

START

0613497.2423

BOOKFS-PNL-027

0045489

1512

**200-BP-1
GROUNDWATER ANALYSIS PROJECT**

TASK 7

DATA PACKAGE/REPORT No. 6

Revision 0

July 22, 1991



Prepared by: B.M. Gillespie

Pacific Northwest Laboratory

(PNL Project #16772)



INTRODUCTION

This data package contains the results obtained by Pacific Northwest Laboratory (PNL) staff in the characterization of samples for the 200-BP-1 Groundwater Analysis Project. The samples were submitted for analysis by Westinghouse Hanford Company (WHC) under the Technical Project Plan (TPP) 16772 and the Quality Assurance Project Plan (QAPjP) ALO-001. The samples are all ground water collected in support of Task 7. The analytical procedures required for analysis were defined in the Test Instructions (TI) prepared by the PNL 200-BP-1 Project Management Office in accordance with the TPP and the QAPjP ALO-001.

The samples (Table 1) were submitted with the appropriate WHC Chain of Custody (COC) and Sample Analysis Request Forms. The samples were delivered at refrigerated temperature to the 300 Area, 325 Building and 314 Building 200-BP-1 Sample Custodians.

The requested analyses for these samples were cyanide, free cyanide and ferrocyanide. A complex cyanide result is determined by the difference of the total cyanide and the free cyanide results. A "ferrocyanide" result is not obtained nor calculated since the amount of the complex cyanide being ferrocyanide is indeterminant. The quality control (QC) requirements for each sample are defined in the test instructions for each sample. The QC requirements outlined in the procedures and requested in the WHC SOW were followed. Sample duplicates, methods blank, matrix spikes and laboratory control standards were analyzed. All QC data that exist are included in this Data Package/Report.

The data in this package are reported in separate tables (Tables 2 through 4) for each analyte or method. Three appendices are provided; one for Test Instruction, one for Chain of Custody, Sample Analysis Request Forms and Sample Receipt Forms and one that contains the primary inorganic analytical data.

CERTIFICATION STATEMENT

I certify that this data package is in compliance with the terms and conditions of the TPP 16772 and QAPjP ALO-001 for completeness. Release of the data contained in this hard copy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Project Manager or the Project Manager's designee, as verified by the following signature.

B. M. Gillespie

B. M. Gillespie
200-BP-1 Project Manager

7-19-91

Date

TABLE 1: 200-BP-1 Sample Numbers

<u>WHC Sample Number</u>	<u>PNL ALO Sample Number</u>
B00XF5	91-4687
B00XF2	91-4688
B00XF8	91-4689
B00XG4	91-4690
B00XG7	91-4691
B00XG1	91-4692
B00XH0	91-4790
B00XH3	91-4791
B00XH6	91-4792
B00XH9	91-4793
B00XJ2	91-4794
B00XJ5	91-4795
B00XK4	91-4854
B00XP9	91-4855
B00XJ8	91-4856
B00XL0	91-4857
B00XK7	91-4858
B00XL6	91-4859
B00XK1	91-4860

CYANIDE ANALYSIS RESULTS

Cyanide analysis was performed in room 419 of building 325 in the Hanford Site 300 area. The results are summarized by distillation/colorimetric analysis set (Procedure PNL-ALO-270).

Sample results for sample and duplicate were below the instrument detection limit (IDL) of 5.9 $\mu\text{g/L}$, except for seven samples. Free cyanide analysis was done for 5 samples that had a total cyanide concentrations of greater than 20 $\mu\text{g/L}$.

The 12 day hold time specified for total cyanide analysis under the CLP protocol was met for all samples in this work package.

Average spiked sample cyanide recovery was 100.7% with a standard deviation of 7.34%. We chose to calculate the spike recovery by subtracting the sample cyanide concentration from the sample + spike concentration. This is a deviation from the CLP protocol which calls for correcting the sample + spike concentration for just those samples where the sample concentration was above the IDL. This deviation was implemented to avoid biasing the cyanide recovery by the high IDL values we obtained in our quarterly IDL study. We thus prevented the reporting of high spike recovery values obtained where cyanide concentrations were detectable in the sample but were below the arbitrary IDL.

Recovery of cyanide for initial calibration verification sample [ICV-6, ICF Technology Inc., consensus value 9.4 mg/L] was 101.1% with a standard deviation of 7.9%. Recovery value for ICV-6 is based on the spiking of 1 mL of stock standard ICV-6 to 500 mL of deionized water and recovery back calculated to the original ICV-6 cyanide concentration. Cyanide found in blanks analyzed in the work package were below the stated IDL.

TABLE 2: TOTAL CYANIDE ANALYSIS RESULTS FOR TASK 7
SDG #6

WATER SAMPLES

Sample ID#	PNL Log#	G1 Sample (ug/L)	C	G2 Sample dup. (ug/L)	C	%RPD	G5 Blank (ug/L)	C	G3 Sample+ spike (ug/L)	G4 - ICV (mg/L)	G3 Sample+ spike recovery (%)	G4 - ICV sample recovery (%)	Flags Q	Footnote#	
BOOXF5	91-4687	5.9	U	5.9	U	N/A	5.9	U	174.7	10.11	104.8	107.5		1,2,3, 4, 5 (ALL)	
BOOXF2	91-4688	128.7													
BOOXF8	91-4689	5.9	U	5.9	U	N/A	5.9	U	166.9	11.09	99.7	118			
BOOXG4	91-4690	5.9	U												
BOOXG7	91-4691	5.9	U	5.9	U	N/A	5.9	U	163.6	8.4	98.9	89.4			
BOOXG1	91-4692	5.9	U												
BOOXHO	91-4790	5.9	U	5.9	U	N/A	5.9	U	179.3	10.05	105.8	106.9			
BOOXH3	91-4791	52.1													
BOOXH6	91-4792	5.9	U	5.9	U	N/A	5.9	U	156.9	8.65	94.9	92.0			
BOOXH9	91-4793	26.2													
BOOXJ2	91-4794	876.3		883.5		0.82	5.9	U	1117.2	9.3	144.7	99.0		6	
BOOXJ5	91-4795	26.4													
BOOXK4	91-4854	5.9	U	5.9	U	N/A	5.9	U	163.8	9.47	98.5	100.7			
BOOXK9	91-4855	5.9	U												
BOOXJ8	91-4856	5.9	U	5.9	U	N/A	5.9	U	174.2	8.95	104.7	95.2			
BOOXL0	91-4857	5.9	U												
BOOXK7	91-4858	10.1		9.4	B	7.13	5.9	U	155	9.32	87.0	99.2			
BOOXL6	91-4859	5.91	B												
BOOXK1	91-4860	5.9	U	5.9	U	N/A	5.9	U	92.7	9.66	112.3	102.8			
											Mean	100.7	101.1		
											Std. Dev.	7.3	7.9		

1. Concentration of stock CY-6=9.4 mg/L (9.4 ug of cyanide is added to each distillation flask and recovered in 250 mL of NaOH).
2. Concentration of spike added = 41.6 ug.
3. Contract required detection limit for water = 10 ug/L.
4. Used 250 mL of sample per distillation for samples G1, G2 and G3 due to limited sample size of 1.5L of total sample.
5. Duplicate precision under the CLP protocol must be within one CRDL when either sample or duplicate are below 5X CRDL.
6. Spike added is <25% of conc. of sample, therefore not required to flag with N. Also, % recovery not included in the mean % recovery.

CLP Flags

- U = Analyzed but not detected (less than IDL)
 B = Less than CRDL but greater than or equal to IDL
 N = Spiked sample recovery not within control limit

SC1001-2428

FREE CYANIDE ANALYSIS RESULTS

Sample solutions were analyzed by direct injection into an ion chromatograph/amperometric detector instrument system (WB 37427) according to procedure PNL-ALO-271, "Procedure for Analysis of Free Cyanide in Water and Solid Sample Leachates". The analytical session of May 26, 1991, involved samples 91-4688, 91-4791, 91-4793, and 91-4794. The analytical session of July 11, 1991, involved sample 91-4795.

