994

TMA/Richmond
2030 Wright Avenue
Richmond, CA 94804
Attention: Dan Stuermer

Quality Control Narrative

Scope
Two water samples were submitted to TMA/Waltham on October 25 and 26, 1994 from TMA/Richmond. The samples were analyzed for the elements listed on the chain of custody. The analysis was performed under TMA/Waltham work order S410160.

Methodology
The samples were prepared, analyzed and reported in accordance with the USEPA Contract Laboratory Program Statement of Work ILM02. Bismuth was analyzed by flame atomic absorption spectroscopy.

Discussion
All quality control requirements were met for the samples with no exceptions.

Please feel free to call if there are any questions concerning the data package.

Respectfully submitted,

TMA/WALTHAM

Steven Provencal

Steven R. Provencal
Metals Supervisor

RECORD COPY

TMA
Thermo Analytical Inc.

300 Second Avenue
Post Office Box 521
Waltham, MA 02254-0521
(617) 890-7200
FAX (617) 890-3883

RECORD COPY

NOV 1994
RECEIVED
Data
Log In

November 17, 1994

TMA/NORCAL
2030 Wright Avenue
Richmond, CA 94804
Attention: Dan Stuermer

Quality Control Narrative

Scope
One (1) water sample was submitted to TMA/Waltham on October 20, 1994 from TMA/Norcal. The sample was analyzed for the elements specified on the chain of custody. The analysis was performed under TMA/Waltham work order S410138.

Methodology
The sample was prepared, analyzed and reported in accordance with the USEPA Contract Laboratory Program ILM02. Bismuth was analyzed by flame atomic absorption spectroscopy.

Discussion
All quality control requirements were met for the sample with the following exceptions.

The ICP serial dilution for potassium exceeded the control limit requirements.

Please feel free to call if there are any questions concerning the data package.

Respectfully submitted,

TMA/WALTHAM
Steven Provencal
Steven R. Provencal
Metals Supervisor

1 for 12-2-94

000005

ARL1

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Data Turnaround: [ ] Priority [X] Normal

Collector: A Rizzo	Company Contact: PM BUTCHER	Telephone No.: 509-376-4388
Project Designation: 200-BP-5	Sampling Location: 200 Areas	SAF No.: 894-036
Ice Chest No.: GWS-130	Field Logbook No.: EFL 1020	Method of Shipment: EMERY BW 10-24-94
Shipped To: TMA	Offsite Property No.: W95-0-0001-30	Bill of Lading/Air Bill No.: ~~1402135174~~ 520302591
Possible Sample Hazards/Remarks		

	Preservative	HNO3<2	COOL 4	COOL 4	COOL 4	NaOH>12	HNO3 <2		HCl <2			HNO3<2				
	Type of Container	P/G	G	P/G	P	P	G/P	Gs	G/P			P/G				
	No. of Container(s)	1	1	1	1	1	6	1	1			1				
Special Handling and/or Storage: COOL TO 4 DEGREES CENTIGRADE	Volume	1000ml	500ml	250ml	500ml	1000ml	1000ml	250ml	1000ml			1000ml				
SAMPLE ANALYSIS		METALS (see S. I. #1) UNFILTERED	IC ANIONS-F,Cl, SO4,NO2 PO4	ALKALINITY	TDS	CLP-CYANIDE	GROSS ALPHA/BETA, (see S. I. #2)	TRITIUM	Tc-99			METALS (see S. I. #3) FILTERED				

Sample No.	Matrix*	Date Sampled	Time Sampled														
80 D4P0	W	10-21-94	0920	X	X	X	X	X	X	X	X						
80 D4P1	W	10-21-94	0920									X					

CHAIN OF POSSESSION	Sign/Print Names	Date/Time
Relinquished By	A G Rizzo	10-21-94 1045
Received By	Bu Whitten	10-21-94 1045
Relinquished By	Bu Whitten	10-24-94 0840
Received By		10-25-94 12:50
Relinquished By		
Received By		
Relinquished By		
Received By		

SPECIAL INSTRUCTIONS

#1: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(UNFILTERED)
#2: GROSS ALPHA/BETA;GAMMA SCAN-Cs-137,Co-60,Ru-106;Pu238/239/240, Sr-90,TOTAL URANIUM
#3: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(FILTERED)

NOTE: DATA DELIVERABLE-STANDALONE

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
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

DISTRIBUTION: Original-Sample Yellow - Sampler

BC-6000-828 (12/92)

021

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Data Turnaround: [ ] Priority [X] Normal

Collector: AJ Simpson	Company Contact: PM BUTCHER	Telephone No.: 509-376-4388
Project Designation: 200-BP-5	Sampling Location: 200 Areas	BAF No.: B96-036
Ice Chest No.: Dumby	Field Logbook No.: EFL-1125	Method of Shipment: EMERY
Shipped To: TMA	Offsite Property No.: W95-0-0001-17	Bill of Lading/Air Bill No.: 1402135416

Possible Sample Hazards/Remarks:

Special Handling and/or Storage: COOL TO 4 DEGREES CENTIGRADE

SAMPLE ANALYSIS

Sample No.	Matrix*	Date Sampled	Time Sampled	METALS (see S. I. #1) UNFILTERED	IC ANIONS-F,Cl,SO4,NO2,PO4	ALKALINITY	TDS	CLP-CYANIDE	GROSS ALPHA/BETA, (see S. I. #2)	TRITIUM	Tc-99			METALS (see S. I. #3) FILTERED				
Preservative				HNO3<2	COOL 4	COOL 4	COOL 4	NaOH>12	HNO3 <2		HCl <2			HNO3<2				
Type of Container				P/G	G	P/G	P	P	G/P	Gs	G/P			P/G				
No. of Container(s)				1	1	1	1	1	6	1	1			1				
Volume				1000ml	500ml	250ml	500ml	1000ml	1000ml	250ml	1000ml			1000ml				
80 D4N2	W	10/14/94	0932	X	X	X	X	X	X	X	X							
80 D4N3	W	10/14/94	0932											X				

CHAIN OF POSSESSION

Relinquished By	Date/Time	Received By	Date/Time
K.R. Lee	10/14/94 1345	Dawson	10-14-94 1345
Dawson	10/17/94 0840	[illegible]	10-18-94 11:00

Sign/Print Names

SPECIAL INSTRUCTIONS

#1: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(UNFILTERED)
#2: GROSS ALPHA/BETA;GAMMA SCAN-Cs-137,Co-60,Ru-106;Pu238/239/240, Sr-90,TOTAL URANIUM
#3: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(FILTERED)

NOTE: DATA DELIVERABLE-STANDALONE

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

TRANSACTOR'S SECTION: Received By | Title | Date/Time

TMA SAMPLE DISPOSAL SECTION: Disposal Method | Disposed By | Date/Time

DISTRIBUTION: Original Sample Yellow - Sampler

BC-6000-828 (12/92)

10-18-94 01:37PM FROM Tma Richmond TO TMA/MONROVIA P002/004
10-18-94 01:41PM P002 #22 FROM Tma Richmond 15102350438
R-94X
022

000004

ARL 1

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Data Turnaround: [ ] Priority [X] Normal

Collector: K.O. Lee	Company Contact: PH BUTCHER	Telephone No.: 509-376-4388
Project Designation: 200-BP-5	Sampling Location: 200 Areas	SAF No.: B94-036
Ice Chest No.: GWS-029	Field Logbook No.: FFEL-1125	Method of Shipment: EMERY
Shipped To: TMA	Offsite Property No.: W95-0-0001-23	Bill of Lading/Air Bill No.: 1402135108
Possible Sample Hazards/Remarks		

Preservative	HNO3<2	COOL 4	COOL 4	COOL 4	NaOH>12	HNO3 <2		HCl <2			HNO3<2				
Type of Container	P/G	G	P/G	P	P	G/P	Gs	G/P			P/G				
No. of Container(s)	1	1	1	2	1	6	1	1			1				
Special Handling and/or Storage: COOL TO 4 DEGREES CENTIGRADE															
Volume	1000ml	500ml	250ml	250ml 500ml	1000ml	1000ml	500ml 250ml	1000ml			1000ml				
SAMPLE ANALYSIS	METALS (see S. I. #1) UNFILTERED	IC ANIONS-F,Cl, SO4,NO2 PO4	ALKALINITY	TDS	CLP-CYANIDE	GROSS ALPHA/BETA, (see S. I. #2)	TRITIUM	Tc-99			METALS (see S. I. #3) FILTERED				

Sample No.	Matrix*	Date Sampled	Time Sampled															
BO DYN6	W	10/19/94	0847	X	X	X	X	X	X	X	X							
BO DYN7	W	10/19/94	0847											X				

CHAIN OF POSSESSION	Sign/Print Names	Date/Time
Relinquished By: K.O. Lee		10/19/94 1230
Received By: B. Whitten		10-19-94 1230
Relinquished By: B. Whitten		10-20-94 0800
Received By:		10-24-94 11:00AM
Relinquished By		
Received By		
Relinquished By		
Received By		

SPECIAL INSTRUCTIONS

#1: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(UNFILTERED)
#2: GROSS ALPHA/BETA;GAMMA SCAN-Cs-137,Co-60,Ru-106;Pu238/239/240, Sr-90,TOTAL URANIUM
#3: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(FILTERED)

NOTE: DATA DELIVERABLE-STANDALONE

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
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

DISTRIBUTION: Original- Sample Yellow - Sampler

BC-6000-B28 (12/92)

023

ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 200-BP-5			DATA PACKAGE: BOD4N2-TMA		
VALIDATOR: A. Jensen		LAB: Thermo Analytical		DATE: 1/26/95	
CASE:			SDG:		

ANALYSES PERFORMED

☐ CLP/ICP	☐ CLP/GFAA	☐ CLP/Hg	☒ CLP/Cyanide	☐	☐
☒ SW-846/ICP	☒ SW-846/GFAA	☐ SW-846/Hg	~~☒ SW-846~~ Cyanide aj 1/30/95	☐	☐

SAMPLES/MATRIX	
	BOD4N2
	BOD4N3
	BOD4N6
	BOD4N7
	BOD4P0
	BOD4P1 / ALL 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: See attached Holding Time Summary

025

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? . . . ~~see note ⑥~~ . . . Yes ~~No~~ N/A aj 2/13/95

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: ~~⑥ The correlation coefficient of the initial calibration for bismuth is unacceptable. Data qualification is required: UJ. See attached: "Bismuth-Supporting Documentation".~~ aj 2/13/95

4. BLANKS

Were ICB and CCB checks performed for all applicable analyses? Yes No N/A

Are ICB and CCB results acceptable? . . . . see note ① . . Yes No N/A

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

Are preparation blank results acceptable? . . see note ② . Yes No N/A

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

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

Comments: ① The initial calibration blank for aluminum exceeds the IDL. Data qualification is required: U.

② The preparation blanks for iron, aluminum and selenium exceed the IDL'S. Data qualification is required: "U/J"

5. ACCURACY

Were spike samples analyzed? . . . . . Yes No N/A

Are spike sample recoveries acceptable? . . see note ③ . Yes No N/A

Were laboratory control samples (LCS) analyzed? . . . . . Yes No N/A

Are LCS recoveries acceptable? . . . see note ④ . . . . Yes No N/A

Comments: ③ The recovery for the silicon matrix spike is outside the control limits. Data qualification is required: J.

④ The percent recovery for the silicon laboratory control sample is outside the control limits. Data qualification is required: J.

aj replaced 2/9/95
revised 2/13/95 026

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? see note (6) . Yes No N/A

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

Are field split RPD values acceptable? . see note (7) . . . . Yes No N/A

Comments: (6) The percent difference of the potassium serial dilution was outside the control limits. Data qualification is required: "J"
(7) The cyanide results for the field split sample B0D4N2 are greater than ±CRDL for the results of sample B0D4G0. The potassium and iron results for field split sample B0D4P0 are greater than ±CRDL for the results of sample B0D4K0. Data qualification is not required.

7. FURNACE AA QUALITY CONTROL

Were duplicate injections performed as required? . . . . . Yes No N/A

Are duplicate injection %RSD values acceptable? . . . . . Yes No N/A

Were analytical spikes performed as required? . . . . . Yes No N/A

Are analytical spike recoveries acceptable? . . . . . Yes No N/A

Was MSA performed as required? . . . . . Yes No N/A

Are MSA results acceptable? . . . . . Yes No N/A

Comments:

8. REPORTED RESULTS AND DETECTION LIMITS

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

Are all results supported in the raw data? . . . . . Yes No N/A

Are results calculated properly? . . . . . Yes No N/A

Do results meet the CRDLs? . . . . . Yes No N/A

Comments:

027

HOLDING TIME SUMMARY

SDG: BOD4N2-TMA | VALIDATOR: A. Jensen | DATE: 1/26/95 | PAGE 1 OF ____

COMMENTS:

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
BOD4N2	Metals	10/14/94	N/A	11/12/94	N/A	≤ 180	NONE
BOD4N6	↓	10/19/94	↓	11/16/94	↓	↓	↓
BOD4P0	↓	10/21/94	↓	↓	↓	↓	↓
BOD4N7	↓	10/19/94	↓	↓	↓	↓	↓
BOD4P1	↓	10/21/94	↓	↓	↓	↓	↓
BOD4N3	↓	10/14/94	↓	11/15/94	↓	↓	↓
BOD4N2	Cyanide	10/14/94	N/A	10/26/94	N/A	≤ 14	↓
BOD4N6	↓	10/19/94	↓	10/28/94	↓	↓	↓
BOD4P0	↓	10/21/94	↓	10/28/94	↓	↓	↓

WESTINGHOUSE/HANFORD

7

LABORATORY CONTROL SAMPLE

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D2-0039

Lab Code: SKINER Case No.: N4-10-082SAS No.: SDG No.: BOD4N2

Solid LCS Source:

Aqueous LCS Source: SPEX ICV-1

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Aluminum	2000.0	1943.80	97.2						
Calcium	50000.0	46517.00	93.0						
Iron	1000.0	970.86	97.1						
Magnesium	50000.0	46572.00	93.1						
Manganese	150.0	138.13	92.1						
Potassium	50000.0	46572.00	93.1						
Selenium	50.0	50.32	100.6						
Sodium	50000.0	47010.00	94.0						
Cyanide									
Silicon	1000.0	1748.30	174.8						
Bismuth	2500.0	2490.00	99.6						

Silicon %R is outside the control limits. Data qualification required: "J"
The associated sample is BOD4N2.

aj 1/27/95

~~U16~~

WESTINGHOUSE/HANFORD

9

ICP SERIAL DILUTIONS

SAMPLE NUMBER:

BOD4N2L

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D2-0039

Lab Code: SKINER Case No.: N4-10-082SAS No.: SDG No.: BOD4N2

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

Concentration Units: ug/L

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Differ-ence	Q	M
Aluminum	16.60	U	83.00	U			P
Calcium	28939.00		27029.50		6.6		P
Iron	132.19		133.45	B	1.0		P
Magnesium	8432.40		8036.50	B	4.7		P
Manganese	0.90	U	4.50	U			P
Potassium	7720.90		6864.00	B	11.1	E	P
Selenium	3.08	B	16.59	B	438.6		P
Sodium	21012.00		19112.00	B	9.0		P
Silicon	25988.00		23857.00		8.2		P
Bismuth							NR

Potassium %D is outside the control limits. Data qualification required: "J"

The associated sample is BOD4N2

aj 1/27/95

~~015~~

FORM IX - IN ILMO2.1

030

WESTINGHOUSE/HANFORD

7

LABORATORY CONTROL SAMPLE

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D2-0039

Lab Code: SKINER Case No.: N4-10-082SAS No.: SDG No.: BOD4N3

Solid LCS Source:

Aqueous LCS Source: SPEX ICV-1

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Aluminum	2000.0	2064.60	103.2						
Calcium	50000.0	47820.00	95.6						
Iron	1000.0	1006.50	100.6						
Magnesium	50000.0	47692.00	95.4						
Manganese	150.0	146.38	97.6						
Potassium	50000.0	47325.00	94.6						
Selenium	50.0	49.07	98.1						
Sodium	50000.0	47508.00	95.0						
Cyanide									
Silicon	1000.0	1898.90	189.9						
Bismuth	2500.0	2390.00	95.6						

Silicon %R is outside the control limits. Data qualification required: "J"
The associated sample is BOD4N3.
aj
1/27/95

~~013~~

WESTINGHOUSE/HANFORD

3

BLANKS

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D2-0039

Lab Code: SKINER Case No.: N4-10-082SAS No.: SDG No.: BOD4N3

Preparation Blank Matrix (soil/water): WATER

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

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum	16.6	U	23.4	B	16.6	U	16.6	U	23.370	B	P
Calcium	21.2	U	124.6	B	21.2	U	37.5	B	102.540	B	P
Iron	6.4	B	11.3	B	6.1	U	8.3	B	15.860	B	P
Magnesium	229.9	B	55.2	B	36.5	U	36.5	U	321.800	B	P
Manganese	0.9	U	0.9	U	0.9	U	0.9	U	0.900	U	P
Potassium	78.5	U	81.3	B	78.5	U	78.5	U	81.320	B	P
Selenium	2.5	U	2.5	U	2.5	U	2.5	U	2.500	U	P
Sodium	57.9	B	48.5	U	48.5	U	48.5	U	103.060	B	P
Cyanide											NR
Silicon	-13.3	B	8.9	U	8.9	U	8.9	U	8.900	U	P
Bismuth	387.0	U	387.0	U	387.0	U			387.000	U	A

Preparation Blank results for Aluminum and Iron exceed the IDL. Data qualification required: "U" The associated sample is BOD4N3.

aj 1/27/95

~~UA7~~

WESTINGHOUSE/HANFORD

3

BLANKS

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D2-0039

Lab Code: SKINER Case No.: N4-10-102SAS No.: SDG No.: BOD4N6

Preparation Blank Matrix (soil/water): WATER

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

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum	* 26.1	B	16.6	U	16.6	U	16.6	U	16.600	U	P
Calcium	55.9	B	105.0	B	21.2	U	21.2	U	73.590	B	P
Iron	6.1	U	16.6	B	6.1	U	6.1	U	6.100	U	P
Magnesium	36.5	U	36.5	U	36.5	U	36.5	U	36.500	U	P
Manganese	0.9	U	0.9	U	0.9	U	0.9	U	0.900	U	P
Potassium	78.5	U	78.5	U	78.5	U	78.5	U	78.500	U	P
Selenium	2.5	U	2.5	U	2.5	U	-3.0	B	✗ -2.643	B	P
Sodium	48.5	U	-76.3	B	-65.7	B	-103.1	B	48.500	U	P
Cyanide	10.0	U	10.0	U	10.0	U	10.0	U	10.000	U	CA
Silicon	8.9	U	8.9	U	8.9	U	8.9	U	104.630	B	P
Bismuth	387.0	U	387.0	U	387.0	U	387.0	U	387.000	U	A

* The initial calibration blank for Aluminum exceeds the IDL. Data qualification required: "U". The associated sample is BOD4P0.

✗ The preparation blank for Selenium exceeds the IDL. Data qualification required: "J"
The associated samples are BOD4N6 & BOD4P0.
aj
1/27/95

WESTINGHOUSE/HANFORD

3

BLANKS

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D2-0039

Lab Code: SKINER Case No.: N4-10-102SAS No.: SDG No.: BOD4N7

Preparation Blank Matrix (soil/water): WATER

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

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum	26.1	B	16.6	U	16.6	U	16.6	U	16.600	U	P
Calcium	55.9	B	105.0	B	21.2	U	21.2	U	53.970	B	P
Iron	6.1	U	16.6	B	6.1	U	6.1	U	18.880	B	P
Magnesium	36.5	U	36.5	U	36.5	U	36.5	U	36.500	U	P
Manganese	0.9	U	0.9	U	0.9	U	0.9	U	0.900	U	P
Potassium	78.5	U	78.5	U	78.5	U	78.5	U	78.500	U	P
Selenium	2.5	U	2.5	U	2.5	U	-3.0	B	2.500	U	P
Sodium	48.5	U	-76.3	B	-65.7	B	-103.1	B	-52.570	B	P
Cyanide											NR
Silicon	8.9	U	8.9	U	8.9	U	8.9	U	107.220	B	P
Bismuth	387.0	U	387.0	U	387.0	U	387.0	U	387.000	U	A

Iron priparation blank results are greater than the IDL. Data qualification required: "U"
The associated samples are BOD4N7 & BOD4P1.

aj 1/26/95

FORM III - IN

ILM02.1

034

8

WESTINGHOUSE/HANFORD

5A

SPIKE SAMPLE RECOVERY

SAMPLE NUMBER:

BOD4N7S

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D2-0039

Lab Code: SKINER Case No.: N4-10-102SAS No.: SDG No.: BOD4N7

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

% Solids for Sample: 0.0

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

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum	75-125	1895.4000		16.6000	U	2000.00	94.8		P
Calcium									NR
Iron	75-125	973.8100		60.5500	B	1000.00	91.3		P
Magnesium									NR
Manganese	75-125	455.5300		0.9000	U	500.00	91.1		P
Potassium									NR
Selenium	75-125	2052.1000		8.2746		2000.00	102.2		P
Sodium									NR
Cyanide									NR
Silicon		18945.0000		18675.0000		1000.00	27.0		P
Bismuth	75-125	2680.0000		387.0000	U	2500.00	107.2		A

Comments:

Silicon matrix spike recovery is outside of control limits. Data qualification required: "J"
The associated samples are BOD4N7 & BOD4P1.
aj 1/26/95

RECORD COPY

FEB 1995

MEMORANDUM

TO: 200-BP-5 Round 2 Groundwater Project QA Reco[illegible]anuary 31, 1995

FR: Thomas Stapp, Golder Associates Inc.