The quality of the chromatograms developed during these two analytical sessions was less than optimal. The baseline perturbations (May 26 session), noisy baseline (July 11 session), blank and low concentration standards yield "negative" peaks in the CN^- region (July 11 session), and sample 91-4795 (July 11 session) exhibited an interference peak immediately preceding the CN^-

Analyses were completed within the contract required maximum hold time of twelve days for samples 91-4688, 91-4791, 91-4793, and 91-4794. Sample 91-4795 was analyzed for free cyanide approximately 50 days after receipt.

For the data set generated during the May 26, 1991 analytical session, average spike recovery was 93.5% (range 85-102%) and the average recovery of standards was 101% with a standard deviation of 5%. The relative percent difference for duplicate analysis of sample 91-4688 was 4.3%. Thus, method precision and bias observed for free cyanide analyses during the May 26th analytical session meets client requirements.

The July 11, 1991, free cyanide analytical session involved only one sample (91-4795). Average spike recovery was 96% (range 92-100%). The relative percent difference of duplicate analyses was 1.5%.

The actual analytical result for free cyanide content of sample 91-4795 i.e. $23.6 \mu\text{g CN}^-/\text{L}$ compares quite closely to the total cyanide content of $26.4 \mu\text{g CN}^-/\text{L}$ found previously. Since the two values agree well, it cannot be determined if any of the cyanide is complexed. In the author's (KHP) opinion, there was no loss/degradation of cyanide during the excessive hold/delay time.

TABLE 3: FREE CYANIDE ANALYSIS FOR TASK 7
SDG #6

WHC Sample ID#	PNL Sample ID#	J1 Sample ug/L	Flags	J2 Sample Duplicate ug/L	XRPD	-----%recovery-----											
						--J5-- Matrix Blank ug/L	-----J3----- Sample+ Spike ug/L	-----J4----- Control Std. ug/L	Standard Added ug/L	Dup. + Spike ug/L	J6-- Spike Added ug/L	--J3-- Spike Rec.	---J6--- Dup. + Spike Rec.	---J4--- Control Std. Rec.	Flags		
B00XF2	91-4688	37.9		39.6	4.3												
B00XH3	91-4791	21.4				0	40.7	18.9	18.6	18.9	37.4	18.9	102	85	98		
B00XH9	91-4793	2	U														
B00XJ2	91-4794	110															
B00XJ5	91-4795	23.4		23.8	1.5	0.1	33.0	9.6	19.1	19.2	41.0	19.2	100	92	99		

J1 = SAMPLE
J2 = DUPLICATE SAMPLE
J3 = SPIKE SAMPLE
J4 = STANDARD
J5 = METHODS BLANK
J6 = SPIKE DUPLICATE

CLP Flags

U = Analyzed but not detected (less than IDL)

9613497.2430

COMPLEX CYANIDE RESULTS

The complex cyanide results are calculated from the difference in the total cyanide results and the free cyanide results. A "ferrocyanide" result is not obtained nor calculated since the amount of the complex cyanide being ferrocyanide is indeterminant.

Samples are analyzed for free cyanide based on first determining that the total cyanide results are greater than 20 ug/L. Samples below 20 ug/L total cyanide are typically not analyzed for free cyanide to save on analysis cost. Attempting to perform free cyanide analysis near the Contract Required Detection Limit of total cyanide is not meaningful.

In this data set, there were only five samples (91-4688, 91-4791, 91-4793, 91-4794, and 91-4795) requiring free cyanide determination.

TABLE 4: COMPLEX CYANIDE DETERMINATION
FOR TASK 7, SDG #6

Sample ID#	Total CN Sample ug/L	Free CN Sample ug/L	Complex CN Sample ug/L (1)
91-4688	129	37.9	90.8
91-4791	52.1	21.4	30.7
91-4793	26.2	2.0	24.2 (2)
91-4794	876	110	766
91-4795	26.4	23.4	3.0 (3)

- (1) Results calculated by subtracting the Free cyanide results from the Total cyanide results.
- (2) Note: The free cyanide results is flagged as not detected (see Table 3, page 9), therefore the complex cyanide results may be equal to the total cyanide results.
- (3) See explanation of complex cyanide results in the free cyanide results narrative on page 8.

SAMPLE RECEIPT FORMDelivered by: DUSTY BUTCHER Date/Time: 5/15/91 2:50Received by: J. ROBBINSCustomer Sample Number(s): ~~B00~~ XF5, XF2, XF8, XG4, XE7, XG1ALO Sample Number(s): 91-4687, 4688, 4689, 4690, 4691, 46921. Customer Chain-of-Custody Form: Present Absent

2. Additional Shipping Forms (list):

SAMPLE ANALYSIS REQUEST

3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

Present Absent

If Present, Condition: _____

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes: N/A

5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).

OK 3 °C

6. Condition of Sample Vials.

INTACT

7. Verification of Agreement or Nonagreement of Information on Receiving Documents.

OK

8. Resolution of Problems or Discrepancies.

OK

RETURN COMPLETED FORM TO PROJECT MANAGER

B01-002

9613497.2435

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5-14-91	Time 1100
Sample Locations	200-BP-1			
Ice Chest No.		Field Logbook and Page No.	WHC-N-4461 / pg. 34	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST (PNL) 325 LABORATORY			

SAMPLE IDENTIFICATION

BOO X G1
2, 1L, P, WATER, TOTAL CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>L.D. Walker</i> L.D. Walker	Received by: <i>P.H. Butcher</i> <i>P.H. Butcher</i>	Date/Time: <i>15 May 91 / 0730</i>
Relinquished by: <i>P.H. Butcher</i> <i>P.H. Butcher</i>	Received by: J. ROBBINS <i>J. Robbins</i>	Date/Time: <i>5/15/91 1450</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-004

9613497.2436

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5/14/91	Time 12:15
Sample Locations	200-BP-1			
Ice Chest No.		Field Logbook and Page No.	WHC-N-4461 / pg. 34	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST (PNL) 325 LABORATORY			

SAMPLE IDENTIFICATION

<p>800 X G7 2, 1L, P, WATER, TOTAL CYANIDE</p>
--

CHAIN OF POSSESSION

Relinquished by: <i>BH Ford</i>	Received by: <i>PH Butcher</i>	Date/Time: <i>15 May 91 / 0730</i>
Relinquished by: <i>PH Butcher</i>	Received by: <i>J. ROBBINS</i> <i>(D. Robbins)</i>	Date/Time: <i>5/15/91 1450</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-005

9613497.2437

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5/14/91	Time: 1320
Sample Locations	200-BP-1			
Ice Chest No.		Field Logbook and Page No.	WHC-N-4461 / pg 34	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST (PNL) 325 LABORATORY			

SAMPLE IDENTIFICATION

BOOK 44
2, 1L, P, WATER, TOTAL CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>B.H. Ford</i>	Received by: <i>P.H. Butcher</i>	Date/Time: <i>15 May 91 / 0730</i>
Relinquished by: <i>P.H. Butcher</i>	Received by: <i>J. ROBBINS</i>	Date/Time: <i>5/15/91 1430</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

9613497.2438

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465		
Sample Collected by	L. WALKER	Date	5-13-91	Time	12:30
Sample Locations	200-BP-1				
Ice Chest No.		Field Logbook and Page No.	W4C-N-4461 / pg. 33		
Remarks	N/A				
Bill of Lading No.	N/A	Offsite Property No.	N/A		
Method of Shipment	HAND DELIVER				
Shipped to	BATTELLE NORTHWEST (PNL) 325 LABORATORY				

SAMPLE IDENTIFICATION

BOOKS 2, 1L, P, WATER, TOTAL CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>BM</i>	Received by: <i>Pt Butcher</i>	Date/Time: <i>14 May 91 / 0730</i>
Relinquished by: <i>Pt Butcher</i>	Received by: <i>J. ROBBINS</i>	Date/Time: <i>5/15/91 1430</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-007

9613497.2439

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5/13/91	Time 2:20
Sample Locations	200-BP-1			
Ice Chest No.		Field Logbook and Page No.	WTC-N-4461 / pg. 33	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST (PNL) 325 LABORATORY			

SAMPLE IDENTIFICATION

BOO XFZ 2, 1L, P, WATER, TOTAL CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>L.D. Walker</i> <i>L.D. Walker</i>	Received by: <i>PH Butcher</i> <i>PH Butcher</i>	Date/Time: <i>14 May 91 / 0730</i>
Relinquished by: <i>PH Butcher</i> <i>PH Butcher</i>	Received by: <i>J. ROBBINS</i> <i>J. Robbins</i>	Date/Time: <i>5/15/91 1450</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-008

9613497.2440

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5/13/91	Time: 1:20
Sample Locations	200-BP-1			
Ice Chest No.		Field Logbook and Page No.	WHC-N-4461 / pg. 33	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST (PNL) 325 LABORATORY			

SAMPLE IDENTIFICATION

BOO XF8 2, 1L, P, WATER, TOTAL CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>L. D. Walker</i> <i>L.D. Walker</i>	Received by: <i>P.H. Butcher</i>	Date/Time: <i>14 May 91 / 07:30</i>
Relinquished by: <i>P.H. Butcher</i>	Received by: <i>J. ROBBINS</i> <i>J. Robbins</i>	Date/Time: <i>5/15/91 1450</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

SAMPLE RECEIPT FORM

Delivered by: P.L. Butcher Date/Time: 5-15-91 2:00 pm

Received by: S.O. Slater
300XF5 300XF2 300XF8 300G4 300G7 300G7

Customer Sample Number(s): _____

ALO Sample Number(s): 91-4687 to 91-4692

1. Customer Chain-of-Custody Form: Present Absent _____

2. Additional Shipping Forms (list):

3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

Present Absent _____

If Present, Condition: OK. Intact

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes:

5. Condition of Shipping Container (i.e., broken container, dented, breached plastic bag, temperature of sample container as defined in Section 3.0 in PNL-ALO-051, etc.)
Temp = 2.0C

6. Condition of Sample Vials.

7. Verification of Agreement or Nonagreement of Information on Receiving Documents.

8. Resolution of Problems or Discrepancies.

RETURN COMPLETED FORM TO PROJECT MANAGER

B01-010

9613497.2443

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5/13/91	Time 1:20
Sample Locations	200-BP-1			
Ice Chest No.	Simon	Field Logbook and Page No.	WHC-N-4461 / pg. 33	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST (PNL) 314 LABORATORY			

SAMPLE IDENTIFICATION

BOOXF8 1, 1L, P, WATER, FREE CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>L.D. Walker</i> L.D. Walker	Received by: <i>A.H. Butcher</i> <i>A.H. Butcher</i>	Date/Time: 14 May 91 / 0730
Relinquished by: <i>A.H. Butcher</i> <i>A.H. Butcher</i>	Received by: <i>S.D. SLATE</i> <i>S.D. Slate</i>	Date/Time: 5-15-91 / 2:00 pm
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-012

9613497.2444

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5/13/91	Time: 2:20
Sample Locations	200-BP-1			
Ice Chest No.	<i>Simon</i>	Field Logbook and Page No.	WHC-N-4461 / pg. 33	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST (PNL) 314 LABORATORY			

SAMPLE IDENTIFICATION

<p>BOOXF2 1, 1L, P, WATER, FREE CYANIDE</p>

CHAIN OF POSSESSION

Relinquished by: <i>L.D. Walker</i> L.D. Walker	Received by: <i>PH Butcher</i> <i>PH Butcher</i>	Date/Time: <i>14 May 91 / 0730</i>
Relinquished by: <i>PH Butcher</i>	Received by: <i>SO SLATE</i> <i>S.O. Slate</i>	Date/Time: <i>5-15-91 / 2:00 p</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-013

9613497.2445

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5/13/91	Time 1230
Sample Locations	200-BP-1			
Ice Chest No.	<i>Simon</i>	Field Logbook and Page No.	WHC-N-4461 / pg.33	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST (PNL) 314 LABORATORY			

SAMPLE IDENTIFICATION

BOOK#5 1, 1L, P, WATER, FREE CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>PH Butcher</i>	Received by: <i>PH Butcher</i>	Date/Time: <i>14 May 91 / 0730</i>
Relinquished by: <i>PH Butcher</i>	Received by: <i>S.D. SLATE</i>	Date/Time: <i>5-15-91 / 2:00 p.</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-014

9613497.2446

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5/14/91	Time 1320
Sample Locations	200-BP-1			
Ice Chest No.	Simon	Field Logbook and Page No.	WAC-N-4461/pg 34	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST(PNL) 314 LABORATORY			

SAMPLE IDENTIFICATION

<p>BOOK # 4</p>	<p>1, 1L, P, WATER, FREE CYANIDE</p>
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CHAIN OF POSSESSION

Relinquished by: <i>B.H. Ford</i>	Received by: <i>PH Butcher</i>	Date/Time: <i>15 May 91 / 0730</i>
Relinquished by: <i>PH Butcher</i>	Received by: <i>S.O. SLATE</i>	Date/Time: <i>5-15-91 / 2:00 p</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-015

9613497.2447

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465		
Sample Collected by	L. WALKER	Date	5/14/91	Time	12:15
Sample Locations	200-BP-1				
Ice Chest No.	Simon	Field Logbook and Page No.	WHC-N-4461/ pg. 34		
Remarks	N/A				
Bill of Lading No.	N/A	Offsite Property No.	N/A		
Method of Shipment	HAND DELIVER				
Shipped to	BATTELLE NORTHWEST (PNL) 314 LABORATORY				

SAMPLE IDENTIFICATION

BOOK 67 1, 1L, P, WATER, FREE CYANIDE
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CHAIN OF POSSESSION

Relinquished by: <i>BH Ford</i>	Received by: <i>PH Butcher</i>	Date/Time: <i>15 May 91 / 0720</i>
Relinquished by: <i>PH Butcher</i>	Received by: <i>S.D. SLATE</i>	Date/Time: <i>5-15-91 / 2:00 P</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-016

9613497.2448

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465		
Sample Collected by	L. WALKER	Date	5/14/91	Time	1100
Sample Locations	200-BP-1				
Ice Chest No.	<i>Simon</i>	Field Logbook and Page No.	WHC-N-4461 / pg. 34		
Remarks	N/A				
Bill of Lading No.	N/A	Offsite Property No.	N/A		
Method of Shipment	HAND DELIVER				
Shipped to	BATTELLE NORTHWEST (PNL) 314 LABORATORY				

SAMPLE IDENTIFICATION

<p>BOO X61 1, 1L, P, WATER, FREE CYANIDE</p>
--

CHAIN OF POSSESSION

Relinquished by: <i>L.D. Walker</i> L.D. Walker	Received by: <i>A. Butcher</i> <i>A. Butcher</i>	Date/Time: <i>15 May 91 / 0730</i>
Relinquished by: <i>A. Butcher</i> <i>A. Butcher</i>	Received by: <i>S.D. SLATE</i> <i>S.D. Slate</i>	Date/Time: <i>5-15-91 / 2:00 pm</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-017

SAMPLE RECEIPT FORM

Delivered by: DUSTY BUTCHER Date/Time: 5/17/91 1440

Received by: J. ROBBINS

Customer Sample Number(s): ~~B00~~XH0, ... XH3...XH6...XH9...XJ2...XJ5

ALO Sample Number(s): 91-4790, 4791, 4792, 4793, 4794, 4795

1. Customer Chain-of-Custody Form: Present Absent

2. Additional Shipping Forms (list):

SAR

3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

Present Absent

If Present, Condition: _____

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes: N/A

5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).