RE: GENERAL CHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE B0D4N2-TMA (943-1610.062 4N2GEN.BP5)

INTRODUCTION

This memo presents the results of data validation on data package B0D4N2-TMA prepared by the TMA/Monrovia laboratory. Sample information is provided in the following table.

SAMPLE ID	COMMENTS	ANALYSES	MEDIA
B0D4N2	FIELD SPLIT	SEE ATTACHMENT 4	WATER
B0D4N6*	FIELD SPLIT		WATER
B0D4P0	FIELD SPLIT		WATER
NOTES: * - Indicates samples that have been 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 for chloride, sulfate, phosphate, and alkalinity were not met. However, no qualification is required according to the validation procedures.

Completeness. The data package was complete for all requested analyses. A total of three (3) samples were validated in this data package with a total of twenty-one determinations reported, 15 of which were deemed valid. This results in a completeness of 71 percent which does not meet the work plan completeness objective of 90 percent.

MAJOR DEFICIENCIES

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

Holding Times

- The holding times were exceeded by more than two times the maximum allowable holding time for nitrite and phosphate analyses. Attachments 2 and 5 provide a summary of the samples affected, qualifications and supporting documentation.

- Analyses for nitrite and phosphate were requested by WHC for information purposes only and the holding time has been acknowledged as having been exceeded.

MINOR DEFICIENCIES

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

FIELD QC

- Samples B0D4N2, B0D4N6, and B0D4P0 are identified as field splits. The associated sample data was not avaliable at the time of this report. Field QC will be evaluated in the final data summary.

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.

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.

ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

DATA QUALIFICATION SUMMARY - FORM B-7

SDG: B0D4N2-TMA	REVIEWER: T. STAPP	DATE: 01-30-95	PAGE 1 OF 1
COMMENTS: WET CHEMISTRY			
COMPOUND/ ANALYTE	QUALIFIER	SAMPLES AFFECTED	REASON
NITRITE	UR	ALL	HOLDING TIME EXCEEDED
PHOSPHATE	UR	ALL	HOLDING TIME EXCEEDED

ATTACHMENT 3

QUALIFIED DATA SUMMARY and ANNOTATED LABORATORY REPORTS

Validated Data Summary, Data Package: B0D4N2-TMA

	Samp#	B0D4N2		B0D4N6		B0D4P0	
	Date	10-14-94		10-19-94		10-21-94	
	Location	299-E33-12		699-53-55C		699-52-54	
	Depth	---		---		---	
	Type	WATER		WATER		WATER	
	Comments	SPLIT		SPLIT		SPLIT	
Parameter	Units	Result	Q	Result	Q	Result	Q
CHLORIDE	MG/L	9.900		20.000		19.300	
FLUORIDE	MG/L	0.100		0.500		0.300	
PHOSPHATE	MG/L	0.400	UR	0.400	UR	0.400	UR
SULFATE	MG/L	20.000		108.000		176.000	
NITRITE NITROGEN	MG/L	0.100	UR	0.100	UR	0.100	UR
TOTAL DISSOLVED SOLIDS	MG/L	256.000		427.000		666.000	
ALKALINITY	MG/L	106.000		114.000		100.000	

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

Verified 1-30-95

TMA Inc. REPORT Work Order # A4-10-035

Received: 10/18/94 Results by Sample

SAMPLE ID B0D4N2 FRACTION 01A TEST CODE WCCLPL NAME Anions & Wet Chem.

Date & Time Collected 10/14/94 09:32:00 Category

ANIONS AND WET CHEMISTRY - LIQUIDS

ANALYSIS	METHOD	RESULT	UNITS	LIMIT	Q
Chloride	300.0	9.9	mg/L	2.0	
Fluoride	300.0	0.1	mg/L	0.1	
Phosphate	300.0	<0.4	mg/L	0.4	UR
Sulfate	300.0	20	mg/L	10	
Nitrite Nitrogen	300.0	<0.1	mg/L	0.1	UR

FORM I

Verified 1-27-95

TMA Inc. REPORT Work Order # A4-10-035

Received: 10/18/94 Results by Sample

SAMPLE ID B0D4N2 FRACTION 01D TEST CODE WCCLPL NAME Anions & Wet Chem.

Date & Time Collected 10/14/94 09:32:00 Category

ANIONS AND WET CHEMISTRY - LIQUIDS

ANALYSIS	METHOD	RESULT	UNITS	LIMIT
Alkalinity	310.1	106	mg/L	2

FORM I

Verified 1-27-95

TMA Inc. REPORT Work Order # A4-10-035

Received: 10/18/94 Results by Sample

SAMPLE ID B0D4N2 FRACTION 01F TEST CODE WCCLPL NAME Anions & Wet Chem.

Date & Time Collected 10/14/94 09:32:00 Category

ANIONS AND WET CHEMISTRY - LIQUIDS

ANALYSIS	METHOD	RESULT	UNITS	LIMIT
Tot. Dissolved Solids	160.1	256	mg/L	5

FORM I

Verified 1-27-95

TMA Inc. REPORT Work Order # A4-10-044

Received: 10/24/94

Results by Sample

SAMPLE ID B0D4N6 FRACTION 01A TEST CODE WCCLPL NAME Anions & Wet Chem.

Date & Time Collected 10/19/94 08:47:00 Category

ANIONS AND WET CHEMISTRY - LIQUIDS

ANALYSIS	METHOD	RESULT	UNITS	LIMIT	Q
Chloride	300.0	20.0	mg/L	4.0	
Fluoride	300.0	0.5	mg/L	0.1	
Phosphate	300.0	<0.4	mg/L	0.4	UR
Sulfate	300.0	108	mg/L	20	
Nitrite Nitrogen	300.0	<0.1	mg/L	0.1	UR

FORM I

Verified 1-27-95

TMA Inc. REPORT Work Order # A4-10-044

Received: 10/24/94

Results by Sample

SAMPLE ID B0D4N6 FRACTION 01D TEST CODE WCCLPL NAME Anions & Wet Chem.

Date & Time Collected 10/19/94 08:47:00 Category

ANIONS AND WET CHEMISTRY - LIQUIDS

ANALYSIS	METHOD	RESULT	UNITS	LIMIT
Alkalinity	310.1	114	mg/L	2

FORM I

Verified 1-27-95

TMA Inc. REPORT Work Order # A4-10-044

Received: 10/24/94

Results by Sample

SAMPLE ID B0D4N6 FRACTION 01P TEST CODE WCCLPL NAME Anions & Wet Chem.

Date & Time Collected 10/19/94 08:47:00 Category

ANIONS AND WET CHEMISTRY - LIQUIDS

ANALYSIS	METHOD	RESULT	UNITS	LIMIT
Tot. Dissolved Solids	160.1	427	mg/L	5

FORM I

Verified 1-27-95

TMA Inc. REPORT Work Order # ~~000018~~ A4-10-044

Received: 10/24/94 Results by Sample

SAMPLE ID B0D4P0 FRACTION 03A TEST CODE WCCLPL NAME Anions & Wet Chem.

Date & Time Collected 10/21/94 09:20:00 Category

ANIONS AND WET CHEMISTRY - LIQUIDS

ANALYSIS	METHOD	RESULT	UNITS	LIMIT	Q
Chloride	300.0	19.3	mg/L	2.0	
Fluoride	300.0	0.3	mg/L	0.1	
Phosphate	300.0	<0.4	mg/L	0.4	UR
Sulfate	300.0	176	mg/L	10	
Nitrite Nitrogen	300.0	<0.1	mg/L	0.1	UR

FORM I

Verified 1-27-95

TMA Inc. REPORT Work Order # A4-10-044

Received: 10/24/94

Results by Sample

SAMPLE ID B0D4P0 FRACTION 03B TEST CODE WCCLPL NAME Anions & Wet Chem.

Date & Time Collected 10/21/94 09:20:00 Category

ANIONS AND WET CHEMISTRY - LIQUIDS

ANALYSIS	METHOD	RESULT	UNITS	LIMIT
Alkalinity	310.1	100	mg/L	2

FORM I

Verified 1-27-95

TMA Inc. REPORT Work Order # A4-10-044

Received: 10/24/94

Results by Sample

SAMPLE ID B0D4P0 FRACTION 03C TEST CODE WCCLPL NAME Anions & Wet Chem.

Date & Time Collected 10/21/94 09:20:00 Category

ANIONS AND WET CHEMISTRY - LIQUIDS

ANALYSIS	METHOD	RESULT	UNITS	LIMIT
Tot. Dissolved Solids	160.1	666	mg/L	5

FORM I

Verified 1-27-95

ATTACHMENT 4

LABORATORY NARRATIVE and CHAIN-OF-CUSTODY DOCUMENTATION

GENERAL CHEMISTRY RESULTS

CASE NO. 10-035

Sample #:

B0D4N2

CASE NARRATIVE

No problems were encountered during sample analysis.
All QC results were acceptable.

Maureen Parrish 11/15/94

Maureen Parrish

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Data Turnaround: [ ] Priority [X] Normal

Collector: AJ Simpson	Company Contact: PH BUTCHER	Telephone No.: 509-376-4388
Project Designation: 200-BP-5	Sampling Location: 200 Areas	SAF No.: B96-036
Ice Chest No.: Dumby	Field Logbook No.: EFL-1125	Method of Shipment: EMERY
Shipped To: TMA	Offsite Property No.: W95-0-0001-17	Bill of Lading/Air Bill No.: 1402135416
Possible Sample Hazards/Remarks:		
Special Handling and/or Storage: COOL TO 4 DEGREES CENTIGRADE		

Preservative	HNO3<2	COOL 4	COOL 4	COOL 4	NaOH>12	HNO3 <2		HCl 2			HNO3<2				
Type of Container	P/G	G	P/G	P	P	G/P	G	G/P			P/G				
No. of Containers(s)	1	1	1	1	1	6	1	1			1				
Volume	1000ml	500ml	250ml	500ml	1000ml	1000ml	250ml	1000ml			1000ml				
SAMPLE ANALYSIS	METALS (see S. 1. #1) UNFILTERED	IC ANIONS-F,Cl, SO4,NO2 PO4	ALKALINITY	TDS	CLP-CYANIDE	GROSS ALPHA/BETA, (see S. 1. #2)	TRITIUM	Tc-99			METALS (see S. 1. #3) FILTERED				

Sample No.	Matrix*	Date Sampled	Time Sampled														
BO D4N2	W	10/14/94	0972	X	X	X	X	X	X	X	X						
BO D4N3	W	10/14/94	0972									X					

CHAIN OF POSSESSION	Sign/Print Names	
Relinquished By: [signature] Date/Time: 10/14/94 1345	Received By: [signature] Date/Time: 1345	
Relinquished By: [signature] Date/Time: 0840	Received By: [signature] Date/Time: 10-18-94 11:00	
Relinquished By: Date/Time:	Received By: Date/Time:	
Relinquished By: Date/Time:	Received By: Date/Time:	

SPECIAL INSTRUCTIONS

#1: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(UNFILTERED)
#2: GROSS ALPHA/BETA;GAMMA SCAN-Cs-137,Co-60,Ru-106;Pu238/239/240, Sr-90,TOTAL URANIUM
#3: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(FILTERED)

NOTE: DATA DELIVERABLE-STANDALONE

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
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

DISTRIBUTION: Original Sample Yellow - Sampler

BC-8000-820 (12/92)

1-22-95
000003
F002/004
TO TMA/MONROVIA
10-18-94 01:37PM FROM tma
020
10-18-94 01:41PM P002 #22
15102350438
FROM tma richland
P.94%

GENERAL CHEMISTRY RESULTS

CASE NO. 10-044

Sample #s:

B0D4N6 B0D4P0

CASE NARRATIVE

The relative percent difference between sample B0D4N6 and its duplicate analysis was 22.2%. The high RPD is due to the very low Fluoride concentration relative to the difference between the sample and the duplicate.

The holding time was exceeded for the analysis of pH. Careful review of the QC analysis indicates that the data is reliable.

No other problems were encountered during sample analysis. All QC results were acceptable.

Maureen Parrish 11/15/96

Maureen Parrish

ARL 1

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Data Turnaround: [ ] Priority [X] Normal

Collector: K.O.Lee	Company Contact: PM BUTCHER	Telephone No.: 509-376-4388
Project Designation: 200-BP-5	Sampling Location: 200 Areas	SAF No.: 894-036
Ice Chest No.: GWS-029	Field Logbook No.: RFL-1125	Method of Shipment: EMERY
Shipped To: TMA	Offsite Property No.: W95-0-0001-03	Bill of Lading/Air Bill No.: 1402135108
Possible Sample Hazards/Remarks		

Special Handling and/or Storage: COOL TO 4 DEGREES CENTIGRADE

SAMPLE ANALYSIS																
Preservative			HNO3<2	COOL 4	COOL 4	COOL 4	NaOH>12	HNO3 <2		HCL <2			HNO3<2			
Type of Container			P/G	G	P/G	P	P	G/P	G	G/P			P/G			
No. of Container(s)			1	1	1	2	1	6	1	1			1			
Volume			1000ml	500ml	250ml	250ml 500ml	1000ml	1000ml	500ml 250ml	1000ml			1000ml			
			METALS (see S. I. #1) UNFILTERED	IC ANIONS-F,Cl,SO4,NO2 PO4	ALKALINITY	TDS	CLP-CYANIDE	GROSS ALPHA/BETA, (see S. I. #2)	TRITIUM	Tc-99			METALS (see S. I. #3) FILTERED			
Sample No.	Matrix*	Date Sampled	Time Sampled													
80 D4N6	W	10/19/94	0847	X	X	X	X	X	X	X	X		X			
80 D4N7	W	10/19/94	0847										X			

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By: K.O.Lee	Date/Time: 10/19/94 1230	Received By: B Whitten	Date/Time: 1230 10-19-94
Relinquished By: B Whitten	Date/Time: 0800 10-20-94	Received By: [illegible]	Date/Time: 10-24-94 11:00AM
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

#1: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(UNFILTERED)
#2: GROSS ALPHA/BETA;GAMMA SCAN-Cs-137,Co-60,Ru-106;Pu238/239/240, Sr-90,TOTAL URANIUM
#3: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(FILTERED)

NOTE: DATA DELIVERABLE-STANDALONE

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
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

DISTRIBUTION: Original-Sample Yellow - Sampler

BC-6000-828 (12/92)

~~400000~~ 1-27-95

022

ARL

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Page 1 of 1

Date Turnaround: [ ] Priority [X] Normal

Collector: A. Rizzo	Company Contact: PN BUTCHER	Telephone No.: 509-376-4388
Project Designation: 200-BP-5	Sampling Location: 200 Areas	SAF No.: 894-036
Ice Chest No.: GWS-130	Field Logbook No.: EFL 1020	Method of Shipment: EMERY
Shipped To: TMA	Offsite Property No.: W95-0-0001-30	Bill of Lading/Air Bill No.: ~~1402135174~~ 52030259 1
Possible Sample Hazards/Remarks		
Special Handling and/or Storage: COOL TO 4 DEGREES CENTIGRADE		

BW 10-24-94

Preservative	HNO3<2	COOL 4	COOL 4	COOL 4	NaOH>12	HNO3 <2		HCl <2			HNO3<2				
Type of Container	P/G	G	P/G	P	P	G/P	G	G/P			P/G				
No. of Container(s)	1	1	1	1	1	6	1	1			1				
Volume	1000ml	500ml	250ml	500ml	1000ml	1000ml	250ml	1000ml			1000ml				
SAMPLE ANALYSIS	METALS (see S. I. #1) UNFILTERED	IC ANIONS-F,Cl, SO4,NO2 PO4	ALKALINITY	TDS	CLP-CYANIDE	GROSS ALPHA/BETA, (see S. I. #2)	TRITIUM	Tc-99			METALS (see S. I. #3) FILTERED				

Sample No.	Matrix*	Date Sampled	Time Sampled														
BO D4P0	W	10-21-94	0920	X	X	X	X	X	X	X	X						
BO D4P1	W	10-21-94	0920											X			

CHAIN OF POSSESSION	Sign/Print Names	Date/Time	Received By	Date/Time
Relinquished By	A G Rizzo	1045 10-21-95	Received By	1045 10-21-94
Relinquished By	Buckham	0840 10-24-94	Received By	10-25-94 12:50
Relinquished By			Received By	
Relinquished By			Received By	

SPECIAL INSTRUCTIONS

#1: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(UNFILTERED)
#2: GROSS ALPHA/BETA;GAMMA SCAN-Cs-137,Co-60,Ru-106;Pu238/239/240, Sr-90,TOTAL URANIUM
#3: METALS-Ca,Mg,Na,K,Fe,Mn,Si,Al,Bi; AA METALS-Selenium(FILTERED)

NOTE: DATA DELIVERABLE-STANDALONE

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
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

DISTRIBUTION: Original-Sample Yellow - Sampler

BC-6000-828 (12/92)

1-27-95

000005

023

ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 200-BP-5 ROUND 2 GHZC			DATA PACKAGE: BOD4N2 - TMA		
VALIDATOR: T. Stapp		LAB: TMA-Monrovia		DATE: 1-25-95	
CASE:			SDG:		

ANALYSES PERFORMED

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

SAMPLES/MATRIX BOD4N2, BOD4N6, BOD4PO / 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? . . NOTE ① . . . . . Yes (No) N/A

Comments: Anions:

Lab ID	Samples	Collected	Cl	Fl	PO_4	SO_4	NO_2 /	AlK /	TDS
	BOD4N2	10-14-94	10-27				→	10-28	10-21
01A	BOD4N6	10-19-94	10-28				→	11-1	10-26
03A	BOD4PO	10-21-94	10-28				→	11-1	10-26
	DAYS:		≤28	≤28	(≤2)	≤28	(≤2)	≤14	≤7

① Holding time has been exceeded for phosphate and nitrite for all samples, qualifying results as estimated ~~(J/UJ)~~ for detects (J) and rejected for non-detects (UR).

1-25-95

GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

3. INSTRUMENT CALIBRATION

Was initial calibration performed for all applicable analyses? (Yes) No N/A NOTE ①

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: ① Normality check for Alkalinity analysis not performed however an LCS analysis with a known amount of Na_2CO_3 was conducted and recovery was acceptable. No qualification applied.

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? . . . . NOTE ① . . . . Yes No (N/A) 1-25-95 Stet

026

GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

Comments: (1) Field split data for the "original" sample is not available at this time and will be evaluated in the final data summary.

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? . . . . NOTE (1) . . . . . Yes (No) N/A

Comments:

(1) Phosphate anion and alkalinity results exceeded contract required detection limits (of 0.1 mg/L) for all samples. Chloride and sulfate anions also exceeded CRDL's however, dilution of 100 x was required for results reported with all samples.

027

2/22/95

Data Validation Check List

for Project 200-BP-5

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
B0D4N2	split	B0D4N2		TMA/NORCAL	N	N	N	Y 11/21/94	Y 11/21/94	10/18/94 - SAF-B94-036	Y 12/19/94	12/19/94
B0D4N3	split	B0D4N2		TMA/NORCAL	N	N	N	N	Y 11/21/94	10/18/94 - SAF-B94-036	N	11/21/94
B0D4N6	split	B0D4N2		TMA/NORCAL	N	N	N	Y 11/25/94	Y 11/25/94	10/24/94 - SAF-B94-036	Y 12/19/94	12/19/94
B0D4N7	split	B0D4N2		TMA/NORCAL	N	N	N	N	Y 11/25/94	10/24/94 - SAF-B94-036	N	11/25/94
B0D4P0	split	B0D4N2		TMA/NORCAL	N	N	N	Y 11/25/94	Y 11/25/94	10/25/94 - SAF-B94-036	Y 12/19/94	12/19/94
B0D4P1	split	B0D4N2		TMA/NORCAL	N	N	N	N	Y 11/25/94	10/25/94 - SAF-B94-036	N	11/25/94
B0D4Q9		B0D4Q9		TMA/NORCAL	N	N	N	N	N	10/15/94 - SAF-B94-037	Y 11/21/94	11/21/94
B0D4G0	field split of B0D4N2	W0250		QUANTERRA	N	N	N	Y 12/05/94	Y 12/05/94	10/14/94 - SAF-B94-036	Y 12/01/94	12/05/94
B0D4G1		W0250		QUANTERRA	N	N	N	N	Y 12/05/94	10/14/94 - SAF-B94-036	N	12/05/94
B0D4G2		W0250		QUANTERRA	N	N	N	Y 12/05/94	Y 12/05/94	10/11/94 - SAF-B94-036	Y 12/01/94	12/05/94
B0D4G3		W0250		QUANTERRA	N	N	N	N	Y 12/05/94	10/11/94 - SAF-B94-036	N	12/05/94

Validation Rcvd 2-22-95

2/22/95

Data Validation Check List

for Project 200-BP-5

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
B0D4G4		W0250		QUANTERRA	N	N	N	Y 12/05/94	Y 12/05/94	10/11/94 - SAF-B94-036	Y 12/01/94	12/05/94
B0D4G5		W0250		QUANTERRA	N	N	N	N	Y 12/05/94	10/11/94 - SAF-B94-036	N	12/05/94
B0D4H2		W0250		QUANTERRA	N	N	N	Y 12/05/94	Y 12/05/94	10/11/94 - SAF-B94-036	Y 12/01/94	12/05/94
B0D4H3		W0250		QUANTERRA	N	N	N	N	Y 12/05/94	10/11/94 - SAF-B94-036	N	12/05/94
B0D4H8		W0250		QUANTERRA	N	N	N	Y 12/05/94	Y 12/05/94	10/12/94 - SAF-B94-036	Y 12/01/94	12/05/94
B0D4H9		W0250		QUANTERRA	N	N	N	N	Y 12/05/94	10/12/94 - SAF-B94-036	N	12/05/94
B0D4J0		W0250		QUANTERRA	N	N	N	Y 12/05/94	Y 12/05/94	10/13/94 - SAF-B94-036	Y 12/01/94	12/05/94
B0D4J1		W0250		QUANTERRA	N	N	N	N	Y 12/05/94	10/13/94 - SAF-B94-036	N	12/05/94
B0D4J2		W0250		QUANTERRA	N	N	N	Y 12/05/94	Y 12/05/94	10/13/94 - SAF-B94-036	Y 12/01/94	12/05/94
B0D4J3		W0250		QUANTERRA	N	N	N	N	Y 12/05/94	10/13/94 - SAF-B94-036	N	12/05/94
B0D4J8		W0250		QUANTERRA	N	N	N	Y 12/05/94	Y 12/05/94	10/14/94 - SAF-B94-036	Y 12/01/94	12/05/94
B0D4J9		W0250		QUANTERRA	N	N	N	N	Y 12/05/94	10/14/94 - SAF-B94-036	N	12/05/94

Validation Rcvd 2-22-95

2/22/95

Data Validation Check List

for Project 200-BP-5

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
B0D4M4		W0250		QUANTERRA	N	N	N	Y 12/05/94	Y 12/05/94	10/12/94 - SAF-B94-036	Y 12/01/94	12/05/94
B0D4M5		W0250		QUANTERRA	N	N	N	N	Y 12/05/94	10/12/94 - SAF-B94-036	N	12/05/94
B0D4M8		W0250		QUANTERRA	N	N	N	Y 12/05/94	Y 12/05/94	10/12/94 - SAF-B94-036	Y 12/01/94	12/05/94
B0D4M9		W0250		QUANTERRA	N	N	N	N	Y 12/05/94	10/12/94 - SAF-B94-036	N	12/05/94
B0D4Q0		W0258		QUANTERRA	N	N	N	N	N	10/27/94 - SAF-B94-037	Y 12/12/94	12/12/94
B0D4Q1		W0258		QUANTERRA	N	N	N	N	N	10/18/94 - SAF-B94-037	Y 12/12/94	12/12/94
B0D4Q2		W0258		QUANTERRA	N	N	N	N	N	10/18/94 - SAF-B94-037	Y 12/12/94	12/12/94
B0D4Q3		W0258		QUANTERRA	N	N	N	N	N	10/14/94 - SAF-B94-037	Y 12/12/94	12/12/94
B0D4Q4		W0258		QUANTERRA	N	N	N	N	N	10/25/94 - SAF-B94-037	Y 12/12/94	12/12/94
B0D4Q5		W0258		QUANTERRA	N	N	N	N	N	10/24/94 - SAF-B94-037	Y 12/12/94	12/12/94
B0D4Q6		W0258		QUANTERRA	N	N	N	N	N	10/14/94 - SAF-B94-037	Y 12/12/94	12/12/94

Validation Rcvd 2-22-95

2/22/95

Data Validation Check List

for Project 200-BP-5

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
B0D4Q7		W0258		QUANTERRA	N	N	N	N	N	10/14/94 - SAF-B94-037	Y 12/12/94	12/12/94
B0D4Q8		W0258		QUANTERRA	N	N	N	N	N	10/14/94 - SAF-B94-037	Y 12/12/94	12/12/94
B0D4R0		W0258		QUANTERRA	N	N	N	N	N	10/18/94 - SAF-B94-037	Y 12/12/94	12/12/94
B0D4R1		W0258		QUANTERRA	N	N	N	N	N	10/24/94 - SAF-B94-037	Y 12/12/94	12/12/94
B0D4H6		W0260		QUANTERRA	N	N	N	Y 12/05/94	Y 12/05/94	10/19/94 - SAF-B94-036	Y 12/05/94	12/05/94
B0D4H7		W0260		QUANTERRA	N	N	N	N	Y 12/05/94	10/19/94 - SAF-B94-036	N	12/05/94
B0D4J6		W0260		QUANTERRA	N	N	N	Y 12/05/94	Y 12/05/94	10/18/94 - SAF-B94-036	Y 12/05/94	12/05/94
B0D4J7		W0260		QUANTERRA	N	N	N	N	Y 12/05/94	10/18/94 - SAF-B94-036	N	12/05/94
B0D4K0		W0260		QUANTERRA	N	N	N	Y 12/05/94	Y 12/05/94	10/19/94 - SAF-B94-036	Y 12/05/94	12/05/94
B0D4K1		W0260		QUANTERRA	N	N	N	N	Y 12/05/94	10/19/94 - SAF-B94-036	N	12/05/94
B0D4K4		W0260		QUANTERRA	N	N	N	Y 12/05/94	Y 12/05/94	10/20/94 - SAF-B94-036	Y 12/05/94	12/05/94

Validation Rcvd 2-22-95

2/22/95

Data Validation Check List

for Project 200-BP-5

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
B0D4K5		W0260		QUANTERRA	N	N	N	N	Y 12/05/94	10/20/94 - SAF-B94-036	N	12/05/94
B0D4K8		W0260		QUANTERRA	N	N	N	Y 12/05/94	Y 12/05/94	10/19/94 - SAF-B94-036	Y 12/05/94	12/05/94
B0D4K9		W0260		QUANTERRA	N	N	N	N	Y 12/05/94	10/19/94 - SAF-B94-036	N	12/05/94
B0D4L0		W0260		QUANTERRA	N	N	N	Y 12/05/94	Y 12/05/94	10/20/94 - SAF-B94-036	Y 12/05/94	12/05/94
B0D4L1		W0260		QUANTERRA	N	N	N	N	Y 12/05/94	10/20/94 - SAF-B94-036	N	12/05/94
B0D4L2		W0260		QUANTERRA	N	N	N	Y 12/05/94	Y 12/05/94	10/20/94 - SAF-B94-036	Y 12/05/94	12/05/94
B0D4L3		W0260		QUANTERRA	N	N	N	N	Y 12/05/94	10/20/94 - SAF-B94-036	N	12/05/94
B0D4L4		W0260		QUANTERRA	N	N	N	Y 12/05/94	Y 12/05/94	10/20/94 - SAF-B94-036	Y 12/05/94	12/05/94
B0D4L5		W0260		QUANTERRA	N	N	N	N	Y 12/05/94	10/20/94 - SAF-B94-036	N	12/05/94
B0D4N0	dup	W0260		QUANTERRA	N	N	N	Y 12/05/94	Y 12/05/94	10/20/94 - SAF-B94-036	Y 12/05/94	12/05/94
B0D4N1	dup	W0260		QUANTERRA	N	N	N	N	Y 12/05/94	10/20/94 - SAF-B94-036	N	12/05/94
B0D4N4	dup	W0260		QUANTERRA	N	N	N	Y 12/05/94	Y 12/05/94	10/17/94 - SAF-B94-036	Y 12/05/94	12/05/94

Validation Rcvd 2-22-95

2/22/95

Data Validation Check List

for Project 200-BP-5

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
B0D4N5	dup	W0260		QUANTERRA	N	N	N	N	Y 12/05/94	10/17/94 - SAF-B94-036	N	12/05/94
B0D4R3		W0260		QUANTERRA	N	N	N	N	N	10/19/94 - SAF-B94-036	Y 12/05/94	12/05/94
B0D4H0		W0267		QUANTERRA	N	N	N	Y 12/12/94	Y 12/12/94	10/24/94 - SAF-B94-036	Y 12/12/94	12/12/94
B0D4H1		W0267		QUANTERRA	N	N	N	N	Y 12/12/94	10/24/94 - SAF-B94-036	N	12/12/94
B0D4H4		W0267		QUANTERRA	N	N	N	Y 12/12/94	Y 12/12/94	10/21/94 - SAF-B94-036	Y 12/12/94	12/12/94
B0D4H5		W0267		QUANTERRA	N	N	N	N	Y 12/12/94	10/21/94 - SAF-B94-036	N	12/12/94
B0D4K6		W0267		QUANTERRA	N	N	N	Y 12/12/94	Y 12/12/94	10/24/94 - SAF-B94-036	Y 12/12/94	12/12/94
B0D4K7		W0267		QUANTERRA	N	N	N	N	Y 12/12/94	10/24/94 - SAF-B94-036	N	12/12/94
B0D4L6		W0267		QUANTERRA	N	N	N	Y 12/12/94	Y 12/12/94	10/21/94 - SAF-B94-036	Y 12/12/94	12/12/94
B0D4L7		W0267		QUANTERRA	N	N	N	N	Y 12/12/94	10/21/94 - SAF-B94-036	N	12/12/94
B0D4L8		W0267		QUANTERRA	N	N	N	Y 12/12/94	Y 12/12/94	10/25/94 - SAF-B94-036	Y 12/12/94	12/12/94

Validation Rcvd 2-22-95

2/22/95

Data Validation Check List

for Project 200-BP-5

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
B0D4L9		W0267		QUANTERRA	N	N	N	N	Y 12/12/94	10/25/94 - SAF-B94-036	N	12/12/94
B0D4M0		W0267		QUANTERRA	N	N	N	Y 12/12/94	Y 12/12/94	10/26/94 - SAF-B94-036	Y 12/12/94	12/12/94
B0D4M1		W0267		QUANTERRA	N	N	N	N	Y 12/12/94	10/26/94 - SAF-B94-036	N	12/12/94
B0D4M2		W0267		QUANTERRA	N	N	N	Y 12/12/94	Y 12/12/94	10/25/94 - SAF-B94-036	Y 12/12/94	12/12/94
B0D4M3		W0267		QUANTERRA	N	N	N	N	Y 12/12/94	10/25/94 - SAF-B94-036	N	12/12/94
B0D4N8	dup	W0267		QUANTERRA	N	N	N	Y 12/12/94	Y 12/12/94	10/24/94 - SAF-B94-036	Y 12/12/94	12/12/94
B0D4N9	dup	W0267		QUANTERRA	N	N	N	N	Y 12/12/94	10/24/94 - SAF-B94-036	N	12/12/94
B0D4P2	FB	W0267		QUANTERRA	N	N	N	Y 12/12/94	Y 12/12/94	10/25/94 - SAF-B94-036	Y 12/12/94	12/12/94
B0D4P3	FB	W0267		QUANTERRA	N	N	N	N	Y 12/12/94	10/25/94 - SAF-B94-036	N	12/12/94
B0D4P4	FB	W0267		QUANTERRA	N	N	N	Y 12/12/94	Y 12/12/94	10/21/94 - SAF-B94-036	Y 12/12/94	12/12/94
B0D4P5	FB	W0267		QUANTERRA	N	N	N	N	Y 12/12/94	10/21/94 - SAF-B94-036	N	12/12/94

Validation Rcvd 2-22-95

2/22/95

Data Validation Check List

for Project 200-BP-5

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
B0D4F8		W0272		QUANTERRA	N	N	N	Y 12/23/94	Y 12/23/94	10/27/94 - SAF-B94-036	Y 12/22/94	12/23/94
B0D4F9		W0272		QUANTERRA	N	N	N	N	Y 12/23/94	10/27/94 - SAF-B94-036	N	12/23/94
B0D4G6		W0272		QUANTERRA	N	N	N	Y 12/23/94	Y 12/23/94	10/28/94 - SAF-B94-036	Y 12/22/94	12/23/94
B0D4G7		W0272		QUANTERRA	N	N	N	N	Y 12/23/94	10/28/94 - SAF-B94-036	N	12/23/94
B0D4K2		W0272		QUANTERRA	N	N	N	Y 12/23/94	Y 12/23/94	10/31/94 - SAF-B94-036	Y 12/22/94	12/23/94
B0D4K3		W0272		QUANTERRA	N	N	N	N	Y 12/23/94	10/31/94 - SAF-B94-036	N	12/23/94
B0D4M6		W0272		QUANTERRA	N	N	N	Y 12/23/94	Y 12/23/94	10/26/94 - SAF-B94-036	Y 12/22/94	12/23/94
B0D4M7		W0272		QUANTERRA	N	N	N	N	Y 12/23/94	10/26/94 - SAF-B94-036	N	12/23/94
B0D4P6	EB	W0272		QUANTERRA	N	N	N	Y 12/23/94	Y 12/23/94	10/26/94 - SAF-B94-036	Y 12/22/94	12/23/94
B0D4P7		W0272		QUANTERRA	N	N	N	N	Y 12/23/94	10/26/94 - SAF-B94-036	N	12/23/94
B0D4P8		W0272		QUANTERRA	N	N	N	Y 12/23/94	Y 12/23/94	10/26/94 - SAF-B94-036	Y 12/22/94	12/23/94
B0D4P9		W0272		QUANTERRA	N	N	N	N	Y 12/23/94	10/26/94 - SAF-B94-036	N	12/23/94

Validation Rcvd 2-22-95

2/22/95

Data Validation Check List

for Project 200-BP-5

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

Data Entry Complete: DP DIA 2-22-95

DATATRAC

2-23-95

Validation Rcvd 2-22-95

Golder Associates Inc.

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

FEB 1995
RECEIVED
Validation
Log In

Golder Associates

February 21, 1995

Our ref: 943-1610.067.0400
94-1610/O/257

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

COPY

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

200 BP5 Rnd 2 Groundwater

Please call if you have any questions.

Sincerely,

GOLDER ASSOCIATES INC.

Christina I. Jensen

Christina I. Jensen
Task Manager

Enclosures

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

Golder Associates Inc.

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

COPY

Golder Associates

MAR 1995

March 7, 1995

Our ref: 943-1610.067.0400
94-1610/O/272

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

200-BP-5 Round 2, Final Report

Please call if you have any questions.

Sincerely,

GOLDER ASSOCIATES INC.

Christina I. Jensen

Christina I. Jensen
Task Manager

CIJ/lk

Enclosures

p:\environ\wbc\dv\summary.ltr

BHI-00400
Rev. 00

COPY

MAR 1995
RECEIVED
Validation
Log In

DATA VALIDATION SUMMARY REPORT FOR THE 200-BP-5 ROUND 2 GROUNDWATER SAMPLING TASK

Prepared for

Bechtel Hanford, Inc.
Richland, Washington

Prepared by

Golder Associates Inc.
Redmond, Washington

March 7, 1995

943-1610.067

0220ej1.rpt

CONTENTS

1.0 INTRODUCTION 1-1
1.1 CHEMICAL ANALYSES 1-1
1.2 RADIOCHEMICAL ANALYSES 1-2
1.3 WESTINGHOUSE HANFORD GUIDANCE USED 1-2
1.4 DEFICIENCIES 1-2
1.5 SAMPLES AND ANALYSES VALIDATED 1-2

2.0 METALS DATA VALIDATION SUMMARY 2-1
2.1 SUMMARY 2-1
2.1.1 Sample Delivery Groups 2-1
2.1.2 All Samples Validated 2-1
2.1.3 Westinghouse Hanford Validation Guidance Used 2-1
2.1.4 Data Quality Objectives 2-1
2.1.5 Deficiencies Noted 2-2
2.2 ANALYTICAL METHOD 2-2
2.2.1 Initial and Continuing Calibration 2-2
2.2.2 Blanks 2-3
2.3 HOLDING TIMES 2-4
2.4 ANALYTICAL ACCURACY 2-4
2.4.1 Spike Samples 2-4
2.4.2 Laboratory Control Samples 2-5
2.5 ANALYTICAL PRECISION 2-5
2.5.1 Laboratory Duplicates 2-5
2.5.2 Serial Dilution 2-5
2.5.3 Field Duplicates 2-5
2.5.4 Field Splits 2-6
2.6 GRAPHITE FURNACE PERFORMANCE 2-6
2.6.1 Analytical Spikes 2-6
2.7 SAMPLE RESULT QUANTITATION, VERIFICATION, AND REPORTED DETECTION LIMITS 2-6
2.8 SYSTEM PERFORMANCE AND OVERALL ASSESSMENT 2-7

3.0 GENERAL CHEMISTRY ANALYSIS DATA VALIDATION SUMMARY 3-1
3.1 SUMMARY 3-1
3.1.1 Sample Delivery Groups 3-1
3.1.2 All Samples Validated 3-1
3.1.3 Westinghouse Hanford Validation Guidance Used 3-1
3.1.4 Samples Analyzed 3-1
3.1.5 Deficiencies Noted 3-2
3.2 ANALYTICAL METHOD 3-2
3.2.1 Initial and Continuing Calibration 3-2
3.2.2 Blanks 3-2
3.3 HOLDING TIMES 3-3
3.4 ANALYTICAL ACCURACY 3-3
3.4.1 Matrix Spike and Matrix Spike Duplicates 3-3

CONTENTS (Cont.)

3.5 ANALYTICAL PRECISION 3-3
3.5.1 Laboratory Duplicates 3-3
3.5.2 Field Duplicates 3-3
3.5.3 Field Splits 3-3
3.6 COMPOUND IDENTIFICATION 3-4
3.7 SAMPLE RESULT QUANTITATION, VERIFICATION, AND REPORTED DETECTION LIMITS 3-4
3.8 SYSTEM PERFORMANCE AND OVERALL ASSESSMENT 3-4

4.0 RADIOCHEMISTRY DATA VALIDATION SUMMARY 4-1
4.1 SUMMARY 4-1
4.1.1 Sample Delivery Groups 4-1
4.1.2 All Samples Validated 4-1
4.1.3 Westinghouse Hanford Validation Guidance Used 4-1
4.1.4 Samples Analyzed 4-1
4.1.5 Deficiencies Noted 4-2
4.2 ANALYTICAL METHOD 4-2
4.2.1 Instrument Calibration 4-2
4.2.2 Blanks 4-2
4.2.3 Holding Times 4-3
4.3 ANALYTICAL ACCURACY 4-3
4.3.1 Laboratory Control Samples 4-3
4.3.2 Matrix Spikes 4-3
4.3.3 Chemical Yield 4-3
4.4 ANALYTICAL PRECISION 4-3
4.4.1 Laboratory Duplicates 4-3
4.4.2 Field Duplicates 4-4
4.4.3 Field Splits 4-4
4.5 SAMPLE RESULTS QUANTITATION, VERIFICATION AND REPORTED DETECTION LIMITS 4-4
4.6 SYSTEM PERFORMANCE AND OVERALL ASSESSMENT 4-5

5.0 REFERENCES 5-1

APPENDIXES:

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

CONTENTS (Cont.)