OK 5°C

6. Condition of Sample Vials.

OK, INTACT ~~SEALED~~

7. Verification of Agreement or Nonagreement of Information on Receiving Documents.

OK

8. Resolution of Problems or Discrepancies.

OK

RETURN COMPLETED FORM TO PROJECT MANAGER

9613497.2451

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5/15/91	Time 10:00
Sample Locations	200-BP-1			
Ice Chest No.		Field Logbook and Page No.	WHC-N-4461 / pg 35	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST (PNL) 325 LABORATORY			

SAMPLE IDENTIFICATION

BOOXHD
 2, 1L, P, WATER, TOTAL CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>B.H. Ford</i> B.H. FORD	Received by: <i>P.H. Butcher</i> P.H. BUTCHER	Date/Time: 17 May 91 / 0800
Relinquished by: <i>P.H. Butcher</i> P.H. BUTCHER	Received by: <i>J. Robbins</i> J. ROBBINS	Date/Time: 5/17/91 1440
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-020

9613497.2452

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5/15/91	Time 11:15
Sample Locations	200-BP-1			
Ice Chest No.		Field Logbook and Page No.	WAC - N - 4461 / pg 35	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST (PNL) 325 LABORATORY			

SAMPLE IDENTIFICATION

<p>BOOXHZ 2, 1L, P, WATER, TOTAL CYANIDE</p>
--

CHAIN OF POSSESSION

Relinquished by: <i>BH Ford</i>	Received by: <i>PH Butcher</i>	Date/Time: <i>17 May 91 / 0800</i>
Relinquished by: <i>PH Butcher</i>	Received by: <i>J. ROBBINS</i>	Date/Time: <i>5/17/91 1440</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-021

9613497.2453

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465		
Sample Collected by	L. WALKER	Date	5/15/91	Time	1300
Sample Locations	200-BP-1				
Ice Chest No.		Field Logbook and Page No.	WHC-N-4461 / pg. 35		
Remarks	N/A				
Bill of Lading No.	N/A	Offsite Property No.	N/A		
Method of Shipment	HAND DELIVER				
Shipped to	BATTELLE NORTHWEST(PNL) 325 LABORATORY				

SAMPLE IDENTIFICATION

BOOX H6
 2, 1L, P, WATER, TOTAL CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>L.D. Walker</i> L.D. Walker	Received by: <i>P.H. Butcher</i> <i>P.H. Butcher</i>	Date/Time: 17 May 91 / 0800
Relinquished by: <i>P.H. Butcher</i> <i>P.H. Butcher</i>	Received by: J. ROBBINS <i>J. Robbins</i>	Date/Time: 5/17/91 1440
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-022

9613497-2454

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465		
Sample Collected by	L. WALKER	Date	5/16/91	Time	1030 1030 5/16/91
Sample Locations	200-BP-1				
Ice Chest No.		Field Logbook and Page No.	WHC-N-441 p.36		
Remarks	N/A				
Bill of Lading No.	N/A	Offsite Property No.	N/A		
Method of Shipment	HAND DELIVER				
Shipped to	BATTELLE NORTHWEST (PNL) 325 LABORATORY				

SAMPLE IDENTIFICATION

BOOX119
2, 1L, P, WATER, TOTAL CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>[Signature]</i> B.H. Ford	Received by: <i>[Signature]</i> P.H. Dutcher	Date/Time: 17 May 91 / 0800
Relinquished by: <i>[Signature]</i> P.H. Dutcher	Received by: <i>[Signature]</i> J. ROBBINS	Date/Time: 5/17/91 1440
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-023

9613497.2455

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5/16/91	Time: 1215
Sample Locations	200-BP-1			
Ice Chest No.		Field Logbook and Page No.	WHL-N-4461 p 36	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST(PNL) 325 LABORATORY			

SAMPLE IDENTIFICATION

BOOK 2
2, 1L, P, WATER, TOTAL CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>B.H. Ford</i>	Received by: <i>P.H. Butcher</i>	Date/Time: 17 May 91 / 0800
Relinquished by: <i>P.H. Butcher</i>	Received by: J. ROBBINS <i>J. Robbins</i>	Date/Time: 5/17/91 1440
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-024

9613497.2456

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465		
Sample Collected by	L. WALKER	Date	5/10/91	Time	1345
Sample Locations	200-BP-1				
Ice Chest No.		Field Logbook and Page No.	WHC-N-4461 p36		
Remarks	N/A				
Bill of Lading No.	N/A	Offsite Property No.	N/A		
Method of Shipment	HAND DELIVER				
Shipped to	BATTELLE NORTHWEST (PNL) 325 LABORATORY				

SAMPLE IDENTIFICATION

<p>BOOXS 2, 1L, P, WATER, TOTAL CYANIDE</p>

CHAIN OF POSSESSION

Relinquished by: <i>[Signature]</i> B.H. FORD	Received by: <i>[Signature]</i> P.H. Butler	Date/Time: 17 May 91 / 0800
Relinquished by: <i>[Signature]</i> P.H. Butler	Received by: <i>[Signature]</i> J. ROBBINS	Date/Time: 5/17/91 1440
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

SAMPLE RECEIPT FORMDelivered by: P.H. Butcher Date/Time: 5/17/91 1350Received by: K.H. PoolCustomer Sample Number(s): B00XHO, ... XH3, ... XH6, ... XH9 ... XJ2 ... XJ5ALO Sample Number(s): 91-4790, 4791, 4792, 4793, 4794, 47951. Customer Chain-of-Custody Form: Present Absent

2. Additional Shipping Forms (list):

3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

Present Absent If Present, Condition: Good

4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes:

5. Condition of Shipping Container (i.e., broken container, dented, breached plastic bag, temperature of sample container as defined in Section 3.0 in PNL-ALO-051, etc.) All OK. T = +0.5°C

6. Condition of Sample Vials.

7. Verification of Agreement or Nonagreement of Information on Receiving Documents.

8. Resolution of Problems or Discrepancies.

RETURN COMPLETED FORM TO PROJECT MANAGER

B01-026

9613497.2459

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5/15/91	Time 10:00
Sample Locations	200-BP-1			
Ice Chest No.	Simon	Field Logbook and Page No.	WAC-N-4461 pg 35	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST (PNL) 314 LABORATORY			

SAMPLE IDENTIFICATION

BOOXHO 1, 1L, P, WATER, FREE CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>[Signature]</i> Bit Ford	Received by: <i>[Signature]</i> P.H. Dutcher	Date/Time: 17 May 91 / 0800
Relinquished by: <i>[Signature]</i> P.H. Dutcher	Received by: <i>[Signature]</i> Karl Pool	Date/Time: 5-17-91 1400
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-028

9613497.2460

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5/15/91	Time 11:15
Sample Locations	200-BP-1			
Ice Chest No.	<i>Sigmon</i>	Field Logbook and Page No.	W4C-N-4461/ pg 25	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST (PNL) 314 LABORATORY			

SAMPLE IDENTIFICATION

BOOK H3
 1, 1L, P, WATER, FREE CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>[Signature]</i>	Received by: <i>P.H. Butcher</i>	Date/Time: 17 May 91 / 0800
Relinquished by: <i>P.H. Butcher</i>	Received by: <i>Karl Pool</i>	Date/Time: 5-17-91 1400
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-029

9613497.2461

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465		
Sample Collected by	L. WALKER	Date	5/15/91	Time	1300
Sample Locations	200-BP-1				
Ice Chest No.	Simon	Field Logbook and Page No.	WHC-N-4461 / pg. 35		
Remarks	N/A				
Bill of Lading No.	N/A	Offsite Property No.	N/A		
Method of Shipment	HAND DELIVER				
Shipped to	BATTELLE NORTHWEST (PNL) 314 LABORATORY				