TABLES:

1-1. 200-BP-5 Data Validation, List of Samples Validated 1-3
1-2. Glossary of Inorganic Data Reporting Qualifiers 1-6
1-3. Glossary of Radiochemistry Data Reporting Qualifiers 1-7

1.0 INTRODUCTION

This report presents a summary of data validation results on groundwater samples collected for the 200-BP-5 Round 2 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 and Thermo Analytics.

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 specific levels of validation as described in the data validation procedures. 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, 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 78 water samples analyzed for selected target analyte list (TAL) metals, bismuth and silicon using CLP methodology.

- A total of 39 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 52 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. List of Samples Validated 200-BP-5 Round 2 Groundwater.

SAMPLE NUMBER	SAMPLE DATE	SAMPLE TYPE	COMMENTS	PACKAGE ID	LOCATION	VALIDATION LEVEL	M	C	R
B0D4N2	14-Oct-94	WATER	SPLIT	B0D4N2-TMA	299-E33-12	D	X	X	X
B0D4N3	14-Oct-94	WATER	SPLIT	B0D4N2-TMA	299-E33-12	D	X		
B0D4N6*	19-Oct-94	WATER	SPLIT	B0D4N2-TMA	699-53-55C	D	X	X	X
B0D4N7*	19-Oct-94	WATER	SPLIT	B0D4N2-TMA	699-53-55C	D	X		
B0D4P0	21-Oct-94	WATER	SPLIT	B0D4N2-TMA	699-52-54	D	X	X	X
B0D4P1	21-Oct-94	WATER	SPLIT	B0D4N2-TMA	699-52-54	D	X		
B0D4Q9*	13-Oct-94	WATER	SPLIT	B0D4Q9-TMA	299-E34-2	D			X
B0D4G0	14-Oct-94	WATER		W0250-QES	299-E33-12	A	X	X	X
B0D4G1	14-Oct-94	WATER		W0250-QES	299-E33-12	A	X		
B0D4G2	10-Oct-94	WATER		W0250-QES	299-E33-13	A	X	X	X
B0D4G3	10-Oct-94	WATER		W0250-QES	299-E33-13	A	X		
B0D4G4	10-Oct-94	WATER		W0250-QES	299-E33-14	A	X	X	X
B0D4G5	10-Oct-94	WATER		W0250-QES	299-E33-14	A	X		
B0D4H2	10-Oct-94	WATER		W0250-QES	299-E33-38	A	X	X	X
B0D4H3	10-Oct-94	WATER		W0250-QES	299-E33-38	A	X		
B0D4H8	11-Oct-94	WATER		W0250-QES	699-47-50	A	X	X	X
B0D4H9	11-Oct-94	WATER		W0250-QES	699-47-50	A	X		
B0D4J0	12-Oct-94	WATER		W0250-QES	699-47-60	A	X	X	X
B0D4J1	12-Oct-94	WATER		W0250-QES	699-47-60	A	X		
B0D4J2	12-Oct-94	WATER		W0250-QES	699-48-50	A	X	X	X
B0D4J3	12-Oct-94	WATER		W0250-QES	699-48-50	A	X		
B0D4J8	13-Oct-94	WATER		W0250-QES	699-49-57A	A	X	X	X
B0D4J9	13-Oct-94	WATER		W0250-QES	699-49-57A	A	X		
B0D4M4	11-Oct-94	WATER		W0250-QES	699-59-58	A	X	X	X
B0D4M5	11-Oct-94	WATER		W0250-QES	699-59-58	A	X		
B0D4M8	11-Oct-94	WATER		W0250-QES	699-60-60	A	X	X	X
B0D4M9	11-Oct-94	WATER		W0250-QES	699-60-60	A	X		
B0D4Q0	26-Oct-94	WATER		W0258-QES	299-E32-2	D			X
B0D4Q1	17-Oct-94	WATER		W0258-QES	299-E33-28	D			X
B0D4Q2*	17-Oct-94	WATER		W0258-QES	299-E33-29	D			X
B0D4Q3	14-Oct-94	WATER		W0258-QES	299-E33-30	D			X
B0D4Q4	23-Oct-94	WATER		W0258-QES	299-E33-34	D			X
B0D4Q5*	21-Oct-94	WATER		W0258-QES	299-E33-35	D			X
B0D4Q6	13-Oct-94	WATER		W0258-QES	299-E34-2	D			X
B0D4Q7	14-Oct-94	WATER		W0258-QES	299-E34-5	D			X
B0D4Q8	13-Oct-94	WATER	DUP	W0258-QES	299-E34-2	D			X
B0D4R0	17-Oct-94	WATER	FIELD BLANK	W0258-QES	299-E33-29	D			X
B0D4R1	21-Oct-94	WATER	EQUIP BLANK	W0258-QES	299-E33-35	D			X
B0D4H6*	18-Oct-94	WATER		W0260-QES	299-E33-40	D	X	X	X

Table 1-1. List of Samples Validated 200-BP-5 Round 2 Groundwater. (Cont.)

SAMPLE NUMBER	SAMPLE DATE	SAMPLE TYPE	COMMENTS	PACKAGE ID	LOCATION	VALIDATION LEVEL	M	C	R
B0D4H7	18-Oct-94	WATER		W0260-QES	299-E33-40	D	X		
B0D4J6	17-Oct-94	WATER		W0260-QES	699-49-55B	D	X	X	X
B0D4J7	17-Oct-94	WATER		W0260-QES	699-49-55B	D	X		
B0D4K0	18-Oct-94	WATER		W0260-QES	699-49-57B	D	X	X	X
B0D4K1*	18-Oct-94	WATER		W0260-QES	699-49-57B	D	X		
B0D4K4	19-Oct-94	WATER		W0260-QES	699-50-53B	D	X	X	X
B0D4K5	19-Oct-94	WATER		W0260-QES	699-50-53B	D	X		
B0D4K8	18-Oct-94	WATER		W0260-QES	699-52-57	D	X	X	X
B0D4K9	18-Oct-94	WATER		W0260-QES	699-52-57	D	X		
B0D4L0	19-Oct-94	WATER		W0260-QES	699-53-55A	D	X	X	X
B0D4L1	19-Oct-94	WATER		W0260-QES	699-53-55A	D	X		
B0D4L2	19-Oct-94	WATER		W0260-QES	699-53-55B	D	X	X	X
B0D4L3	19-Oct-94	WATER		W0260-QES	699-53-55B	D	X		
B0D4L4*	19-Oct-94	WATER		W0260-QES	699-53-55C	D	X	X	X
B0D4L5	19-Oct-94	WATER		W0260-QES	699-53-55C	D	X		
B0D4N0	19-Oct-94	WATER	DUPLICATE	W0260-QES	699-53-55C	D	X	X	X
B0D4N1	19-Oct-94	WATER	DUPLICATE	W0260-QES	699-53-55C	D	X		
B0D4N4	14-Oct-94	WATER	DUPLICATE	W0260-QES	299-E33-12	D	X	X	X
B0D4N5*	14-Oct-94	WATER	DUPLICATE	W0260-QES	299-E33-12	D	X		
B0D4R3	18-Oct-94	WATER		W0260-QES	299-E28-7	D			X
B0D4H0	21-Oct-94	WATER		W0267-QES	299-E33-26	D	X	X	X
B0D4H1	21-Oct-94	WATER		W0267-QES	299-E33-26	D	X		
B0D4H4*	20-Oct-94	WATER		W0267-QES	299-E33-39	D	X	X	X
B0D4H5	20-Oct-94	WATER		W0267-QES	299-E33-39	D	X		
B0D4K6	21-Oct-94	WATER		W0267-QES	699-52-54	D	X	X	X
B0D4K7	21-Oct-94	WATER		W0267-QES	699-52-54	D	X		
B0D4L6	20-Oct-94	WATER		W0267-QES	699-54-57	D	X	X	X
B0D4L7	20-Oct-94	WATER		W0267-QES	699-54-57	D	X		
B0D4L8	24-Oct-94	WATER		W0267-QES	699-55-55	D	X	X	X
B0D4L9*	24-Oct-94	WATER		W0267-QES	699-55-55	D	X		
B0D4M0	25-Oct-94	WATER		W0267-QES	699-55-57	D	X	X	X
B0D4M1	25-Oct-94	WATER		W0267-QES	699-55-57	D	X		
B0D4M2*	23-Oct-94	WATER		W0267-QES	699-57-59	D	X	X	X
B0D4M3	23-Oct-94	WATER		W0267-QES	699-57-59	D	X		
B0D4N8	21-Oct-94	WATER	DUPLICATE	W0267-QES	699-52-54	D	X	X	X
B0D4N9	21-Oct-94	WATER	DUPLICATE	W0267-QES	699-52-54	D	X		
B0D4P2	24-Oct-94	WATER	FIELD BLANK	W0267-QES	699-55-55	D	X	X	X
B0D4P3*	24-Oct-94	WATER	FIELD BLANK	W0267-QES	699-55-55	D	X		
B0D4P4	20-Oct-94	WATER	FIELD BLANK	W0267-QES	699-54-57	D	X	X	X

Table 1-1. List of Samples Validated 200-BP-5 Round 2 Groundwater. (Cont.)

SAMPLE NUMBER	SAMPLE DATE	SAMPLE TYPE	COMMENTS	PACKAGE ID	LOCATION	VALIDATION LEVEL	M	C	R
B0D4P5	20-Oct-94	WATER	FIELD BLANK	W0267-QES	699-54-57	D	X		
B0D4F8	26-Oct-94	WATER		W0272-QES	299-E33-7	D	X	X	X
B0D4F9	26-Oct-94	WATER		W0272-QES	299-E33-7	D	X		
B0D4G6*	27-Oct-94	WATER		W0272-QES	299-E33-15	D	X	X	X
B0D4G7	27-Oct-94	WATER		W0272-QES	299-E33-15	D	X		
B0D4K2	28-Oct-94	WATER		W0272-QES	699-50-53A	D	X	X	X
B0D4K3	28-Oct-94	WATER		W0272-QES	699-50-53A	D	X		
B0D4M6	25-Oct-94	WATER		W0272-QES	699-60-57	D	X	X	X
B0D4M7*	25-Oct-94	WATER		W0272-QES	699-60-57	D	X		
B0D4P6*	25-Oct-94	WATER	EQUIP BLANK	W0272-QES	699-60-57	D	X	X	X
B0D4P7	25-Oct-94	WATER	EQUIP BLANK	W0272-QES	699-60-57	D	X		
B0D4P8	25-Oct-94	WATER	EQUIP BLANK	W0272-QES	699-60-57	D	X	X	X
B0D4P9	25-Oct-94	WATER	EQUIP BLANK	W0272-QES	699-60-57	D	X		

*Indicates sample results which were 100% validated.
M - metals
C - general chemistry
R - radiochemistry

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 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.

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), validation procedures (WHC 1993a) and 200-BP-5 Sampling and Analysis Plan (DOE/RL 88-32). 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
B0D4N2-TMA	6
W0267-QES	20
W0272-QES	12
W0250-QES	20
W0260-QES	20

2.1.2 All 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 200-BP-5 Round 2 Groundwater Sampling task.

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

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

Field split sample RPDs were acceptable with the exception of cyanide (see Section 2.5.4).

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

- **Accuracy.** Laboratory spike recoveries were acceptable with the exception of selenium and silicon (see Section 2.4.1).

  Analytical spike recoveries were acceptable with the exception of selenium (see Section 2.6).

  Laboratory control sample recoveries were acceptable with the exception of silicon (see Section 2.4.2).

- **Representativeness.** Field duplicate sample RPD values were acceptable for all sample sets (see Section 2.5.3).

- **Completeness.** Overall, 78 samples were validated for metals with 858 results reported, all of which were deemed valid. This results in a completeness of 100 percent which meets the Sampling and Analysis Plan completeness objective 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, cyanide, bismuth and silicon.

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 B0D4N2-TMA. Aluminum.

Data Package W0267-QES. Bismuth, cyanide, iron, magnesium, manganese and sodium.

Data Package W0272-QES. Cyanide, magnesium and manganese.

Data Package W0260-QES. Iron, manganese and selenium.

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

Data Package W0267-QES. Aluminum.

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 B0D4N2-TMA. Iron, aluminum and selenium.

Data Package W0267-QES. Bismuth, iron and manganese.

Data Package W0272-QES. Aluminum, calcium, iron, magnesium, manganese and sodium.

Data Package W0260-QES. Iron and manganese.

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.

2.2.2.3 Equipment Blanks. Samples B0D4P6, B0D4P7, B0D4P8 and B0D4P9 were identified as equipment blanks with the following analytes and concentrations detected:

- B0D4P6: calcium (153 ug/L), sodium (355 ug/L) and silicon (104 ug/L).
- B0D4P7: calcium (19600 ug/L), magnesium (5790 ug/L), manganese (46.1 ug/L), sodium (42100 ug/L) and silicon (20100 ug/L).
- B0D4P8: iron (430 ug/L), manganese (3.6 ug/L) and silicon (81.2 ug/L).
- B0D4P9: iron (145 ug/L), silicon (63.7 ug/L) and bismuth (39.5 ug/L).

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

2.2.2.4 Field Blanks. Samples B0D4P2, B0D4P3, B0D4P4 and B0D4P5 were identified as field blanks with the following analytes and concentrations detected:

- B0D4P2: calcium (14900 ug/L), iron (244 ug/L), magnesium (3510 ug/L), sodium (1850 ug/L) and silicon (1330 ug/L).
- B0D4P3: calcium (11600 ug/L), iron (409 ug/L), magnesium (2730 ug/L), sodium (1470 ug/L) and silicon (1070 ug/L).
- B0D4P4: calcium (2360 ug/L) and silicon (224 ug/L).
- B0D4P5: calcium (2190 ug/L) and silicon (270 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.

2.4 ANALYTICAL ACCURACY

2.4.1 Spike Samples

Matrix spike percent recoveries (%R) were acceptable with the following exceptions:

Data Package B0D4N2-TMA. Silicon.

Data Packages W0267-QES, W0272-QES and W0260-QES. Selenium.

In accordance with the data validation procedures, matrix spike recoveries greater than 125% or less than 75% and greater than the IDL were qualified as estimated (J for detects), and

recoveries greater than 30% and less than 75% and less than the IDL were qualified as estimated (UJ for nondetects).

2.4.2 Laboratory Control Samples

All laboratory control sample percent recoveries were acceptable for all data packages with the following exception:

Data Package B0D4N2-TMA. Silicon.

In accordance with the data validation procedures, sodium results above the instrument detection limit (IDL) were qualified as estimated (BJ).

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 W0267-QES. Iron.

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 W0267-QES. Magnesium.

Data Package B0D4N2-TMA. Potassium.

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

2.5.3 Field Duplicates

A total of six 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 six 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 with the following exceptions:

Split set B0D4G0/B0D4N2. Cyanide.

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

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 W0267-QES. Selenium, samples B0D4L6, B0D4L7, B0D4H4, B0D4H5, B0D4P2 and B0D4M0.

Data Package W0272-QES. Selenium, samples B0D4M6, B0D4M7, B0D4P7, B0D4F8, B0D4F9, B0D4G6 and B0D4G7.

Data Package W0260-QES. Selenium, samples B0D4J6, B0D4J7, B0D4H6, B0D4H7, B0D4K0, B0D4K1, B0D4K8, B0D4K9, B0D4K4 and B0D4L0.

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.

For data package W0272-QES, equipment blank B0D4P7 and sample B0D4M7, a possibility exists that the sample containers may have been mislabeled or mishandled in the laboratory due to the comparison of the equipment blank with other blanks in the batch and the comparison of the sample results with other sample results.

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
W0260-QES	10
W0250-QES	10
W0272-QES	6
W0267-QES	10
B0D4N2-TMA	3

3.1.2 All 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 200-BP-5 Round 2 Groundwater Sampling task.

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

  All field duplicate sample RPD results were acceptable.

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

- **Accuracy.** All matrix spike were within specified control limits.
- **Representativeness.** All field duplicate RPD values were acceptable.
- **Completeness.** Overall, 39 water samples were validated for general chemistry with 286 results reported, 210 of which were deemed valid. This results in a completeness of 73% which does not meet normal work plan QAPjP objectives of 90%.
- **Comparability.** Field split RPD values were acceptable with the exception of chloride (see Section 3.5.3). All results were reported in common units (miligrams per liter, mg/L) 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 Field Blanks. Samples B0D4P6, B0D4P8, B0D4P4, and B0D4P2 were identified as equipment blanks with total dissolved solids were detected at 188, 21, 71, and 273 mg/L, respectively.

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 W0260-QES and W0250-QES. Nitrate, nitrite and phosphate.

Data Packages W0272-QES, W0267-QES and B0D4N2. Nitrite and phosphate.

In accordance with the validation requirements, undetected results associated with greatly 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.

3.5 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 three field duplicate sets were collected and analyzed for general chemistry parameters. Appendix B presents a summary of the primary and duplicate sample results and the calculated RPD values. All RPD values were acceptable.

3.5.3 Field Splits

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

Sample set B0D4G0/B0D4N2: chloride.

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 D provides a summary of all validated data results and Appendix E provides a summary of the field QC results.

4.1.1 Sample Delivery Groups

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

Data Package ID	No. of Samples
W0250-QES	10
W0258-QES	11
W0260-QES	11
W0267-QES	10
W0272-QES	6
B0D4N2-TMA	3
B0D4Q9-TMA	1

4.1.2 All 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 200-BP-5 Round 2 Groundwater Sampling task.

- **Precision.** Laboratory duplicate RPD results were acceptable for all data packages with the exception of gross alpha and gross beta (see Section 4.4.1).

  Field duplicate RPD results were acceptable all sample sets collected with the exception of gross beta (see Section 4.4.2).

- **Accuracy.** Laboratory control sample (LCS) and matrix spike (MS) recoveries were acceptable for all results with the exception of the MS for tritium (see Section 4.3.2).

- **Representativeness.** Field duplicate RPDs were acceptable with the exception of gross alpha (see Section 4.4.2).

  Field split sample RPDs were acceptable with the exception of gross beta, technetium-99, total uranium (see Section 4.4.3).

- **Completeness.** A total of 52 samples were validated for radiochemistry parameters with 770 results reported. All results were deemed valid. This results in a completeness of 100% which meets normal work plan objectives of 90%.

- **Comparability.** All results were reported in common units (microgram per liter, ug/L for total uranium, and pico-curie per liter, pCi/L for all other isotopes) facilitating comparison of results.

4.1.5 Deficiencies Noted

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 with the exception of the following.

Data package W0267-QES. Technetium-99.

4.2.2.2 Field Blanks. Samples B0D4P4, B0D4P2, B0D4R0 were identified as equipment blanks and samples B0D4P6, B0D4P8 and B0D4R1 were identified as field blanks. All sample results were acceptable with the following exceptions:

Sample B0D4P2: Technetium-99 (2.68 pCi/L) and total uranium (0.26 ug/L).

Sample B0D4P4: Total uranium (0.019 ug/L).

In accordance with the validation requirements, no qualification is required for field QC samples.

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 Package W0267-QES. Tritium matrix spike analysis was not performed.

Data Package W0272-QES. Tritium matrix spike analysis was 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

The yield of carriers and tracers was 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 B0D4N2-TMA. Gross alpha for samples B0D4N6, B0D4N2, and B0D4P0; gross beta for sample B0D4P0.

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

4.4.2 Field Duplicates

Four 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 results are acceptable with the following exceptions:

Sample set B0D4K6/B0D4P0: gross beta.

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

4.4.3 Field Splits

Four 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 results were acceptable with the following exceptions:

Sample sets B0D4K6/B0D4P0 and B0D4L4/B0D4N6: Gross beta, technetium-99 and total uranium.

Sample set B0D4G0/B0D4N2: Gross beta and total uranium.

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 and were calculated properly with the exception of the following:

Data Package B0D4N2-TMA. MDAs could not be confirmed by recalculation for Pu-238 results for samples B0D4N2 and B0D4N6, therefore, nondetected results were qualified as estimated (UJ). Also, the MDA exceeded the RDL for technetium-99 and europium-155, however, no qualification was required.

Data Package W0260-QES. Detection limits were met with the exception of gross beta for sample B0D4K8; gross alpha for samples B0D4N4, B0D4K8, B0D4N0, B0D4L2 and B0D4L4. Data qualification was not required.

Data Package W0272-QES. The required detection limit (RDL) for gross alpha was elevated to 6 pCi/L due to the available analysis volume. Data qualification was not required.

Data Package W0267-QES. The MDA for technetium-99 was incorrectly reported on the sample result form based on the raw data. Data qualification was not required.

Data Packages B0D4N2-TMA and B0D4Q9-TMA. The gamma scan results originally reported as "U" on the sample result forms were elevated to the MDA and qualified as undetected.

4.6 SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

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

5.0 REFERENCES

DOE-RL 88-32, 200-BP-1 Sampling and Analysis Plan, Department of Energy, Richland, Washington.

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

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

WHC 1994, Environmental and Waste Characterization Analytical Data Validation, Statement of Work, MSH-SWV-315905, August 10, 1994, Westinghouse Hanford Company, Richland, Washington.

APPENDIX A

Metals Validated Data Summary Tables

	Samp#	B0D4F8		B0D4F9		B0D4G0		B0D4G1		B0D4G2		B0D4G3	
	Date	10-26-94		10-26-94		10-14-94		10-14-94		10-10-94		10-10-94	
	Location	299-E33-7		299-E33-7		299-E33-12		299-E33-12		299-E33-13		299-E33-13	
	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	28.200	U	40.900	U	33.600	B	39.800	B	28.600	B	24.900	U
CALCIUM	UG/L	50600.000		50300.000		32400.000		32500.000		41000.000		40500.000	
IRON	UG/L	1220.000		629.000		126.000		54.200	B	283.000		89.800	B
MAGNESIUM	UG/L	13800.000		13700.000		9800.000		9820.000		14200.000		14100.000	
MANGANESE	UG/L	18.600		8.200	B	3.000	B	3.100	B	4.100	B	3.500	B
POTASSIUM	UG/L	5950.000		7070.000		10900.000		10700.000		6670.000		5810.000	
SELENIUM	UG/L	1.700	UJ	1.700	UJ	1.700	U	1.700	U	1.700	U	1.700	U
SODIUM	UG/L	26100.000		25400.000		22800.000		23000.000		21400.000		21400.000	
CYANIDE	UG/L	24.200		NR		22.300		NR		10.700		NR	
BISMUTH	UG/L	74.200	B	69.700	B	38.000	U	38.000	U	38.000	U	38.000	U
SILICON	UG/L	18400.000		18100.000		26900.000		27000.000		17500.000		17200.000	

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

	Samp#	B0D4G4		B0D4G5		B0D4G6		B0D4G7		B0D4H0		B0D4H1	
	Date	10-10-94		10-10-94		10-27-94		10-27-94		10-21-94		10-21-94	
	Location	299-E33-14		299-E33-14		299-E33-15		299-E33-15		299-E33-26		299-E33-26	
	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	53.700	B	32.400	B	24.900	U	28.900	U	24.900	U	24.900	U
CALCIUM	UG/L	40200.000		39600.000		38400.000		40600.000		30200.000		38800.000	
IRON	UG/L	1300.000		53.300	B	63.900	U	40.500	U	307.000	J	60.600	BJ
MAGNESIUM	UG/L	11500.000		11300.000		11800.000		12400.000		10300.000	J	12100.000	J
MANGANESE	UG/L	21.700		7.100	B	4.900	U	3.700	U	15.000		9.500	U
POTASSIUM	UG/L	9630.000		8040.000		6140.000		5650.000		1940.000	U	4850.000	B
SELENIUM	UG/L	1.700	U	1.700	U	1.700	UJ	1.700	UJ	6.500	UJ	6.500	UJ
SODIUM	UG/L	22900.000		22700.000		20100.000		21200.000		20900.000		20900.000	
CYANIDE	UG/L	1.200	U	NR		1.200	U	NR		4.000	U	NR	
BISMUTH	UG/L	38.000	U	38.000	U	78.600	B	52.400	B	38.000	U	100.000	U
SILICON	UG/L	17600.000		17200.000		17100.000		18100.000		15800.000		18000.000	

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

	Samp#	B0D4H2		B0D4H3		B0D4H4		B0D4H5		B0D4H6		B0D4H7	
	Date	10-10-94		10-10-94		10-20-94		10-20-94		10-18-94		10-18-94	
	Location	299-E33-38		299-E33-38		299-E33-39		299-E33-39		299-E33-40		299-E33-40	
	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	24.900	U	54.300	B	38.200	B	24.900	U	25.100	B	24.900	U
CALCIUM	UG/L	39700.000		39300.000		42600.000		44000.000		31300.000		29800.000	
IRON	UG/L	93.000	B	299.000		556.000	J	226.000	J	116.000	U	59.900	U
MAGNESIUM	UG/L	12300.000		12200.000		12500.000	J	12500.000	J	8890.000		8430.000	
MANGANESE	UG/L	4.400	B	4.400	B	9.500	U	7.700	U	41.800		39.500	
POTASSIUM	UG/L	6030.000		8030.000		6880.000		6490.000		7020.000		6930.000	
SELENIUM	UG/L	1.700	U	1.700	U	6.500	UJ	1.300	UJ	1.700	UJ	1.700	UJ
SODIUM	UG/L	20400.000		20800.000		23400.000		23500.000		12900.000		12100.000	
CYANIDE	UG/L	11.400		NR		1.200	U	NR		1.200	U	NR	
BISMUTH	UG/L	38.000	U	38.000	U	38.000	U	38.000	U	58.800	B	39.700	B
SILICON	UG/L	17500.000		17300.000		20000.000		20000.000		25400.000		24100.000	

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

	Samp#	B0D4H8		B0D4H9		B0D4J0		B0D4J1		B0D4J2		B0D4J3	
	Date	10-11-94		10-11-94		10-12-94		10-12-94		10-12-94		10-12-94	
	Location	699-47-50		699-47-50		699-47-60		699-47-60		699-48-50		699-48-50	
	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	38.900	B	38.300	B	29.600	B	24.900	U	41.100	B	24.900	U
CALCIUM	UG/L	52600.000		51500.000		37500.000		38600.000		44700.000		47000.000	
IRON	UG/L	481.000		121.000		545.000		54.700	B	232.000		202.000	
MAGNESIUM	UG/L	15100.000		14900.000		12200.000		12500.000		14600.000		15200.000	
MANGANESE	UG/L	8.300	B	6.900	B	6.600	B	4.200	B	8.100	B	5.000	B
POTASSIUM	UG/L	6840.000		7840.000		5150.000		6800.000		7860.000		6960.000	
SELENIUM	UG/L	8.500	U	8.500	U	9.000	B	1.700	U	8.500	U	8.500	U
SODIUM	UG/L	20400.000		20300.000		25400.000		25800.000		23900.000		24600.000	
CYANIDE	UG/L	1.200	U	NR		1.200	U	NR		1.200	U	NR	
BISMUTH	UG/L	42.700	B	38.000	U	38.000	U	38.000	U	40.600	B	48.900	B
SILICON	UG/L	20000.000		19600.000		18500.000		19100.000		17500.000		18400.000	

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

	Samp#	B0D4J6		B0D4J7		B0D4J8		B0D4J9		B0D4K0		B0D4K1	
	Date	10-17-94		10-17-94		10-13-94		10-13-94		10-18-94		10-18-94	
	Location	699-49-55B		699-49-55B		699-49-57A		699-49-57A		699-49-57B		699-49-57B	
	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	24.900	U	24.900	U	25.800	B	24.900	U	24.900	U	27.700	B
CALCIUM	UG/L	30000.000		29600.000		42900.000		41100.000		34500.000		34500.000	
IRON	UG/L	253.000		46.000	U	413.000		105.000		96.200	U	47.500	U
MAGNESIUM	UG/L	9820.000		9700.000		13100.000		12600.000		8070.000		8470.000	
MANGANESE	UG/L	4.400	B	2.600	B	4.800	B	2.800	B	8.100	U	8.800	U
POTASSIUM	UG/L	6640.000		6120.000		8870.000		7610.000		5570.000		4270.000	B
SELENIUM	UG/L	1.700	UJ	1.700	UJ	8.500	U	8.500	U	1.700	UJ	1.700	UJ
SODIUM	UG/L	10000.000		9950.000		38600.000		37600.000		22600.000		23600.000	
CYANIDE	UG/L	1.200	U	NR		52.500		NR		1.200	U	NR	
BISMUTH	UG/L	38.000	U	38.000	U	38.000	U	38.000	U	38.000	U	38.000	U
SILICON	UG/L	25900.000		25400.000		19600.000		18900.000		17900.000		18800.000	

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

	Samp#	B0D4K2		B0D4K3		B0D4K4		B0D4K5		B0D4K6		B0D4K7	
	Date	10-28-94		10-28-94		10-19-94		10-19-94		10-21-94		10-21-94	
	Location	699-50-53A		699-50-53A		699-50-53B		699-50-53B		699-52-54		699-52-54	
	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	49.900	U	24.900	U	24.900	U	24.900	U	24.900	U	24.900	U
CALCIUM	UG/L	158000.000		159000.000		40600.000		41100.000		97100.000		101000.000	
IRON	UG/L	289.000		195.000		346.000		72.600	U	352.000	J	133.000	J
MAGNESIUM	UG/L	42300.000		42500.000		11400.000		11600.000		30300.000	J	30400.000	J
MANGANESE	UG/L	9.500	B	8.800	B	7.800	B	6.200	B	10.800	B	6.600	U
POTASSIUM	UG/L	9870.000		12900.000		7910.000		8420.000		1940.000	U	10100.000	
SELENIUM	UG/L	24.300	J	26.800	J	1.700	UJ	8.500	UJ	12.300	BJ	10.800	BJ
SODIUM	UG/L	41600.000		40800.000		12100.000		12400.000		46100.000		45100.000	
CYANIDE	UG/L	189.000		NR		1.200	U	NR		160.000		NR	
BISMUTH	UG/L	159.000		193.000		38.000	U	38.000	U	46.300	U	135.000	U
SILICON	UG/L	18100.000		18200.000		27700.000		28100.000		18000.000		18200.000	

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

	Samp#	B0D4K8		B0D4K9		B0D4L0		B0D4L1		B0D4L2		B0D4L3	
	Date	10-18-94		10-18-94		10-19-94		10-19-94		10-19-94		10-19-94	
	Location	699-52-57		699-52-57		699-53-55A		699-53-55A		699-53-55B		699-53-55B	
	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	74.500	B	35.000	B	37.800	B	24.900	U	24.900	U	24.900	U
CALCIUM	UG/L	47100.000		45400.000		36300.000		37500.000		59100.000		62900.000	
IRON	UG/L	1780.000		396.000		606.000		65.700	U	615.000		133.000	U
MAGNESIUM	UG/L	10300.000		10600.000		12100.000		12000.000		18400.000		19500.000	
MANGANESE	UG/L	1110.000		1120.000		26.900		21.200		25.500		18.200	
POTASSIUM	UG/L	8040.000		8210.000		9950.000		10700.000		7750.000		7540.000	
SELENIUM	UG/L	8.500	UJ	8.500	UJ	1.800	UJ	8.500	UJ	8.500	UJ	8.500	UJ
SODIUM	UG/L	51900.000		51200.000		24800.000		25000.000		27600.000		29200.000	
CYANIDE	UG/L	1.200	U	NR		1.200	U	NR		42.100		NR	
BISMUTH	UG/L	58.700	B	38.000	U	38.000	U	41.100	B	38.000	U	39.400	B
SILICON	UG/L	9520.000		9290.000		17300.000		18600.000		16400.000		17500.000	

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

	Samp#	B0D4L4		B0D4L5		B0D4L6		B0D4L7		B0D4L8		B0D4L9	
	Date	10-19-94		10-19-94		10-20-94		10-20-94		10-24-94		10-24-94	
	Location	699-53-55C		699-53-55C		699-54-57		699-54-57		699-55-55		699-55-55	
	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	132.000	B	24.900	U	25.600	B	25.500	B	24.900	U	24.900	U
CALCIUM	UG/L	66200.000		65600.000		33700.000		32100.000		27300.000		27600.000	
IRON	UG/L	92.900	U	65.200	U	320.000	J	156.000	UJ	141.000	J	58.900	BJ
MAGNESIUM	UG/L	18900.000		18800.000		11200.000	J	11500.000	J	10300.000	J	10400.000	J
MANGANESE	UG/L	3.600	U	3.600	U	9.400	U	8.100	U	5.000	U	3.400	U
POTASSIUM	UG/L	8130.000		7760.000		5390.000		8520.000		3910.000	B	4190.000	B
SELENIUM	UG/L	8.500	UJ	8.500	UJ	1.300	UJ	6.500	UJ	6.500	UJ	6.500	UJ
SODIUM	UG/L	27700.000		27600.000		14100.000		14500.000		25800.000		25800.000	
CYANIDE	UG/L	51.000		NR		1.200	U	NR		5.400	U	NR	
BISMUTH	UG/L	38.700	B	38.000	U	38.000	U	41.000	B	98.500	U	102.000	U
SILICON	UG/L	19700.000		19500.000		32900.000		33800.000		17000.000		17000.000	

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

	Samp#	B0D4M0		B0D4M1		B0D4M2		B0D4M3		B0D4M4		B0D4M5	
	Date	10-25-94		10-25-94		10-23-94		10-23-94		10-11-94		10-11-94	
	Location	699-55-57		699-55-57		699-57-59		699-57-59		699-59-58		699-59-58	
	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	24.900	U	24.900	U	24.900	U	24.900	U	24.900	U	24.900	U
CALCIUM	UG/L	79500.000		79200.000		31100.000		31000.000		25800.000		25600.000	
IRON	UG/L	384.000	J	94.200	BJ	70.500	BJ	114.000	J	292.000		28.000	B
MAGNESIUM	UG/L	22600.000	J	22400.000	J	9650.000	J	9630.000	J	8460.000		8410.000	
MANGANESE	UG/L	27.200		24.200		5.100	U	5.700	U	2.800	B	2.000	B
POTASSIUM	UG/L	6910.000		5080.000		4700.000	B	4140.000	B	5860.000		5120.000	
SELENIUM	UG/L	11.600	BJ	8.600	BJ	6.500	UJ	6.500	UJ	1.700	U	1.700	U
SODIUM	UG/L	29600.000		29900.000		26600.000		26600.000		29700.000		29900.000	
CYANIDE	UG/L	78.900		NR		3.100	U	NR		7.100		NR	
BISMUTH	UG/L	118.000	U	123.000	U	96.800	U	91.000	U	38.000	U	38.000	U
SILICON	UG/L	15300.000		15400.000		19200.000		19100.000		18900.000		18800.000	

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

	Samp#	B0D4M6		B0D4M7		B0D4M8		B0D4M9		B0D4N0		B0D4N1	
	Date	10-25-94		10-25-94		10-11-94		10-11-94		10-19-94		10-19-94	
	Location	699-60-57		699-60-57		699-60-60		699-60-60		699-53-55C		699-53-55C	
	Depth	---		---		---		---		---		---	
	Type	WATER		WATER		WATER		WATER		WATER		WATER	
	Comments									DUPLICATE		DUPLICATE	
Parameter	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
ALUMINUM	UG/L	24.900	U	24.900	U	24.900	U	50.800	B	24.900	U	24.900	U
CALCIUM	UG/L	19400.000		71.200	U	33100.000		32900.000		65900.000		64700.000	
IRON	UG/L	179.000		60.600	U	512.000		33.500	B	279.000		57.500	U
MAGNESIUM	UG/L	5730.000		102.000	U	10200.000		10100.000		18900.000		18600.000	
MANGANESE	UG/L	44.600		2.900	U	7.200	B	3.400	B	4.400	U	3.600	U
POTASSIUM	UG/L	8040.000		1940.000	U	5480.000		7720.000		8970.000		8980.000	
SELENIUM	UG/L	1.700	UJ	1.700	UJ	1.700	U	1.700	U	8.500	UJ	8.500	UJ
SODIUM	UG/L	40400.000		235.000	U	26800.000		26500.000		27500.000		27300.000	
CYANIDE	UG/L	1.700	U	NR		3.700	B	NR		49.900		NR	
BISMUTH	UG/L	38.000	U	49.700	B	38.000	U	38.000	U	61.300	B	39.500	B
SILICON	UG/L	19900.000		27.300	B	17900.000		17600.000		19800.000		19400.000	

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

	Samp#	B0D4N2		B0D4N3		B0D4N4		B0D4N5		B0D4N6		B0D4N7	
	Date	10-14-94		10-14-94		10-14-94		10-14-94		10-19-94		10-19-94	
	Location	299-E33-12		299-E33-12		299-E33-12		299-E33-12		699-53-55C		699-53-55C	
	Depth	---		---		---		---		---		---	
	Type	WATER		WATER		WATER		WATER		WATER		WATER	
	Comments	SPLIT		SPLIT		DUPLICATE		DUPLICATE		SPLIT		SPLIT	
Parameter	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
ALUMINUM	UG/L	16.600	U	46.400	U	63.700	B	33.400	B	16.600	U	16.600	U
CALCIUM	UG/L	28900.000		30100.000		31800.000		31700.000		58300.000		59400.000	
IRON	UG/L	132.000		24.600	U	196.000		88.300	U	38.800	B	60.600	U
MAGNESIUM	UG/L	8430.000		9010.000		9650.000		9620.000		16600.000		16900.000	
MANGANESE	UG/L	0.900	U	2.400	B	3.200	U	2.200	U	0.900	U	0.900	U
POTASSIUM	UG/L	7720.000	J	8490.000		8590.000		7580.000		7760.000		7630.000	
SELENIUM	UG/L	3.100	B	3.900	B	8.500	UJ	1.700	UJ	8.500	J	8.300	
SODIUM	UG/L	21000.000		22100.000		22600.000		22300.000		25300.000		26000.000	
CYANIDE	UG/L	39.500		NR		24.000		NR		58.000		NR	
BISMUTH	UG/L	387.000	U	387.000	U	38.000	U	38.000	U	387.000	U	387.000	U
SILICON	UG/L	26000.000	J	27700.000	J	27600.000		27400.000		17400.000		18700.000	J

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

	Samp#	B0D4N8		B0D4N9		B0D4P0		B0D4P1		B0D4P2		B0D4P3	
	Date	10-21-94		10-21-94		10-21-94		10-21-94		10-24-94		10-24-94	
	Location	699-52-54		699-52-54		699-52-54		699-52-54		699-55-55		699-55-55	
	Depth	---		---		---		---		---		---	
	Type	WATER		WATER		WATER		WATER		WATER		WATER	
	Comments	DUPLICATE		DUPLICATE		SPLIT		SPLIT		FIELD BLANK		FIELD BLANK	
Parameter	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
ALUMINUM	UG/L	32.400	J	24.900	U	115.000	U	16.600	U	24.900	U	24.900	U
CALCIUM	UG/L	102000.000		101000.000		88900.000		87100.000		14900.000		11600.000	
IRON	UG/L	308.000	J	122.000	J	554.000		91.500	U	244.000	J	409.000	J
MAGNESIUM	UG/L	31000.000	J	30500.000	J	26900.000		26300.000		3510.000	BJ	2730.000	BJ
MANGANESE	UG/L	9.900	U	6.100	U	9.900	B	0.900	U	7.200	U	5.400	U
POTASSIUM	UG/L	8150.000		8300.000		10100.000		10000.000		1940.000	U	1940.000	U
SELENIUM	UG/L	8.600	BJ	8.800	BJ	11.200	J	13.100		1.300	UJ	1.300	UJ
SODIUM	UG/L	46100.000		45400.000		41200.000		41900.000		1850.000	B	1470.000	B
CYANIDE	UG/L	143.000		NR		164.000		NR		2.100	U	NR	
BISMUTH	UG/L	106.000	U	129.000	U	387.000	U	387.000	U	90.800	U	63.800	U
SILICON	UG/L	18600.000		18200.000		16300.000		17000.000	J	1330.000		1070.000	