SAMPLE IDENTIFICATION

BOOX H6 1, 1L, P, WATER, FREE CYANIDE
--

CHAIN OF POSSESSION

Relinquished by: <i>L.D. Walker</i> <i>L.D. Walker</i>	Received by: <i>P.H. Butcher</i> <i>P.H. Butcher</i>	Date/Time: <i>17 May 91 / 0800</i>
Relinquished by: <i>P.H. Butcher</i> <i>P.H. Butcher</i>	Received by: <i>Carl Pool</i>	Date/Time: <i>5-17-91 1400</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-030

9613497.2462

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5/16/91	Time: 1030
Sample Locations	200-BP-1			
Ice Chest No.		Field Logbook and Page No.	WHC-N-4461 p.36	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST (PNL) 314 LABORATORY			

SAMPLE IDENTIFICATION

BOO XH9 1, 1L, P, WATER, FREE CYANIDE
--

CHAIN OF POSSESSION

Relinquished by: <i>BH Ford</i> BH Ford	Received by: <i>P.H. Butcher</i> P.H. Butcher	Date/Time: 17 May 91 / 0800
Relinquished by: <i>P.H. Butcher</i> P.H. Butcher	Received by: <i>Karl Pool</i> Karl Pool	Date/Time: 5-17-91 1400
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-031

9613497.2463

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5/16/91	Time 12:15
Sample Locations	200-BP-1			
Ice Chest No.	Simon	Field Logbook and Page No.	WAC-N-4461 p.36	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST(PNL) 314 LABORATORY			

SAMPLE IDENTIFICATION

BOOKJZ 1, 1L, P, WATER, FREE CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>R.H. Ford B.H. Ford</i>	Received by: <i>P.H. Butcher</i>	Date/Time: <i>12 May 91 / 0800</i>
Relinquished by: <i>P.H. Butcher</i>	Received by: <i>Carl Pool</i>	Date/Time: <i>5-17-91 1400</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-032

9613497.2464

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465
Sample Collected by	L. WALKER	Date	5/16/91
Sample Locations	200-BP-1		
Ice Chest No.	Simas	Field Logbook and Page No.	NHC-U-44/61 p 36
Remarks	N/A		
Bill of Lading No.	N/A	Offsite Property No.	N/A
Method of Shipment	HAND DELIVER		
Shipped to	BATTELLE NORTHWEST (PNL) 314 LABORATORY		

SAMPLE IDENTIFICATION

BOOKS
1, 1L, P, WATER, FREE CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>B.H. Ford</i>	Received by: <i>P.H. Butcher</i>	Date/Time: <i>17 May 91 / 0800</i>
Relinquished by: <i>P.H. Butcher</i>	Received by: <i>Tarl Pool</i>	Date/Time: <i>5-17-91 1400</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

SAMPLE RECEIPT FORMDelivered by: P.H. Butcher Date/Time: 5/22/91 1330Received by: Carl PoolCustomer Sample Number(s): B00XK4, ...XP9, ...XJ8, ...XL0, ...XK7, ...XL6, ...XK1ALO Sample Number(s): 41-4854, 4855 4856 4857 4858 4859 4860

1. Customer Chain-of-Custody Form: Present X Absent _____
2. Additional Shipping Forms (list):
3. Custody Seals on Shipping and/or Sample Containers and their Conditions.
Present X Absent _____
If Present, Condition: Good. - Intact.
4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes:

5. Condition of Shipping Container (i.e., broken container, dented, breached plastic bag, temperature of sample container as defined in Section 3.0 in PNL-ALO-051, etc.) All just fine. T=3.5°C
6. Condition of Sample Vials.
7. Verification of Agreement or Nonagreement of Information on Receiving Documents.
8. Resolution of Problems or Discrepancies.

RETURN COMPLETED FORM TO PROJECT MANAGER

B01-034

9613497.2467

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5-20-91	Time 1300
Sample Locations	200-BP-1			
Ice Chest No.	<i>Simon</i>	Field Logbook and Page No.	WHC-N-4461 / pg. 37	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST (PNL) 314 LABORATORY			

SAMPLE IDENTIFICATION

<p>BOO XP9 1, 1L, P, WATER, FREE CYANIDE</p>
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CHAIN OF POSSESSION

Relinquished by: <i>L.D. Walker</i> L.D. Walker	Received by: <i>PH Butcher</i> <i>PH Butcher</i>	Date/Time: 21 May 91 / 0730
Relinquished by: <i>PH Butcher</i> <i>PH Butcher</i>	Received by: <i>Earl Pool</i>	Date/Time: 5/22/91 1330
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-036

9613497-2468

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5-20-91	Time 1300
Sample Locations	200-BP-1			
Ice Chest No.	<i>Simon</i>	Field Logbook and Page No.	WHC-N-4461 / pg. 37	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST (PNL) 314 LABORATORY			

SAMPLE IDENTIFICATION

BOO X K 4
 1, 1L, P, WATER, FREE CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>X.D. Walker</i> <i>L.D. Walker</i>	Received by: <i>PH Butcher</i> <i>PH Butcher</i>	Date/Time: <i>21 May 91 / 0730</i>
Relinquished by: <i>PH Butcher</i>	Received by: <i>Stan Pool</i>	Date/Time: <i>5/22/91 1330</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

9613497.2469

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5/20/91	Time: 0930
Sample Locations	200-BP-1			
Ice Chest No.	<i>Simon</i>	Field Logbook and Page No.	WHC-N-4461 / pg. 35 ^{cc} ₃₇ 5/20/91	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST (PNL) 314 LABORATORY			

SAMPLE IDENTIFICATION

BOO XJ8
1, 1L, P, WATER, FREE CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>L.D. Walker</i> <i>L.D. Walker</i>	Received by: <i>PH Butcher</i> <i>PH Butcher</i>	Date/Time: <i>21 May 91 / 0730</i>
Relinquished by: <i>PH Butcher</i> <i>PH Butcher</i>	Received by: <i>Stan Pool</i>	Date/Time: <i>5/22/91 1330</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-038

9613497.2470

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465
Sample Collected by	L. WALKER	Date	5-21-91 Time 0930
Sample Locations	200-BP-1		
Ice Chest No.	Simon	Field Logbook and Page No.	WHC-N-4461 / pg. 38
Remarks	N/A		
Bill of Lading No.	N/A	Offsite Property No.	N/A
Method of Shipment	HAND DELIVER		
Shipped to	BATTELLE NORTHWEST (PNL) 325 LABORATORY		

SAMPLE IDENTIFICATION

B00 XLD 2, 1L, P, WATER, TOTAL CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>L.D. Walker</i> <i>L.D. Walker</i>	Received by: <i>PH Butcher</i> <i>PH Butcher</i>	Date/Time: <i>22 May 91 / 0730</i>
Relinquished by: <i>PH Butcher</i>	Received by: <i>Karl Pal</i>	Date/Time: <i>5/22/91 1330</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-039

9613497.2471

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465
Sample Collected by	L. WALKER	Date	5-21-91 Time 1315
Sample Locations	200-BP-1		
Ice Chest No.	<i>Simon</i>	Field Logbook and Page No.	WHC-N-4461/ pg. 38
Remarks	N/A		
Bill of Lading No.	N/A	Offsite Property No.	N/A
Method of Shipment	HAND DELIVER		
Shipped to	BATTELLE NORTHWEST (PNL) 314 LABORATORY		

SAMPLE IDENTIFICATION

BOO x K 7
 1, 1L, P, WATER, FREE CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>L.D. Walker</i> <i>L.D. Walker</i>	Received by: <i>PH Butcher</i> <i>PH Butcher</i>	Date/Time: <i>22 May 91 / 0730</i>
Relinquished by: <i>PH Butcher</i> <i>PH Butcher</i>	Received by: <i>Harl Pool</i>	Date/Time: <i>5/22/91 1330</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-040