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

	Samp#	B0D4P4		B0D4P5		B0D4P6		B0D4P7		B0D4P8		B0D4P9	
	Date	10-20-94		10-20-94		10-25-94		10-25-94		10-25-94		10-25-94	
	Location	699-54-57		699-54-57		699-60-57		699-60-57		699-60-57		699-60-57	
	Depth	---		---		---		---		---		---	
	Type	WATER		WATER		WATER		WATER		WATER		WATER	
	Comments	FIELD BLANK		FIELD BLANK		EQUIP BLANK		EQUIP BLANK		EQUIP BLANK		EQUIP BLANK	
Parameter	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
ALUMINUM	UG/L	24.900	U	24.900	U	24.900	U	24.900	U	24.900	U	24.900	U
CALCIUM	UG/L	2360.000	B	2190.000	B	153.000	B	19600.000		125.000	U	49.600	U
IRON	UG/L	45.100	UJ	45.300	UJ	88.600	U	44.000	U	430.000		145.000	
MAGNESIUM	UG/L	1000.000	UJ	1000.000	UJ	119.000	U	5790.000		104.000	U	127.000	U
MANGANESE	UG/L	5.100	U	5.200	U	1.700	U	46.100		3.600	B	1.700	U
POTASSIUM	UG/L	1940.000	U	1940.000	U	1940.000	U	8180.000		1940.000	U	1940.000	U
SELENIUM	UG/L	1.300	UJ	1.300	UJ	1.700	UJ	1.700	UJ	1.700	UJ	1.700	UJ
SODIUM	UG/L	643.000	U	678.000	U	355.000	B	42100.000		248.000	U	254.000	U
CYANIDE	UG/L	1.200	U	NR		2.400	U	NR		1.200	U	NR	
BISMUTH	UG/L	38.000	U	38.000	U	38.000	U	38.000	U	38.000	U	39.500	B
SILICON	UG/L	224.000		270.000		104.000		20100.000		81.200	B	63.700	B

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

APPENDIX B

Metals Validated Field Quality Control Sample Summary

METALS DUPLICATES (μg/L)						
SAMPLE:		B0D4G0		B0D4N4		
DATE:		10/14/94		10/14/94		
LOCATION:		299-E33-12		299-E33-12		
COMMENTS:				DUPLICATE		
PARAMETER	CRDL	RESULT	Q	RESULT	Q	RPD
ALUMINUM	200	33.6	B	63.7	B	61.87
BISMUTH	60	38	U	38	U	NC
CALCIUM	5000	32400		31800		1.869
CYANIDE	10	22.3		24		7.343
IRON	100	126		196		43.47
MAGNESIUM	5000	9800		9650		1.542
MANGANESE	15	3	B	3.2	U	200
POTASSIUM	5000	10900		8590		23.70
SELENIUM	5	1.7	U	8.5	UJ	NC
SILICON		26900		27600		2.568
SODIUM	5000	22800		22600		.8810

METALS DUPLICATES (μg/L)						
SAMPLE:		B0D4G1		B0D4N5		
DATE:		10/14/94		10/14/94		
LOCATION:		299-E33-12		299-E33-12		
COMMENTS:				DUPLICATE		
PARAMETER	CRDL	RESULTS	Q	RESULTS	Q	RPD
ALUMINUM	200	39.8	B	33.4	B	17.48
BISMUTH	60	38	U	38	U	NC
CALCIUM	5000	32500		31700		2.492
IRON	100	54.2	B	88.3	U	200
MAGNESIUM	5000	9820		9620		2.057
MANGANESE	15	3.1	B	2.2	U	200
POTASSIUM	5000	10700		7580		34.13
SELENIUM	5	1.7	U	1.7	UJ	NC
SILICON		27000		27400		1.470
SODIUM	5000	23000		22300		3.090

METALS DUPLICATES (μg/L)						
SAMPLE:		B0D4K6		B0D4N8		
DATE:		10/24/94		10/24/94		
LOCATION:		699-52-54		699-52-54		
COMMENTS:				DUPLICATE		
PARAMETER	CRDL	RESULT	Q	RESULT	Q	RPD
ALUMINUM	200	24.9	U	32.4	J	200
BISMUTH	60	46.3	U	106	U	NC
CALCIUM	5000	97100		102000		4.922
CYANIDE	10	160		143		11.22
IRON	100	352	J	308	J	13.33
MAGNESIUM	5000	30300	J	31000	J	2.283
MANGANESE	15	10.8	B	9.9	U	200
POTASSIUM	5000	1940	U	8150		200
SELENIUM	5	12.3	BJ	8.6	BJ	35.40
SILICON		18000		18600		3.278
SODIUM	5000	46100		46100		0

METALS DUPLICATES (μg/L)						
SAMPLE:		B0D4K7		B0D4N9		
DATE:		10/21/94		10/21/94		
LOCATION:		699-52-54		699-52-54		
COMMENTS:				DUPLICATE		
PARAMETER	CRDL	RESULTS	Q	RESULTS	Q	RPD
ALUMINUM	200	24.9	U	24.9	U	NC
BISMUTH	60	135	U	129	U	NC
CALCIUM	5000	101000		101000		0
IRON	100	133	J	122	J	8.627
MAGNESIUM	5000	30400	J	30500	J	.3284
MANGANESE	15	6.6	U	6.1	U	NC
POTASSIUM	5000	10100		8300		19.56
SELENIUM	5	10.8	BJ	8.8	BJ	20.40
SILICON		18200		18200		0
SODIUM	5000	45100		45400		.6629

METALS DUPLICATES (μg/L)						
SAMPLE:		B0D4L4		B0D4N0		
DATE:		10/20/94		10/20/94		
LOCATION:		699-53-55C		699-53-55C		
COMMENTS:				DUPLICATE		
PARAMETER	CRDL	RESULT	Q	RESULT	Q	RPD
ALUMINUM	200	132	B	24.9	U	200
BISMUTH	60	38.7	B	61.3	B	45.2
CALCIUM	5000	66200		65900		.4542
CYANIDE	10	51		49.9		2.180
IRON	100	92.9	U	279		200
MAGNESIUM	5000	18900		18900		0
MANGANESE	15	3.6	U	4.4	U	NC
POTASSIUM	5000	8130		8970		9.824
SELENIUM	5	8.5	UJ	8.5	UJ	NC
SILICON		19700		19800		.5063
SODIUM	5000	27700		27500		.7246

METALS DUPLICATES (μg/L)						
SAMPLES:		B0D4L5		B0D4N1		
DATES:		10/19/94		10/19/94		
LOCATIONS:		699-53-55C		699-53-55C		
COMMENTS:				DUPLICATE		
PARAMETERS	CRDL	RESULTS	Q	RESULTS	Q	RPD
ALUMINUM	200	24.9	U	24.9	U	NC
BISMUTH	60	38	U	39.5	B	200
CALCIUM	5000	65600		64700		1.381
IRON	100	65.2	U	57.5	U	NC
MAGNESIUM	5000	18800		18600		1.069
MANGANESE	15	3.6	U	3.6	U	NC
POTASSIUM	5000	7760		8980		14.57
SELENIUM	5	8.5	UJ	8.5	UJ	NC
SILICON		19500		19400		.5141
SODIUM	5000	27600		27300		1.092

METALS SPLITS (μg/L)						
SAMPLE:		B0D4G0		B0D4N2		
DATE:		10/14/94		10/14/94		
LOCATION:		299-E33-12		299-E33-12		
COMMENTS				SPLIT		
PARAMETER	CRDL	RESULT	Q	RESULT	Q	RPD
ALUMINUM	200	33.6	B	16.6	U	200
BISMUTH	60	38	U	387	U	NC
CALCIUM	5000	32400		28900		11.41
CYANIDE	10	22.3		39.5		55.66
IRON	100	126		132		4.651
MAGNESIUM	5000	9800		8430		15.03
MANGANESE	15	3	B	0.9	U	200
POTASSIUM	5000	10900		7720	J	34.15
SELENIUM	5	1.7	U	3.1	B	200
SILICON		26900		26000	J	3.402
SODIUM	5000	22800		21000		8.219

METALS SPLITS (μg/L)						
SAMPLE:		B0D4G1		B0D4N3		
DATE:		10/14/94		10/14/94		
LOCATION:		299-E33-12		299-E33-12		
COMMENTS:				SPLIT		
PARAMETERS	CRDL	RESULT	Q	RESULTS	Q	RPD
ALUMINUM	200	39.8	B	46.4	U	200
BISMUTH	60	38	U	387	U	NC
CALCIUM	5000	32500		30100		7.667
IRON	100	54.2	B	24.6	U	200
MAGNESIUM	5000	9820		9010		8.603
MANGANESE	15	3.1	B	2.4	B	25.45
POTASSIUM	5000	10700		8490		23.03
SELENIUM	5	1.7	U	3.9	B	200
SILICON		27000		27700	J	2.559
SODIUM	5000	23000		22100		3.991

METALS SPLITS (μg/L)						
SAMPLE:		B0D4K6		B0D4P0		
DATE:		10/21/94		10/21/94		
LOCATION:		699-52-54		699-52-54		
COMMENTS:				SPLIT		
PARAMETER	CRDL	RESULT		RESULT	Q	RPD
ALUMINUM	200	24.9 Q	U	115	U	NC
BISMUTH	60	46.3	U	387	U	NC
CALCIUM	5000	97100		88900		8.817
CYANIDE	10	160		164		2.469
IRON	100	352	J	554		44.59
MAGNESIUM	5000	30300	J	26900		11.88
MANGANESE	15	10.8	B	9.9	B	8.695
POTASSIUM	5000	1940	U	10100		200
SELENIUM	5	12.3	BJ	11.2	J	9.361
SILICON		18000		16300		9.912
SODIUM	5000	46100		41200		11.22

METALS SPLITS (μg/L)						
SAMPLE:		B0D4K7		B0D4P1		
DATE:		10/21/94		10/21/94		
LOCATION		699-52-54		699-52-54		
COMMENTS:				SPLIT		
PARAMETER	CRDL	RESULTS	Q	RESULTS	Q	RPD
ALUMINUM	200	24.9	U	16.6	U	NC
BISMUTH	60	135	U	387	U	NC
CALCIUM	5000	101000		87100		14.77
IRON	100	133	J	91.5	U	200
MAGNESIUM	5000	30400	J	26300		14.46
MANGANESE	15	6.6	U	0.9	U	NC
POTASSIUM	5000	10100		10000		.9950
SELENIUM	5	10.8	BJ	13.1		19.24
SILICON		18200		17000	J	6.818
SODIUM	5000	45100		41900		7.356

METALS SPLITS (μg/L)						
SAMPLE:		B0D4L4		B0D4N6		
DATE:		10/19/94		10/19/94		
LOCATION:		699-53-55C		699/53/55C		
COMMENTS:				SPLIT		
PARAMETER	CRDL	RESULT	Q	RESULT	Q	RPD
ALUMINUM	200	132	B	16.6	U	200
BISMUTH	60	38.7	B	387	U	200
CALCIUM	5000	66200		58300		12.69
CYANIDE	10	51		58		12.84
IRON	100	92.9	U	38.8	B	200
MAGNESIUM	5000	18900		16600		12.95
MANGANESE	15	3.6	U	0.9	U	NC
POTASSIUM	5000	8130		7760		4.657
SELENIUM	5	8.5	UJ	8.5	J	200
SILICON		19700		17400		12.39
SODIUM	5000	27700		25300		9.056

METALS SPLITS (μg/L)						
SAMPLE:		B0D4L5		B0D4N7		
DATE:		10/19/94		10/19/94		
LOCATION:		699-53-55C		699-53-55C		
COMMENTS:				SPLIT		
PARAMETER	CRDL	RESULTS		RESULTS	Q	RPD
ALUMINUM	200	24.9	U	16.6	U	NC
BISMUTH	60	38	U	387	U	NC
CALCIUM	5000	65600		59400		9.92
IRON	100	65.2	U	60.6	U	NC
MAGNESIUM	5000	18800		16900		10.64
MANGANESE	15	3.6	U	0.9	U	NC
POTASSIUM	5000	7760		7630		1.689
SELENIUM	5	8.5	UJ	8.3		200
SILICON		19500		18700	J	4.188
SODIUM	5000	27600		26000		5.970

APPENDIX C

General Chemistry Validated Data Summary Tables

	Samp#	B0D4F8		B0D4G0		B0D4G2		B0D4G4		B0D4G6		B0D4H0	
	Date	10-26-94		10-14-94		10-10-94		10-10-94		10-27-94		10-21-94	
	Location	299-E33-7		299-E33-12		299-E33-13		299-E33-14		299-E33-15		299-E33-26	
	Depth	---		---		---		---		---		---	
	Type	WATER		WATER		WATER		WATER		WATER		WATER	
	Comments												
Parameter	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
ALKALINITY	MG/L	118.000		93.800		104.000		95.200		115.000		102.000	
CHLORIDE	MG/L	7.090		7.610		5.970		8.950		5.450		6.440	
FLUORIDE	MG/L	0.620		0.210		0.340		0.380		0.330		0.340	
NITRITE	MG/L	0.020	UR	0.020	UR	0.020	UR	0.043	J	0.020	UR	0.020	UR
NITRATE	MG/L	NR		11.000	J	13.400	J	3.550	J	NR		NR	
PHOSPHATE	MG/L	1.000	UR	1.000	UR	1.000	UR	1.000	UR	1.000	UR	1.000	UR
SULFATE	MG/L	41.400		17.300		34.500		68.700		26.200		34.200	
TOTAL DISSOLVED SOLIDS	MG/L	323.000		259.000		293.000		256.000		248.000		254.000	

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

	Samp#	B0D4H2		B0D4H4		B0D4H6		B0D4H8		B0D4J0		B0D4J2	
	Date	10-10-94		10-20-94		10-18-94		10-11-94		10-12-94		10-12-94	
	Location	299-E33-38		299-E33-39		299-E33-40		699-47-50		699-47-60		699-48-50	
	Depth	---		---		---		---		---		---	
	Type	WATER		WATER		WATER		WATER		WATER		WATER	
	Comments												
Parameter	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
ALKALINITY	MG/L	104.000		106.000		92.200		99.600		114.000		103.000	
CHLORIDE	MG/L	7.640		9.540		3.300		26.200		10.700		19.800	
FLUORIDE	MG/L	0.340		0.490		0.250		0.480		0.790		0.480	
NITRITE	MG/L	0.020	UR	0.020	UR	0.020	UR	0.020	UR	0.020	UR	0.020	UR
NITRATE	MG/L	8.630	J	NR		0.038	J	2.380	J	6.200	J	2.160	J
PHOSPHATE	MG/L	1.000	UR	1.000	UR	1.000	UR	1.000	UR	1.000	UR	1.000	UR
SULFATE	MG/L	35.100		63.600		30.900		83.500		39.200		81.300	
TOTAL DISSOLVED SOLIDS	MG/L	228.000		288.000		323.000		303.000		269.000		323.000	

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

	Samp#	B0D4J6		B0D4J8		B0D4K0	
	Date	10-17-94		10-13-94		10-18-94	
	Location	699-49-55B		699-49-57A		699-49-57B	
	Depth	---		---		---	
	Type	WATER		WATER		WATER	
	Comments						
Parameter	Units	Result	Q	Result	Q	Result	Q
ALKALINITY	MG/L	113.000		103.000		124.000	
CHLORIDE	MG/L	7.640		8.240		7.600	
FLUORIDE	MG/L	0.210		0.740		0.560	
NITRITE	MG/L	0.020	UR	0.020	UR	0.020	UR
NITRATE	MG/L	NR		20.600	J	0.270	J
PHOSPHATE	MG/L	1.000	UR	1.000	UR	1.000	UR
SULFATE	MG/L	14.000		46.500		12.700	
TOTAL DISSOLVED SOLIDS	MG/L	239.000		358.000		273.000	

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

	Samp#	B0D4K2		B0D4K4		B0D4K6		B0D4K8		B0D4L0		B0D4L2	
	Date	10-28-94		10-19-94		10-21-94		10-18-94		10-19-94		10-19-94	
	Location	699-50-53A		699-50-53B		699-52-54		699-52-57		699-53-55A		699-53-55B	
	Depth	---		---		---		---		---		---	
	Type	WATER		WATER		WATER		WATER		WATER		WATER	
	Comments												
Parameter	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
ALKALINITY	MG/L	100.000		102.000		95.000		94.000		104.000		109.000	
CHLORIDE	MG/L	52.000		8.320		18.500		16.000		15.900		18.000	
FLUORIDE	MG/L	0.250		0.330		0.320		0.680		0.440		0.410	
NITRITE	MG/L	0.020	UR	0.020	UR	0.020	UR	0.049	J	0.020	UR	0.020	UR
NITRATE	MG/L	NR		NR		NR		0.032	J	NR		NR	
PHOSPHATE	MG/L	1.000	UR	1.000	UR	1.000	UR	1.000	UR	1.000	UR	1.000	UR
SULFATE	MG/L	308.000		48.800		170.000		132.000		60.600		110.000	
TOTAL DISSOLVED SOLIDS	MG/L	937.000		335.000		660.000		96.000		323.000		437.000	

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

	Samp#	B0D4L4		B0D4L6		B0D4L8		B0D4M0		B0D4M2		B0D4M4	
	Date	10-19-94		10-20-94		10-24-94		10-25-94		10-23-94		10-11-94	
	Location	699-53-55C		699-54-57		699-55-55		699-55-57		699-57-59		699-59-58	
	Depth	---		---		---		---		---		---	
	Type	WATER		WATER		WATER		WATER		WATER		WATER	
	Comments												
Parameter	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
ALKALINITY	MG/L	108.000		122.000		114.000		114.000		108.000		102.000	
CHLORIDE	MG/L	17.500		11.300		8.230		19.300		14.800		6.910	
FLUORIDE	MG/L	0.430		0.280		0.670		0.390		0.590		0.740	
NITRITE	MG/L	0.020	UR	0.020	UR	0.020	UR	0.020	UR	0.020	UR	0.020	UR
NITRATE	MG/L	NR		NR		NR		NR		NR		3.940	J
PHOSPHATE	MG/L	1.000	UR	1.000	UR	1.000	UR	1.000	UR	1.000	UR	1.000	UR
SULFATE	MG/L	108.000		16.200		28.400		135.000		36.200		28.100	
TOTAL DISSOLVED SOLIDS	MG/L	402.000		241.000		159.000		448.000		346.000		209.000	

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

	Samp#	B0D4M6		B0D4M8		B0D4N0	
	Date	10-25-94		10-11-94		10-19-94	
	Location	699-60-57		699-60-60		699-53-55C	
	Depth	---		---		---	
	Type	WATER		WATER		WATER	
	Comments					DUPLICATE	
Parameter	Units	Result	Q	Result	Q	Result	Q
ALKALINITY	MG/L	138.000		102.000		112.000	
CHLORIDE	MG/L	6.100		8.490		17.400	
FLUORIDE	MG/L	1.750		0.720		0.420	
NITRITE	MG/L	0.020	UR	0.020	UR	0.020	UR
NITRATE	MG/L	NR		6.390	J	NR	
PHOSPHATE	MG/L	1.000	UR	1.000	UR	1.000	UR
SULFATE	MG/L	14.100		39.600		110.000	
TOTAL DISSOLVED SOLIDS	MG/L	179.000		234.000		466.000	

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

	Samp#	B0D4N2		B0D4N4		B0D4N6		B0D4N8		B0D4P0		B0D4P2	
	Date	10-14-94		10-14-94		10-19-94		10-21-94		10-21-94		10-24-94	
	Location	299-E33-12		299-E33-12		699-53-55C		699-52-54		699-52-54		699-55-55	
	Depth	---		---		---		---		---		---	
	Type	WATER		WATER		WATER		WATER		WATER		WATER	
	Comments	SPLIT		DUPLICATE		SPLIT		DUPLICATE		SPLIT		FIELD BLANK	
Parameter	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
ALKALINITY	MG/L	106.000		96.000		114.000		110.000		100.000		46.000	
CHLORIDE	MG/L	9.900		7.680		20.000		20.000		19.300		3.030	
FLUORIDE	MG/L	0.100		0.210		0.500		0.310		0.300		0.100	U
NITRITE	MG/L	NR		0.020	UR	NR		0.020	UR	NR		0.020	UR
NITRITE-N	MG/L	0.100	UR	NR		0.100	UR	NR		0.100	UR	NR	
PHOSPHATE	MG/L	0.400	UR	1.000	UR	0.400	UR	1.000	UR	0.400	UR	1.000	UR
SULFATE	MG/L	20.000		17.200		108.000		182.000		176.000		14.100	
TOTAL DISSOLVED SOLIDS	MG/L	256.000		234.000		427.000		618.000		666.000		273.000	

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

	Samp#	B0D4P4		B0D4P6		B0D4P8	
	Date	10-20-94		10-25-94		10-25-94	
	Location	699-54-57		699-60-57		699-60-57	
	Depth	---		---		---	
	Type	WATER		WATER		WATER	
	Comments	FIELD BLANK		EQUIP BLANK		EQUIP BLANK	
Parameter	Units	Result	Q	Result	Q	Result	Q
ALKALINITY	MG/L	42.000		6.600		6.600	
CHLORIDE	MG/L	2.780		0.250	U	0.250	U
FLUORIDE	MG/L	0.100	U	0.100	U	0.100	U
NITRITE	MG/L	0.020	UR	0.020	UR	0.020	UR
NITRITE-N	MG/L	NR		NR		NR	
PHOSPHATE	MG/L	1.000	UR	1.000	UR	1.000	UR
SULFATE	MG/L	13.800		1.000	U	1.000	U
TOTAL DISSOLVED SOLIDS	MG/L	71.000		188.000		21.000	

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

APPENDIX D

General Chemistry Validated Field Quality Control Sample Summary

GENERAL CHEMISTRY DUPLICATES (mg/L)						
SAMPLE:		B0D4G0		B0D4N4		
DATE:		10/14/94		10/14/94		
LOCATION:		299-E33-12		299-E33-12		
COMMENTS:				DUPLICATE		
PARAMETER	CRDL	RESULT	Q	RESULT	Q	RPD
ALKALINITY	1	93.8		96		2.318
CHLORIDE	.5	7.61		7.68		.9156
FLUORIDE	.5	0.21		0.21		0
NITRATE	.5	11	J			NC
NITRITE	.5	0.02	UR	0.02	UR	NC
ORTHO PHOSPHATE	.5	1	UR	1	UR	NC
SULFATE	.5	17.3		17.2		.5797
TOTAL DISSOLVED SOLIDS	10	259		234		10.14

GENERAL CHEMISTRY DUPLICATES (mg/L)						
SAMPLE:		B0D4K6		B0D4N8		
DATE:		10/21/94		10/21/94		
LOCATION:		699-52-54		699-52-54		
COMMENTS:				DUPLICATE		
PARAMETER	CRDL	RESULT	Q	RESULT	Q	RPD
ALKALINITY	1	95		110		14.63
CHLORIDE	.5	18.5		20		7.792
FLUORIDE	.5	0.32		0.31		3.174
NITRITE	.5	0.02	UR	0.02	UR	NC
ORTHO PHOSPHATE	.5	1	UR	1	UR	NC
SULFATE	.5	170		182		6.818
TOTAL DISSOLVED SOLIDS	10	660		618		6.572

GENERAL CHEMISTRY DUPLICATES (mg/L)						
SAMPLE:		B0D4L4		B0D4N0		
DATE:		10/19/94		10/19/94		
LOCATION:		699-53-55C		699-53-55C		
COMMENTS:				DUPLICATE		
PARAMETER	CRDL	RESULT	Q	RESULT	Q	RPD
ALKALINITY	1	108		112		3.636
CHLORIDE	.5	17.5		17.4		.5730
FLUORIDE	.5	0.43		0.42		2.352
NITRITE	.5	0.02	UR	0.02	UR	NC
ORTHO PHOSPHATE	.5	1	UR	1	UR	NC
SULFATE	.5	108		110		1.834
TOTAL DISSOLVED SOLIDS	10	402		466		14.74

GENERAL CHEMISTRY SPLITS (mg/L)						
SAMPLE:		B0D4G0		B0D4N2		
DATE:		10/14/94		10/14/94		
LOCATION:		299-E33-12		299-E33-12		
COMMENTS:				SPLIT		
PARAMETER	CRDL	RESULT	Q	RESULT	Q	RPD
ALKALINITY	1	93.8		106		12.21
CHLORIDE	.5	7.61		9.9		26.15
FLUORIDE	.5	0.21		0.1		70.96
NITRATE	.5	11	J			NC
NITRITE	.5	0.02	UR	0.1	UR	NC
PHOSPHATE	.5	1	UR	0.4	UR	NC
SULFATE	.5	17.3		20		14.47
TOTAL DISSOLVED SOLIDS	10	259		256		1.165

GENERAL CHEMISTRY SPLITS (mg/L)						
SAMPLE:		B0D4L4		B0D4N6		
DATE:		10/19/94		10/19/94		
LOCATION:		699-53-55C		699-53-55C		
COMMENTS:				SPLIT		
PARAMETER	CRDL	RESULT	Q	RESULT	Q	RPD
ALKALINITY	1	108		114		5.405
CHLORIDE	.5	17.5		20		13.33
FLUORIDE	.5	0.43		0.5		15.05
NITRITE	.5	0.02	UR	0.1	UR	NC
PHOSPHATE	.5	1	UR	0.4	UR	NC
SULFATE	.5	108		108		0
TOTAL DISSOLVED SOLIDS	10	402		427		6.031

GENERAL CHEMISTRY SPLITS (mg/L)						
SAMPLE:		B0D4K6		B0D4P0		
DATE:		10/21/94		10/21/94		
LOCATION:		699-52-54		699-52-54		
COMMENTS:				SPLIT		
PARAMETER	CRDL	RESULT	Q	RESULT	Q	RPD
ALKALINITY	1	95		100		5.128
CHLORIDE	.5	18.5		19.3		4.232
FLUORIDE	.5	0.32		0.3		6.451
NITRITE	.5	0.02	UR	0.1	UR	NC
PHOSPHATE	.5	1	UR	0.4	UR	NC
SULFATE	.5	170		176		3.468
TOTAL DISSOLVED SOLIDS	10	660		666		.9049

APPENDIX E

Radiochemistry Validated Data Summary Tables

	Samp#	B0D4F8		B0D4G0		B0D4G2		B0D4G4		B0D4G6		B0D4H0	
	Date	10-26-94		10-14-94		10-10-94		10-10-94		10-27-94		10-21-94	
	Location	299-E33-7		299-E33-12		299-E33-13		299-E33-14		299-E33-15		299-E33-26	
	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	1.690		0.417	U	19.200		0.794	U	1.290	U	5.060	
GROSS BETA	pCi/L	217.000		505.000		413.000		20.100		8.650		160.000	
COBALT-58	pCi/L	-0.400	U	1.220	U	0.759	U	-3.100	U	1.570	U	1.770	U
COBALT-60	pCi/L	3.870	U	21.700		7.850	U	-2.830	U	0.771	U	8.350	U
CESIUM-137	pCi/L	-1.900	U	-3.620	U	0.689	U	2.660	U	0.638	U	1.140	U
EUROPIUM-152	pCi/L	-8.500	U	1.520	U	2.740	U	6.890	U	-27.800	U	4.110	U
EUROPIUM-154	pCi/L	19.400	U	1.490	U	7.470	U	6.720	U	6.480	U	5.630	U
EUROPIUM-155	pCi/L	2.480	U	-1.340	U	-0.538	U	0.295	U	5.660	U	7.960	U
IRON-59	pCi/L	0.000	U	-6.100	U	5.040	U	-13.500	U	8.960	U	2.190	U
TRITIUM	pCi/L	6810.000	J	406.000		5260.000		3420.000		3180.000	J	6610.000	J
PLUTONIUM-238	pCi/L	0.000	U	-0.018	U	-0.023	U	0.060	U	-0.030	U	0.058	U
PLUTONIUM-239/240	pCi/L	0.000	U	-0.008	U	-0.012	U	0.167	U	-0.015	U	-0.006	U
RUTHENIUM-106	pCi/L	35.900	U	-32.000	U	-0.504	U	23.500	U	31.200	U	46.800	U
STRONTIUM	pCi/L	0.108	U	0.136	U	-0.035	U	0.183	U	0.040	U	0.178	U
TECHNETIUM-99	pCi/L	701.000		1430.000		1280.000		-2.180	U	11.000		636.000	
TOTAL URANIUM	UG/L	2.280		2.480		37.200		2.410		1.700		10.600	

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

	Samp#	B0D4H2		B0D4H4		B0D4H6		B0D4H8		B0D4J0		B0D4J2	
	Date	10-10-94		10-20-94		10-18-94		10-11-94		10-12-94		10-12-94	
	Location	299-E33-38		299-E33-39		299-E33-40		699-47-50		699-47-60		699-48-50	
	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	4.630		2.020	U	4.380		2.760		2.160		1.960	U
GROSS BETA	pCi/L	238.000		14.200		12.000		7.940		6.920		9.490	
COBALT-58	pCi/L	-0.644	U	-1.850	U	-10.000	U	7.700	U	0.235	U	4.800	U
COBALT-60	pCi/L	11.300	U	2.910	U	-7.100	U	5.440	U	0.343	U	0.696	U
CESIUM-137	pCi/L	-0.821	U	5.320	U	-1.330	U	4.750	U	3.940	U	0.000	U
EUROPIUM-152	pCi/L	-2.170	U	8.780	U	-14.300	U	-5.570	U	1.900	U	-3.080	U
EUROPIUM-154	pCi/L	10.500	U	-2.080	U	-8.100	U	3.810	U	7.880	U	-2.410	U
EUROPIUM-155	pCi/L	0.366	U	1.470	U	-0.882	U	-3.840	U	7.880	U	1.100	U
IRON-59	pCi/L	13.500	U	-14.500	U	-17.700	U	1.580	U	0.880	U	6.080	U
TRITIUM	pCi/L	3690.000		3330.000	J	-32.700	U	218.000		30.800	U	348.000	
PLUTONIUM-238	pCi/L	-0.012	U	-0.011	U	0.000	U	0.000	U	-0.005	U	-0.018	U
PLUTONIUM-239/240	pCi/L	-0.024	U	0.047	U	-0.007	U	-0.014	U	-0.008	U	0.000	U
RUTHENIUM-106	pCi/L	-27.200	U	-26.700	U	-37.600	U	-6.080	U	16.900	U	4.980	U
STRONTIUM	pCi/L	0.135	U	0.002	U	0.166	U	0.264	U	0.063		0.130	U
TECHNETIUM-99	pCi/L	843.000		21.100		-1.530	U	0.428		-0.112		-1.190	U
TOTAL URANIUM	UG/L	12.500		2.470		4.530		3.060		2.290		3.580	

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

	Samp#	B0D4J6		B0D4J8		B0D4K0	
	Date	10-17-94		10-13-94		10-18-94	
	Location	699-49-55B		699-49-57A		699-49-57B	
	Depth	---		---		---	
	Type	WATER		WATER		WATER	
	Comments						
Parameter	Units	Result	Q	Result	Q	Result	Q
GROSS ALPHA	pCi/L	2.690		1.470	U	1.300	U
GROSS BETA	pCi/L	6.840		450.000		5.620	
COBALT-58	pCi/L	-0.318	U	-4.110	U	0.686	U
COBALT-60	pCi/L	1.200	U	27.200		1.290	U
CESIUM-137	pCi/L	-2.350	U	-2.070	U	1.580	U
EUROPIUM-152	pCi/L	0.911	U	8.810	U	-2.740	U
EUROPIUM-154	pCi/L	-1.490	U	-11.200	U	-21.200	U
EUROPIUM-155	pCi/L	0.402	U	-0.134	U	1.640	U
IRON-59	pCi/L	5.890	U	-3.460	U	-11.800	U
TRITIUM	pCi/L	756.000		5850.000		-146.000	U
PLUTONIUM-238	pCi/L	-0.013	U	-0.003	U	-0.014	U
PLUTONIUM-239/240	pCi/L	-0.006	U	-0.005	U	0.061	U
RUTHENIUM-106	pCi/L	-2.490	U	3.010	U	-8.770	U
STRONTIUM	pCi/L	0.237	U	0.083	U	0.137	U
TECHNETIUM-99	pCi/L	-2.560	U	1500.000		-0.869	U
TOTAL URANIUM	UG/L	2.400		2.400		2.140	

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

	Samp#	B0D4K2		B0D4K4		B0D4K6		B0D4K8		B0D4L0		B0D4L2	
	Date	10-28-94		10-19-94		10-21-94		10-18-94		10-19-94		10-19-94	
	Location	699-50-53A		699-50-53B		699-52-54		699-52-57		699-53-55A		699-53-55B	
	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	5.110		3.170		4.920	U	-0.352	U	2.610		2.160	U
GROSS BETA	pCi/L	612.000		9.100		1820.000		12.500		10.500		202.000	
COBALT-58	pCi/L	1.090	U	1.170	U	-11.800	U	-0.870	U	8.390	U	-3.920	U
COBALT-60	pCi/L	49.200		5.530	U	62.600		-0.803	U	0.856	U	15.600	U
CESIUM-137	pCi/L	-0.632	U	2.300	U	0.632	U	-0.562	U	0.585	U	5.490	U
EUROPIUM-152	pCi/L	-2.730	U	3.950	U	5.160	U	-9.400	U	0.200	U	-8.210	U
EUROPIUM-154	pCi/L	-12.700	U	7.460	U	-10.500	U	-2.180	U	3.700	U	6.430	U
EUROPIUM-155	pCi/L	0.000	U	-2.080	U	2.950	U	2.450	U	0.367	U	-7.210	U
IRON-59	pCi/L	4.440	U	-5.710	U	-1.350	U	-17.800	U	-10.900	U	-13.800	U
TRITIUM	pCi/L	459.000	J	7.700	U	4290.000	J	524.000		91.500	U	597.000	
PLUTONIUM-238	pCi/L	-0.007	U	0.000	U	-0.011	U	-0.003	U	0.000	U	0.067	U
PLUTONIUM-239/240	pCi/L	-0.010	U	-0.035	U	-0.008	U	-0.010	U	-0.003	U	-0.011	U
RUTHENIUM-106	pCi/L	3.470	U	-3.470	U	-11.500	U	-53.000	U	-96.900	U	21.300	U
STRONTIUM	pCi/L	0.221	U	0.208	U	-0.103	U	0.344	U	0.010	U	-0.072	U
TECHNETIUM-99	pCi/L	3800.000		-3.820	U	4250.000		0.798	U	-1.430	U	738.000	
TOTAL URANIUM	UG/L	5.890		1.950		6.820		1.630		2.130		4.140	

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

	Samp#	B0D4L4		B0D4L6		B0D4L8		B0D4M0		B0D4M2		B0D4M4	
	Date	10-19-94		10-20-94		10-24-94		10-25-94		10-23-94		10-11-94	
	Location	699-53-55C		699-54-57		699-55-55		699-55-57		699-57-59		699-59-58	
	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	1.890	U	2.310		0.287	U	2.510	U	2.430		0.862	U
GROSS BETA	pCi/L	219.000		6.590		65.600		472.000		17.300		55.000	
COBALT-58	pCi/L	0.086	U	2.770	U	2.320	U	2.720	U	6.510	U	-3.080	U
COBALT-60	pCi/L	10.700	U	1.370	U	4.760	U	45.300		2.310	U	-1.800	U
CESIUM-137	pCi/L	1.750	U	0.319	U	-4.610	U	-8.210	U	-2.120	U	0.585	U
EUROPIUM-152	pCi/L	1.740	U	15.800	U	-3.760	U	-6.500	U	-2.730	U	-5.490	U
EUROPIUM-154	pCi/L	0.816	U	-12.000	U	8.040	U	2.410	U	5.970	U	0.927	U
EUROPIUM-155	pCi/L	5.280	U	2.130	U	-6.580	U	-1.460	U	1.270	U	-1.470	U
IRON-59	pCi/L	-10.600	U	3.410	U	10.400	U	4.810	U	-9.810	U	10.900	U
TRITIUM	pCi/L	654.000		13.700	UJ	8980.000	J	5740.000	J	60000.000	J	8030.000	
PLUTONIUM-238	pCi/L	-0.006	U	0.365	U	-0.007	U	-0.023	U	0.000	U	0.039	U
PLUTONIUM-239/240	pCi/L	-0.006	U	-0.015	U	0.056	U	0.102	U	0.000	U	0.000	U
RUTHENIUM-106	pCi/L	-27.300	U	-8.420	U	10.400	U	-31.200	U	-17.900	U	-24.900	U
STRONTIUM	pCi/L	0.114	U	0.118	U	0.339	U	0.426	U	0.261	U	0.154	U
TECHNETIUM-99	pCi/L	552.000		0.097	U	217.000		2030.000		44.200		207.000	
TOTAL URANIUM	UG/L	4.310		2.400		1.470		5.090		4.200		1.050	

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

	Samp#	B0D4M6		B0D4M8		B0D4N0	
	Date	10-25-94		10-11-94		10-19-94	
	Location	699-60-57		699-60-60		699-53-55C	
	Depth	---		---		---	
	Type	WATER		WATER		WATER	
	Comments					DUPLICATE	
Parameter	Units	Result	Q	Result	Q	Result	Q
GROSS ALPHA	pCi/L	0.146	U	2.780		2.680	U
GROSS BETA	pCi/L	9.220		37.200		233.000	
COBALT-58	pCi/L	-0.528	U	-0.366	U	-1.960	U
COBALT-60	pCi/L	-4.470	U	4.280	U	16.800	U
CESIUM-137	pCi/L	0.758	U	2.340	U	1.960	U
EUROPIUM-152	pCi/L	3.880	U	2.060	U	-8.900	U
EUROPIUM-154	pCi/L	3.220	U	0.805	U	17.700	U
EUROPIUM-155	pCi/L	-4.660	U	-10.800	U	5.840	U
IRON-59	pCi/L	12.300	U	10.800	U	-1.380	U
TRITIUM	pCi/L	278.000	J	36100.000		478.000	
PLUTONIUM-238	pCi/L	0.000	U	-0.021	U	-0.013	U
PLUTONIUM-239/240	pCi/L	0.068	U	-0.015	U	-0.010	U
RUTHENIUM-106	pCi/L	6.060	U	-59.400	U	-44.900	U
STRONTIUM	pCi/L	0.355		0.210	U	0.057	U
TECHNETIUM-99	pCi/L	-0.784		122.000		608.000	
TOTAL URANIUM	UG/L	0.205		1.880		4.650	

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

	Samp#	B0D4N2		B0D4N4		B0D4N6		B0D4N8		B0D4P0		B0D4P2	
	Date	10-14-94		10-14-94		10-19-94		10-21-94		10-21-94		10-24-94	
	Location	299-E33-12		299-E33-12		699-53-55C		699-52-54		699-52-54		699-55-55	
	Depth	---		---		---		---		---		---	
	Type	WATER		WATER		WATER		WATER		WATER		WATER	
	Comments	SPLIT		DUPLICATE		SPLIT		DUPLICATE		SPLIT		FIELD BLANK	
Parameter	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
GROSS ALPHA	pCi/L	31.000	J	4.270		5.200	J	4.670	U	70.000	J	0.413	U
GROSS BETA	pCi/L	790.000		471.000		460.000		1310.000		1200.000	J	1.800	U
CERIUM-144	pCi/L	60.000	U	NR		70.000	U	NR		60.000	U	NR	
COBALT-58	pCi/L	10.000	U	1.900	U	10.000	U	-0.458	U	10.000	U	-2.450	U
COBALT-60	pCi/L	36.000		21.900		21.000		49.300		61.000		0.257	U
CESIUM-134	pCi/L	10.000	U	NR		10.000	U	NR		10.000	U	NR	
CESIUM-137	pCi/L	10.000	U	-2.000	U	10.000	U	1.860	U	10.000	U	-0.266	U
EUROPIUM-152	pCi/L	20.000	U	-0.348	U	30.000	U	2.000	U	30.000	U	-8.080	U
EUROPIUM-154	pCi/L	20.000	U	-13.600	U	20.000	U	-14.800	U	20.000	U	3.930	U
EUROPIUM-155	pCi/L	30.000	U	0.383	U	30.000	U	-1.400	U	40.000	U	3.750	U
IRON-59	pCi/L	30.000	U	10.600	U	40.000	U	12.000	U	40.000	U	-1.610	U
TRITIUM	pCi/L	770.000		333.000		610.000		4080.000	J	4500.000		35.200	UJ
POTASSIUM-40	pCi/L	200.000	U	NR		200.000	U	NR		200.000	U	NR	
MANGANESE-54	pCi/L	10.000	U	NR		10.000	U	NR		10.000	U	NR	
SODIUM-22	pCi/L	10.000	U	NR		10.000	U	NR		10.000	U	NR	
NIOBIUM-94	pCi/L	10.000	U	NR		10.000	U	NR		10.000	U	NR	
PLUTONIUM-238	pCi/L	0.017	UJ	-0.024	U	-0.004	UJ	-0.003	U	-0.004	U	0.000	U
PLUTONIUM-239/240	pCi/L	0.004	U	-0.012	U	0.002	U	-0.010	U	-0.001	U	0.000	U
RADIUM-226	pCi/L	20.000	U	NR		30.000	U	NR		30.000	U	NR	
RADIUM-228	pCi/L	50.000	U	NR		60.000	U	NR		60.000	U	NR	
RUTHENIUM-103	pCi/L	20.000	U	NR		20.000	U	NR		20.000	U	NR	
RUTHENIUM-106	pCi/L	100.000	U	1.100	U	100.000	U	-55.100	U	100.000	U	-52.900	U
TIN-113	pCi/L	10.000	U	NR		20.000	U	NR		20.000	U	NR	
STRONTIUM-90	pCi/L	-0.170	U	NR		0.000	U	NR		-0.002	U	NR	
STRONTIUM	pCi/L	NR		0.193	U	NR		0.213	U	NR		-0.023	U
TECHNETIUM-99	pCi/L	1200.000		1530.000		690.000		4250.000		3400.000		2.680	J
THORIUM-228	pCi/L	20.000	U	NR		20.000	U	NR		20.000	U	NR	
THORIUM-232	pCi/L	50.000	U	NR		60.000	U	NR		60.000	U	NR	
TOTAL URANIUM	UG/L	1.500		2.770		2.400		6.990		3.400		0.026	