9613497.2472

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465		
Sample Collected by	L. WALKER	Date	5/21/91	Time	1400
Sample Locations	200-BP-1				
Ice Chest No.	<i>Simon</i>	Field Logbook and Page No.	WHC-N-4461 / Pg. 38		
Remarks	N/A				
Bill of Lading No.	N/A	Offsite Property No.	N/A		
Method of Shipment	HAND DELIVER				
Shipped to	BATTELLE NORTHWEST (PNL) 314 LABORATORY				

SAMPLE IDENTIFICATION

BOO x LG
 1, 1L, P, WATER, FREE CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>L.D. Walker</i> <i>L.D. Walker</i>	Received by: <i>P.H. Butcher</i> <i>P.H. Butcher</i>	Date/Time: <i>22 May 91 / 0730</i>
Relinquished by: <i>P.H. Butcher</i> <i>P.H. Butcher</i>	Received by: <i>Carl Pool</i>	Date/Time: <i>5/22/91 1330</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-041

9613497.2473

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5/21/91	Time 0930
Sample Locations	200-BP-1			
Ice Chest No.	Simon	Field Logbook and Page No.	WHC-N-4461 / pg. 38	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST (PNL) 325 LABORATORY			

SAMPLE IDENTIFICATION

BOO XKI 2, 1L, P, WATER, TOTAL CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>L. Walker</i> <i>L.D. Walker</i>	Received by: <i>P.H. Butcher</i> <i>P.H. Butcher</i>	Date/Time: <i>22 May 91 / 0230</i>
Relinquished by: <i>P.H. Butcher</i>	Received by: <i>Starl Pool</i>	Date/Time: <i>5/22/91 1330</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-042

SAMPLE RECEIPT FORMDelivered by: DUSTY BUTCHER Date/Time: 5/22/91 1400Received by: J. ROBBINSCustomer Sample Number(s): BOOK4, XP9, XJ8, XL8, XK7, XL6, XK1ALO Sample Number(s): 90-4854 TO 91-4860

1. Customer Chain-of-Custody Form: Present Absent
2. Additional Shipping Forms (list):
SAR
3. Custody Seals on Shipping and/or Sample Containers and their Conditions.
Present Absent
If Present, Condition: INTACT
4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

Notes: N/A

5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).
OK 5°C
6. Condition of Sample Vials.
OK
7. Verification of Agreement or Nonagreement of Information on Receiving Documents.
OK
8. Resolution of Problems or Discrepancies.
OK

RETURN COMPLETED FORM TO PROJECT MANAGER

B01-043

9613497.2476

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5-20-91	Time 1300
Sample Locations	200-BP-1			
Ice Chest No.		Field Logbook and Page No.	WHC-N-4461 / pg. 37	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST (PNL) 325 LABORATORY			

SAMPLE IDENTIFICATION

BOO XP9
 2, 1L, P, WATER, TOTAL CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>L.D. Walker</i> L.D. Walker	Received by: <i>PH Butcher</i> PH Butcher	Date/Time: 21 MAY 91 / 0730
Relinquished by: <i>PH Butcher</i> <i>PH Butcher</i>	Received by: <i>J. ROBBINS</i> <i>J. Robbins</i>	Date/Time: 5/22/91 1400
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-045

9613497.2477

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5/20/91	Time 1300
Sample Locations	200-BP-1			
Ice Chest No.		Field Logbook and Page No.	WHC-N-4461 / pg. 37	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST (PNL) 325 LABORATORY			

SAMPLE IDENTIFICATION

B00XK4
 2, 1L, P, WATER, TOTAL CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>L.D. Walker</i> <i>L.D. Walker</i>	Received by: <i>P.H. Butcher</i> <i>P.H. Butcher</i>	Date/Time: <i>21 May 91 / 0730</i>
Relinquished by: <i>P.H. Butcher</i> <i>P.H. Butcher</i>	Received by: <i>J. ROBBINS</i> <i>J. Robbins</i>	Date/Time: <i>5/22/91 1400</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-046

9613497.2478

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5/20/91	Time: 0930
Sample Locations	200-BP-1			
Ice Chest No.		Field Logbook and Page No.	WHC-N-4461/ Pg. 37	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST (PNL) 325 LABORATORY			

SAMPLE IDENTIFICATION

BOO XJ8 2, 1L, P, WATER, TOTAL CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>L.D. Walker</i> L.D. Walker	Received by: <i>P.H. Butcher</i> P.H. Butcher	Date/Time: 21 May 91 / 0730
Relinquished by: <i>P.H. Butcher</i> P.H. Butcher	Received by: J. ROBBINS <i>J. Robbins</i>	Date/Time: 5/21/91 1400
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-047

9613497.2479

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5/21/91	Time 0930
Sample Locations	200-BP-1			
Ice Chest No.		Field Logbook and Page No.	WMC-N-4461 / pg-38	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST (PNL) 314 LABORATORY			

SAMPLE IDENTIFICATION

BOO XLO
 1, 1L, P, WATER, FREE CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>LD Walker</i> LD Walker	Received by: <i>PH Butcher</i> <i>PH Butcher</i>	Date/Time: <i>22 May 91 / 0730</i>
Relinquished by: <i>PH Butcher</i> <i>PH Butcher</i>	Received by: <i>J. ROBBINS</i> <i>J. Robbins</i>	Date/Time: <i>5/22/91 1400</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

9613497.2480

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5-21-91	Time 1315
Sample Locations	200-BP-1			
Ice Chest No.		Field Logbook and Page No.	WHC-N-4461 / pg. 38	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST(PNL) 325 LABORATORY			

SAMPLE IDENTIFICATION

<p>BOO xk7 2, 1L, P, WATER, TOTAL CYANIDE</p>

CHAIN OF POSSESSION

Relinquished by: <i>L.D. Walker</i> L.D. Walker	Received by: <i>PH Butcher</i> PH Butcher	Date/Time: <i>22 May 91 / 0730</i>
Relinquished by: <i>PH Butcher</i> PH Butcher	Received by: <i>J. ROBBINS</i> J. Robbins	Date/Time: <i>5/22/91 1400</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-049

9613497.2481

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5-21-91	Time 1400
Sample Locations	200-BP-1			
Ice Chest No.		Field Logbook and Page No.	WHC-N-4461 / pg-38	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST (PNL) 325 LABORATORY			

SAMPLE IDENTIFICATION

BOO X66
2, 1L, P, WATER, TOTAL CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>L.D. Walker</i>	Received by: <i>P.H. Butcher</i>	Date/Time: <i>22 May 91</i>
Relinquished by: <i>P.H. Butcher</i>	Received by: <i>J. ROBBINS</i>	Date/Time: <i>5/22/91 1400</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

9613497.2482

CHAIN OF CUSTODY

Company Contact	B.H. FORD	Telephone	509-376-6465	
Sample Collected by	L. WALKER	Date	5/21/91	Time 0930
Sample Locations	200-BP-1			
Ice Chest No.		Field Logbook and Page No.	WHC-N-4461 / pg. 38	
Remarks	N/A			
Bill of Lading No.	N/A	Offsite Property No.	N/A	
Method of Shipment	HAND DELIVER			
Shipped to	BATTELLE NORTHWEST (PNL) 314 LABORATORY			

SAMPLE IDENTIFICATION

BOOX 1C1
1, 1L, P, WATER, FREE CYANIDE

CHAIN OF POSSESSION

Relinquished by: <i>LD Walker</i> <i>L.D. Walker</i>	Received by: <i>P.H. Butcher</i> <i>P.H. Butcher</i>	Date/Time: <i>22 May 91 / 0730</i>
Relinquished by: <i>P.H. Butcher</i>	Received by: <i>J. ROBBINS</i> <i>J. Robbins</i>	Date/Time: <i>5/22/91 1400</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-051

9613497.2483

Samples were delivered directly to the Analysts. Therefore, no PNL Chain of Custody forms were needed.