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

	Samp#	B0D4P4		B0D4P6		B0D4P8		B0D4Q0		B0D4Q1		B0D4Q2	
	Date	10-20-94		10-25-94		10-25-94		10-26-94		10-17-94		10-17-94	
	Location	699-54-57		699-60-57		699-60-57		299-E32-2		299-E33-28		299-E33-29	
	Depth	---		---		---		---		---		---	
	Type	WATER		WATER		WATER		WATER		WATER		WATER	
	Comments	FIELD BLANK		EQUIP BLANK		EQUIP BLANK							
Parameter	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
GROSS ALPHA	pCi/L	0.272	U	-0.020	U	0.220	U	NR		NR		NR	
GROSS BETA	pCi/L	0.791	U	1.240	U	0.219	U	NR		NR		NR	
CERIUM-144	pCi/L	NR		NR		NR		NR		NR		NR	
COBALT-58	pCi/L	-4.900	U	-0.685	U	-0.264	U	-2.110	U	0.228	U	0.229	U
COBALT-60	pCi/L	1.200	U	-3.430	U	-2.090	U	1.400	U	-2.400	U	0.943	U
CESIUM-134	pCi/L	NR		NR		NR		NR		NR		NR	
CESIUM-137	pCi/L	-2.410	U	2.290	U	7.640	U	2.120	U	-3.090	U	-4.790	U
EUROPIUM-152	pCi/L	4.560	U	-11.200	U	-3.990	U	NR		NR		NR	
EUROPIUM-154	pCi/L	3.730	U	7.870	U	10.500	U	-4.080	U	-10.600	U	-3.240	U
EUROPIUM-155	pCi/L	-1.070	U	7.280	U	-7.410	U	-1.220	U	-4.850	U	-2.210	U
IRON-59	pCi/L	-0.684	U	3.370	U	-2.180	U	0.000	U	0.631	U	-1.900	U
TRITIUM	pCi/L	108.000	UJ	153.000	UJ	88.300	UJ	NR		NR		NR	
POTASSIUM-40	pCi/L	NR		NR		NR		NR		NR		NR	
MANGANESE-54	pCi/L	NR		NR		NR		NR		NR		NR	
SODIUM-22	pCi/L	NR		NR		NR		NR		NR		NR	
NIOBIUM-94	pCi/L	NR		NR		NR		NR		NR		NR	
PLUTONIUM-238	pCi/L	-0.003	U	0.048	U	0.000	U	NR		NR		NR	
PLUTONIUM-239/240	pCi/L	-0.010	U	0.064	U	-0.015	U	NR		NR		NR	
RADIUM-226	pCi/L	NR		NR		NR		NR		NR		NR	
RADIUM-228	pCi/L	NR		NR		NR		NR		NR		NR	
RUTHENIUM-103	pCi/L	NR		NR		NR		NR		NR		NR	
RUTHENIUM-106	pCi/L	-8.510	U	-0.934	U	34.700	U	NR		NR		NR	
TIN-113	pCi/L	NR		NR		NR		NR		NR		NR	
STRONTIUM-90	pCi/L	NR		NR		NR		NR		NR		NR	
STRONTIUM	pCi/L	0.090	U	0.374	U	0.280	U	NR		NR		NR	
TECHNETIUM-99	pCi/L	0.419	U	1.760	U	-1.700	U	16.400		46.200		25.700	
THORIUM-228	pCi/L	NR		NR		NR		NR		NR		NR	
THORIUM-232	pCi/L	NR		NR		NR		NR		NR		NR	
TOTAL URANIUM	UG/L	0.019		0.003	U	0.000	U	NR		NR		NR	

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

	Samp#	B0D4Q3		B0D4Q4		B0D4Q5		B0D4Q6		B0D4Q7		B0D4Q8	
	Date	10-14-94		10-23-94		10-21-94		10-13-94		10-14-94		10-13-94	
	Location	299-E33-30		299-E33-34		299-E33-35		299-E34-2		299-E34-5		299-E34-2	
	Depth	---		---		---		---		---		---	
	Type	WATER		WATER		WATER		WATER		WATER		WATER	
	Comments											DUP	
Parameter	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
GROSS ALPHA	pCi/L	NR		NR		NR		NR		NR		NR	
GROSS BETA	pCi/L	NR		NR		NR		NR		NR		NR	
CERIUM-144	pCi/L	NR		NR		NR		NR		NR		NR	
COBALT-58	pCi/L	3.180	U	1.550	U	-0.448	U	3.420	U	3.420	U	-3.420	U
COBALT-60	pCi/L	-1.590	U	1.710	U	1.800	U	1.200	U	2.770	U	3.010	U
CESIUM-134	pCi/L	NR		NR		NR		NR		NR		NR	
CESIUM-137	pCi/L	2.090	U	0.851	U	0.904	U	1.090	U	1.490	U	3.250	U
EUROPIUM-152	pCi/L	NR		0.599	U	NR		NR		NR		NR	
EUROPIUM-154	pCi/L	4.830	U	-10.600	U	3.930	U	1.990	U	8.970	U	16.700	U
EUROPIUM-155	pCi/L	-3.940	U	-3.310	U	5.000	U	-0.134	U	7.130	U	3.910	U
IRON-59	pCi/L	-6.380	U	6.210	U	10.200	U	2.950	U	-6.640	U	-6.080	U
TRITIUM	pCi/L	NR		NR		NR		NR		NR		NR	
POTASSIUM-40	pCi/L	NR		NR		NR		NR		NR		NR	
MANGANESE-54	pCi/L	NR		NR		NR		NR		NR		NR	
SODIUM-22	pCi/L	NR		NR		NR		NR		NR		NR	
NIOBIUM-94	pCi/L	NR		NR		NR		NR		NR		NR	
PLUTONIUM-238	pCi/L	NR		NR		NR		NR		NR		NR	
PLUTONIUM-239/240	pCi/L	NR		NR		NR		NR		NR		NR	
RADIUM-226	pCi/L	NR		NR		NR		NR		NR		NR	
RADIUM-228	pCi/L	NR		NR		NR		NR		NR		NR	
RUTHENIUM-103	pCi/L	NR		NR		NR		NR		NR		NR	
RUTHENIUM-106	pCi/L	NR		NR		NR		NR		NR		NR	
TIN-113	pCi/L	NR		NR		NR		NR		NR		NR	
STRONTIUM-90	pCi/L	NR		NR		NR		NR		NR		NR	
STRONTIUM	pCi/L	NR		NR		NR		NR		NR		NR	
TECHNETIUM-99	pCi/L	42.400		781.000		244.000		-1.510	U	-0.633	U	-1.080	U
THORIUM-228	pCi/L	NR		NR		NR		NR		NR		NR	
THORIUM-232	pCi/L	NR		NR		NR		NR		NR		NR	
TOTAL URANIUM	UG/L	NR		NR		NR		NR		NR		NR	

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

	Samp#	B0D409		B0D4R0		B0D4R1		B0D4R3	
	Date	10-13-94		10-17-94		10-21-94		10-18-94	
	Location	299-E34-2		299-E33-29		299-E33-35		299-E28-7	
	Depth	---		---		---		---	
	Type	WATER		WATER		WATER		WATER	
	Comments	SPLIT		FIELD BLANK		EQUIP BLANK			
Parameter	Units	Result	Q	Result	Q	Result	Q	Result	Q
GROSS ALPHA	pCi/L	NR		NR		NR		NR	
GROSS BETA	pCi/L	NR		NR		NR		NR	
CERIUM-144	pCi/L	50.000	U	NR		NR		NR	
COBALT-58	pCi/L	10.000	U	-8.750	U	-0.432	U	0.895	U
COBALT-60	pCi/L	20.000	U	-4.870	U	-8.930	U	-2.910	U
CESIUM-134	pCi/L	10.000	U	NR		NR		NR	
CESIUM-137	pCi/L	10.000	U	2.590	U	-1.890	U	17.000	
EUROPIUM-152	pCi/L	20.000	U	NR		NR		0.898	U
EUROPIUM-154	pCi/L	10.000	U	0.804	U	0.804	U	-2.080	U
EUROPIUM-155	pCi/L	30.000	U	-0.823	U	0.548	U	2.570	U
IRON-59	pCi/L	20.000	U	-13.900	U	0.704	U	-6.520	U
TRITIUM	pCi/L	NR		NR		NR		NR	
POTASSIUM-40	pCi/L	100.000	U	NR		NR		NR	
MANGANESE-54	pCi/L	10.000	U	NR		NR		NR	
SODIUM-22	pCi/L	10.000	U	NR		NR		NR	
NIOBIUM-94	pCi/L	10.000	U	NR		NR		NR	
PLUTONIUM-238	pCi/L	NR		NR		NR		-0.007	U
PLUTONIUM-239/240	pCi/L	NR		NR		NR		-0.007	U
RADIUM-226	pCi/L	20.000	U	NR		NR		NR	
RADIUM-228	pCi/L	50.000	U	NR		NR		NR	
RUTHENIUM-103	pCi/L	10.000	U	NR		NR		NR	
RUTHENIUM-106	pCi/L	100.000	U	NR		NR		36.300	U
TIN-113	pCi/L	10.000	U	NR		NR		NR	
STRONTIUM-90	pCi/L	NR		NR		NR		NR	
STRONTIUM	pCi/L	NR		NR		NR		149.000	
TECHNETIUM-99	pCi/L	-0.150	U	-1.120	U	-2.410	U	NR	
THORIUM-228	pCi/L	22.000		NR		NR		NR	
THORIUM-232	pCi/L	50.000	U	NR		NR		NR	
TOTAL URANIUM	UG/L	NR		NR		NR		NR	

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

APPENDIX F

Radiochemistry Validated Field Quality Control Sample Summary

RADIOCHEMICAL DUPLICATES (pCi/L)						
SAMPLE:		B0D4G0		B0D4N4		
DATE:		10/14/94		10/14/94		
LOCATION:		299-E33-12		299-E33-12		
COMMENTS:				DUPLICATE		
PARAMETER	CRDL	RESULT	Q	RESULT	Q	RPD
CESIUM-137	15	-3.62	U	-2	U	NC
COBALT-58		1.22	U	1.9	U	NC
COBALT-60	25	21.7		21.9		.9174
EUROPIUM-152	50	1.52	U	-0.348	U	NC
EUROPIUM-154	50	1.49	U	-13.6	U	NC
EUROPIUM-155	50	-1.34	U	0.383	U	NC
GROSS ALPHA	3	0.417	U	4.27		200
GROSS BETA	4	505		471		6.967
IRON-59	.05	-6.1	U	10.6	U	NC
PLUTONIUM-238	1	-0.0178	U	-0.0243	U	NC
PLUTONIUM-239/240	1	-0.00761	U	-0.0121	U	NC
RUTHENIUM-106		-32	U	1.1	U	NC
STRONTIUM		0.136	U	0.193	U	NC
TECHNETIUM-99	15	1430		1530		6.756
TOTAL URANIUM	.1	2.48		2.77		11.04
TRITIUM	400	406		333		19.75

RADIOCHEMICAL DUPLICATES (pCi/L)						
SAMPLE:		B0D4Q6		B0D4Q8		
DATE:		10/14/94		10/14/94		
LOCATION:		299-E34-2		299-E34-2		
COMMENTS:				DUPLICATE		
PARAMETER	CRDL	RESULT	Q	RESULT	Q	RPD
CESIUM-137	15	1.09	U	3.25	U	NC
COBALT-58		3.42	U	-3.42	U	NC
COBALT-60	25	1.2	U	3.01	U	NC
EUROPIUM-154	50	1.99	U	16.7	U	NC
EUROPIUM-155	50	-0.134	U	3.91	U	NC
IRON-59	.05	2.95	U	-6.08	U	NC
TECHNETIUM-99	15	-1.51	U	-1.08	U	NC

RADIOCHEMICAL DUPLICATES (pCi/L)						
SAMPLE:		B0D4K6		B0D4N8		
DATE:		10/21/94		10/21/94		
LOCATION:		699-52-54		699-52-54		
COMMENTS:				DUPLICATE		
PARAMETER	CRDL	RESULT	Q	RESULT	Q	RPD
CESIUM-137	15	0.632	U	1.86	U	NC
COBALT-58		-11.8	U	-0.458	U	NC
COBALT-60	25	62.6		49.3		23.77
EUROPIUM-152	50	5.16	U	2	U	NC
EUROPIUM-154	50	-10.5	U	-14.8	U	NC
EUROPIUM-155	50	2.95	U	-1.4	U	NC
GROSS ALPHA	3	4.92	U	4.67	U	NC
GROSS BETA	4	1820		1310		32.58
IRON-59	.05	-1.35	U	12	U	NC
PLUTONIUM-238	1	-0.0111	U	-0.00345	U	NC
PLUTONIUM-239/240	1	-0.00828	U	-0.0103	U	NC
RUTHENIUM-106		-11.5	U	-55.1	U	NC
STRONTIUM		-0.103	U	0.213	U	NC
TECHNETIUM-99	15	4250		4250		0
TOTAL URANIUM	.1	6.82		6.99		2.461
TRITIUM	400	4290	J	4080	J	5.017

RADIOCHEMICAL DUPLICATES (pCi/L)						
SAMPLE:		B0D4L4		B0D4N0		
DATE:		10/19/94		10-19-94		
LOCATION:		699-53-55C		699-53-55C		
COMMENTS:				DUPLICATE		
PARAMETER	CRDL	RESULT	Q	RESULT	Q	RPD
CESIUM-137	15	1.75	U	1.96	U	NC
COBALT-58		0.0863	U	-1.96	U	NC
COBALT-60	25	10.7	U	16.8	U	NC
EUROPIUM-152	50	1.74	U	-8.9	U	NC
EUROPIUM-154	50	0.816	U	17.7	U	NC
EUROPIUM-155	50	5.28	U	5.84	U	NC
GROSS ALPHA	3	1.89	U	2.68	U	NC
GROSS BETA	4	219		233		6.194
IRON-59	.05	-10.6	U	-1.38	U	NC
PLUTONIUM-238	1	-0.00615	U	-0.0128	U	NC
PLUTONIUM-239/240	1	-0.00614	U	-0.00957	U	NC
RUTHENIUM-106		-27.3	U	-44.9	U	NC
STRONTIUM		0.114	U	0.0574	U	NC
TECHNETIUM-99	15	552		608		9.655
TOTAL URANIUM	.1	4.31		4.65		7.589
TRITIUM	400	654		478		31.09

RADIOCHEMISTRY SPLITS (pCi/L)						
SAMPLE:		B0D4G0		B0D4N2		
DATE:		10/14/94		10/14/94		
LOCATION:		299-E33-12		299-E33-12		
COMMENTS:				SPLIT		
PARAMETER	CRDL	RESULT	Q	RESULT	Q	RPD
CESIUM-137	15	-3.62	U	10	U	NC
COBALT-58		1.22	U	10	U	NC
COBALT-60	25	21.7		36		49.56
EUROPIUM-152	50	1.52	U	20	U	NC
EUROPIUM-154	50	1.49	U	20	U	NC
EUROPIUM-155	50	-1.34	U	30	U	NC
GROSS ALPHA	3	0.417	U	31	J	200
GROSS BETA	4	505		790		44.01
IRON-59	.05	-6.1	U	30	U	NC
PLUTONIUM-238	1	-0.0178	U	0.017	UJ	NC
PLUTONIUM-239/240	1	-0.00761	U	0.004	U	NC
RUTHENIUM-106		-32	U	100	U	NC
STRONTIUM		0.14	U			200
STRONTIUM-90	2			-0.17	U	200
TECHNETIUM-99	15	1430		1200		17.49
TOTAL URANIUM	.1	2.48		1.5		49.24
TRITIUM	400	406		770		61.90

RADIOCHEMISTRY SPLITS (pCi/L)						
SAMPLE:		B0D4Q6		B0D4Q9		
DATE:		10/13/94		10/13/94		
LOCATION:		299-E34-2		299-E34-2		
COMMENTS:				SPLIT		
PARAMETER	CRDL	RESULT	Q	RESULT	Q	RPD
CESIUM-137	15	1.09	U	10	U	NC
COBALT-58		3.42	U	10	U	NC
COBALT-60	25	1.2	U	20	U	NC
EUROPIUM-154	50	1.99	U	10	U	NC
EUROPIUM-155	50	-0.134	U	30	U	NC
IRON-59	.05	2.95	U	20	U	NC
TECHNETIUM-99	15	-1.51	U	-0.15	U	NC

RADIOCHEMISTRY SPLITS (pCi/L)						
SAMPLE:		B0D4K6		B0D4P0		
DATE:		10/21/94		10/21/94		
LOCATION:		699-52-54		699-52-54		
COMMENTS:				SPLIT		
PARAMETER	CRDL	RESULT		RESULT	Q	RPD
CESIUM-137	15	0.632	U	10	U	NC
COBALT-58		-11.8	U	10	U	NC
COBALT-60	25	62.6		61		2.588
EUROPIUM-152	50	5.16	U	30	U	NC
EUROPIUM-154	50	-10.5	U	20	U	NC
EUROPIUM-155	50	2.95	U	40	U	NC
GROSS ALPHA	3	4.92	U	70	J	200
GROSS BETA	4	1820		1200	J	41.05
IRON-59	.05	-1.35	U	40	U	NC
PLUTONIUM-238	1	-0.0111	U	-0.004	U	NC
PLUTONIUM-239/240	1	-0.00828	U	-0.001	U	NC
RUTHENIUM-106		-11.5	U	100	U	NC
STRONTIUM		0.1	U			200
STRONTIUM-90	2			-0.002	U	200
TECHNETIUM-99	15	4250		3400		22.22
TOTAL URANIUM	.1	6.82		3.4		66.92
TRITIUM	400	4290	J	4500		4.778

RADIOCHEMISTRY SPLITS (pCi/L)						
SAMPLE:		B0D4L4		B0D4N6		
DATE:		10/19/94		10/19/94		
LOCATION:		699-53-55C		699-53-55C		
COMMENTS:				SPLIT		
PARAMETER	CRDL	RESULT	Q	RESULT	Q	RPD
CESIUM-137	15	1.75	U	10	U	NC
COBALT-58		0.0863	U	10	U	NC
COBALT-60	25	10.7	U	21		200
EUROPIUM-152	50	1.74	U	30	U	NC
EUROPIUM-154	50	0.816	U	20	U	NC
EUROPIUM-155	50	5.28	U	30	U	NC
GROSS ALPHA	3	1.89	U	5.2	J	200
GROSS BETA	4	219		460		70.98
IRON-59	.05	-10.6	U	40	U	NC
PLUTONIUM-238	1	-0.00615	U	-0.004	UJ	NC
PLUTONIUM-239/240	1	-0.00614	U	0.002	U	NC
RUTHENIUM-106		-27.3	U	100	U	NC
STRONTIUM		0.11	U			200
STRONTIUM-90	2			0	U	200
TECHNETIUM-99	15	552		690		22.22
TOTAL URANIUM	.1	4.31		2.4		56.92
TRITIUM	400	654		610		6.962