B02-002

9613497.2484



Science Applications International Corporation
An Employee-Owned Company

0767-PKB.92
July 13, 1992

Mr. Mark A. Buckmaster
Westinghouse Hanford Company
P.O. Box 1970, MSIN H4-55
Richland, WA 99352

Subject: Deliverable for 200-BP-1 Data Validation, Task Order S-92-19, WHC Contract
No. MLW-SVV-073750

Dear Mr. Buckmaster:

Enclosed is the subject deliverable required by the referenced SAIC Task Order and WHC contract. Included in this deliverable, please find a copy of the Data Validation Report for Data Packages B00XF5-PNL-027, B00XL9-PNL-028, B00XT4-PNL-029, B00XW2-PNL-030, B01184-PNL-031 and B01199-PNL-032. This deliverable was prepared by Golder Associates with support from Ken Ridgway of SAIC under the direction of Mr. Kent Angelos.

Should you have any questions, please do not hesitate to contact the following: Mr. Kent Angelos of Golder Associates at (206) 883-0777, Mr. Mike Hoxie or myself at (509) 943-3133.

Sincerely yours,

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

A handwritten signature in black ink, appearing to read "P. K. Brockman", is written over the typed name.

P. K. Brockman
Program Manager

PKB/kdc

w/att.	w/o att.
B. Bechtold, WHC	R. Henckel, WHC
LB/Task S-92-19 Deliv File	D. Martin, Albq
	D. Wilson, WHC

w/enc. including original data package
D. Leech, WHC

9613497.2485

Report To

Westinghouse Hanford Company
Richland, Washington

Data Validation Report
200-BP-1 RI/FS

Data Packages: B00XF5-PNL-027, B00XL9-PNL-028
B00XT4-PNL-029, B00XW2-PNL-030
B01184-PNL-031, B01199-PNL-032

Matrix: Water

Analysis Type: Cyanide

Prepared By

Golder Associates Inc.
Redmond, Washington

July 10, 1992

913-1719

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2. DATA QUALITY OBJECTIVES	1
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3.2 Minor Deficiencies	2
	2
4. CONCLUSIONS	3
5. REFERENCES	3

LIST OF APPENDICES

A	As Qualified Data Summary Tables
B	Data Validation Documentation, SDG B00XF5
C	Data Validation Documentation, SDG B00XL9
D	Data Validation Documentation, SDG B00XT4
E	Data Validation Documentation, SDG B00XW2
F	Data Validation Documentation, SDG B01184
G	Data Validation Documentation, SDG B01199

1. INTRODUCTION

This report presents the results of data validation on the following sample delivery groups and sample numbers. The samples were analyzed by Battelle-Pacific Northwest Laboratories of Richland, Washington for total, free and complexed cyanide. The HEIS sample numbers associated with this group by SDG are:

<u>Data Package ID</u>	<u>HEIS Sample Numbers</u>	<u>Matrix</u>
B00XF5-PNL-027	B00XF5, B00XF2, B00XF8, B00XG4 B00XG7, B00XG1, B00XH0, B00XH2, B00XH6 B00XH9, B00XJ2, B00XJ5, B00XK4, B00XP9 B00XJ8, B00XL0, B00XK7, B00XL6, B00XK1	Water
B00XL9-PNL-028	B00XL9, B00XQ8, B00XM2, B00XM8 B00XN1, B00XN4, B00XN7, B00XP3, B00XL3 B00XP6, B00XW8, B00XQ2, B00XQ5	Water
B00XT4-PNL-029	B00XT4, B00XY6, B00XS6, B00XS3 B00XS0, B00XR1, B00XR7, B00XT7, B00XR4	Water
B00XW2-PNL-030	B00XW2, B00XZ8, B00XV9, B00XV6 B00XX1, B00XX4, B00XX7, B00XZ5, B00XP0 B00XV0, B00XZ2, B00XT1, B00XY9	Water
B01184-PNL-031	B01184, B01178, B01157, B01187 B01190	Water
B01199-PNL-032	B01199, B011J8, B011D0, B011K1 B011D3, B011D6, B011C7	Water

Sample identifications, locations and sample dates are provided in the tabular data summary provided in Appendix A. Data validation was conducted in accordance with the Westinghouse Hanford Company statement of work (WHC 1991) and validation procedures (WHC 1992).

2. DATA QUALITY OBJECTIVES

The data package was complete for all requested analyses and met the data quality objectives of the work plan. Data quality objectives for the project specified the use of method PNL-ALO-270, Cyanide analysis by distillation/colorimetry, for all samples. X

Sample quantitation limits were met with the exception of minor differences due to sample preparation and dilution factors.

Samples B00XL0 and B00XR4 were identified as trip blanks and analyzed for total cyanide. Cyanide was not detected in either sample.

Samples B00XL3 and B00XR7 were identified as equipment blanks. Cyanide was not detected in either of the samples.

Samples B00XP9, B00XQ8, B00XW8 and B00XY6 were identified as duplicate samples. With the exception of sample B00XW8, cyanide was not detected in any of the samples and their corresponding primary samples. Analysis results for sample B00XW8 and its corresponding primary sample, B00XP6, were 7.7 and 8.7 $\mu\text{g/L}$ respectively, with a relative percent difference (RPD) of 12. This RPD value is above the work plan data quality objectives of 10%.

In SDG B00XW2, sample B00XP0 is identified as Spike 1, a spiked duplicate of sample B00XZ5 and sample B00XV0 is identified as Spike 2, a spiked duplicate of B00XZ2. Sample results were B00XZ5 - 39.8 $\mu\text{g/L}$, B00XP0 - 39.7 $\mu\text{g/L}$, B00XZ2 - 11.8 U $\mu\text{g/L}$, and B00XV0 - 11.8 U $\mu\text{g/L}$. The spike sample documentation indicates that 1 ml of a 27 mg/L cyanide solution was added to two 1 liter sample bottles and supplied to the sampling team. Thus, when the sample was added to the sample bottles the resulting added concentration would be 27 $\mu\text{g/L}$. No sampling documentation was submitted with the data packages and it is not clear how the sampling team was able to submit six 1 liter sample bottles for field spikes when the spiking documentation shows only two 1 liter sample bottles were prepared with the spike.

With the exception of the deficiencies identified in Section 3.0, the precision and accuracy goals of the work plan were met.

3. QUALIFIED DATA

This section presents a summary of the qualifications required based on validation of the subject data package.

3.1 Major Deficiencies

There were no major deficiencies requiring the rejection of any data.

3.2 Minor Deficiencies

The following sample qualifications were required as a result of the validation. Appendices B through F provide supporting documentation and a summary of the samples affected.

Holding Times

Cyanide analysis of the following samples exceeded the technical holding time:

- SDG B00XT4: B00XT4, B00XY6, B00XS6, B00XS3, B00XS0, B00XR1, B00XT7, B00XR4
- SDG B01199: B011D0, B011D3, B011D6, B011C7

All associated sample results for the above analytes have been qualified as estimated (J for detects, UJ for non-detects).

Continuing Calibrations

The analysts did not analyze a continuing calibration verification standard during any of the analytical runs for all samples, as required in the analytical method. Sample results have been qualified as estimated (J for detects, UJ for non-detects).

Recovery of Distilled Mid-range Standard

The laboratory did not distill and analyze a mid-range standard as required by the analytical method for any of the analytical runs involving these samples. All associated sample results have been qualified as estimated (J for detects, UJ for non-detects).

4. CONCLUSIONS

Sections 1 through 3 present a summary of the data quality for the subject data package. The results contained in this report are acceptable for use as qualified.

The appendices provide supporting documentation and a tabular summary of the qualified data. The original, as-received data packages are being transmitted with their associated validation documentation under separate cover.

5. REFERENCES

WHC, 1991, Westinghouse Hanford Company, Validation of 200-BP-1 Data, Statement of Work, Revision A, November 1991. Westinghouse Hanford Company, Richland, Washington.

WHC, 1992, Westinghouse Hanford Company, Data Validation Procedures for Chemical Analyses, WHC-SD-EN-SPP-002, Rev. 1, 1992. Westinghouse Hanford Company, Richland, Washington.

9613497.2490

APPENDIX A
AS QUALIFIED DATA SUMMARY

LABORATORY: BATTELLE-PACIFIC NORTHWEST LABORATORIES

SAMPLE DELIVERY GROUP	SAMPLE NUMBER	SAMPLE LOCATION/PURPOSE	SAMPLE DATE	TOTAL CYANIDE Q	FREE CYANIDE Q	COMPLEX CYANIDE Q	SAMPLE UNITS
B00XF5	B00XF5	6-54-57	5/13/91	11.8 UJ	---	---	µg/L
	B00XF2	6-55-57	5/13/91	128.7 J	37.9	90.8	µg/L
	B00XF8	6-55-55	5/13/91	5.9 UJ	---	---	µg/L
	B00XG4	6-48-50	5/14/91	5.9 UJ	---	---	µg/L
	B00XG7	6-47-50	5/14/91	11.8 UJ	---	---	µg/L
	B00XG1	6-53-55A	5/14/91	11.8 UJ	---	---	µg/L
	B00XH0	6-52-57	5/15/91	11.8 UJ	---	---	µg/L
	B00XH2	6-52-54	5/15/91	52.1 J	21.4	30.7	µg/L
	B00XH6	6-47-60	5/15/91	11.8 UJ	---	---	µg/L
	B00XH9	6-49-55A	5/16/91	26.2 J	2 U	24.2 J	µg/L
	B00XJ2	6-50-53A	5/16/91	876.3 J	110	766	µg/L
	B00XJ5	6-47-57A	5/16/91	26.4 J	23.4 J	3 J	µg/L
	B00XK4	6-49-55B	5/20/91	11.8 UJ	---	---	µg/L
	B00XP9	6-49-55B, DUPL 1	5/20/91	11.8 UJ	---	---	µg/L
	B00XJ8	6-50-53B	5/20/91	11.8 UJ	---	---	µg/L
	B00XLO	Trip Blank	5/21/91	11.8 UJ	---	---	µg/L
	B00XK7	6-53-55C	5/21/91	11.8 UJ	---	---	µg/L
	B00XL6	6-53-55C	5/21/91	11.8 UJ	---	---	µg/L
	B00XK1	6-49-57B	5/21/91	5.9 UJ	---	---	µg/L
B00XL9	B00XL9	2-34-1	5/22/91	5.9 UJ	---	---	µg/L
	B00XQ8	2-34-1, DUPL 2	5/22/91	5.9 UJ	---	---	µg/L
	B00XM2	2-34-2	5/22/91	5.9 UJ	---	---	µg/L
	B00XM8	2-34-5	5/22/91	11.8 UJ	---	---	µg/L
	B00XN1	2-32-2	5/23/91	11.8 UJ	---	---	µg/L
	B00XN4	2-33-30	5/23/91	11.8 UJ	---	---	µg/L
	B00XN7	2-33-28	5/23/91	11.8 UJ	---	---	µg/L
	B00XP3	2-33-29	5/23/91	5.9 UJ	---	---	µg/L
	B00XL3	Equip. Blank	5/24/91	5.9 UJ	---	---	µg/L
	B00XP6	2-33-34	5/28/91	8.7 J	---	---	µg/L
	B00XW8	2-33-34, DUPL 3	5/28/91	7.7 J	---	---	µg/L
	B00XQ2	2-33-35	5/28/91	11.8 UJ	---	---	µg/L
	B00XQ5	2-33-26	5/28/91	11.8 UJ	---	---	µg/L
B00XT4	B00XT4	2-33-39	5/30/91	5.9 UJ	---	---	µg/L
	B00XY6	2-33-39, DUPL 4	5/30/91	5.9 UJ	---	---	µg/L
	B00XS6	2-33-32	5/29/91	5.9 UJ	---	---	µg/L
	B00XS3	2-33-31	5/29/91	5.9 UJ	---	---	µg/L
	B00XS0	2-33-14	5/29/91	5.9 UJ	---	---	µg/L
	B00XR1	2-33-33	5/29/91	5.9 UJ	---	---	µg/L
	B00XR7	Equip. Blank	5/31/91	5.9 UJ	---	---	µg/L
	B00XT7	2-33-40	5/30/91	5.9 UJ	---	---	µg/L
	B00XR4	Trip Blank	5/30/91	5.9 UJ	---	---	µg/L
B00XW2	B00XW2	2-33-1	7/8/91	10.4 J	---	---	µg/L
	B00XZ8	2-33-5	7/8/91	14.7 J	---	---	µg/L

B00XF5.WK1

LABORATORY: BATTELLE-PACIFIC NORTHWEST LABORATORIES

SAMPLE DELIVERY GROUP	SAMPLE NUMBER	SAMPLE LOCATION/PURPOSE	SAMPLE DATE	TOTAL CYANIDE Q	FREE CYANIDE Q	COMPLEX CYANIDE Q	SAMPLE UNITS	
B00XW2	B00XV9	2-33-15	7/9/91	5.9 UJ	---	---	µg/L	
	B00XV6	2-33-18	7/9/91	5.9 UJ	---	---	µg/L	
	B00XX1	2-33-3	7/10/91	16.3 J	1.6	15	µg/L	
	B00XX4	2-33-4	7/10/91	34.0 J	8.4	26	µg/L	
	B00XX7	2-33-7	7/10/91	38.8 J	3.7	35	µg/L	
	B00XZ5	2-33-12	7/10/91	39.8 J	---	---	µg/L	
	B00XP0	2-33-12, SPIKE 1	7/11/91	39.7 J	11.1	29	µg/L	
	B00XV0	2-33-13, SPIKE 2	7/11/91	11.8 UJ	---	---	µg/L	
	B00XZ2	2-33-13	7/11/91	11.8 UJ	---	---	µg/L	
	B00XT1	2-33-38	7/12/91	11.8 UJ	---	---	µg/L	
	B00XY9	2-33-24	7/12/91	5.9 UJ	---	---	µg/L	
	B01184	B01184	6-49-55A	8/7/91	27.5 J	2 UJ	26 J	µg/L
		B01178	6-52-54	8/7/91	64.7 J	3 J	62 J	µg/L
B01157		6-55-57	8/5/91	133.6 J	6 J	128 J	µg/L	
B01187		6-50-53A	8/8/91	716.6 J	83 J	634 J	µg/L	
B01190		6-49-57A	8/8/91	28.6 J	7 J	22 J	µg/L	
B01199	B01199	6-53-55C	8/28/91	10.7 J	---	---	µg/L	
	B011J8	2-33-5	8/27/91	16.9 J	---	---	µg/L	
	B011D0	2-33-30	8/21/91	11.8 UJ	---	---	µg/L	
	B011K1	2-33-7	8/27/91	40.3 J	7.3 J	33 J	µg/L	
	B011D3	2-33-28	8/21/91	11.8 UJ	---	---	µg/L	
	B011D6	2-33-29	8/21/91	11.8 UJ	---	---	µg/L	
	B011C7	2-32-2	8/21/91	11.8 UJ	---	---	µg/L	

APPENDIX B

DATA VALIDATION DOCUMENTATION

SDG: B00XF5

SAMPLES: B00XF5, B00XF2, B00XF8, B00XG4,
B00XG7, B00XG1, B00XH0, B00XH2, B00XH6, B00XH9
B00XJ2, B00XJ5, B00XK4, B00XP9, B00XJ8
B00XL0, B00XK7, B00XL6, B00XK1

CONTAINS:

- ATTACHMENT 1 - GLOSSARY OF DATA REPORTING QUALIFIERS
- ATTACHMENT 2 - SUMMARY OF DATA QUALIFICATIONS
- ATTACHMENT 3 - AS QUALIFIED LABORATORY DATA
- ATTACHMENT 4 - DATA VALIDATION SUPPORTING DOCUMENTATION

ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

- B - Indicates the compound or analyte was analyzed for and detected. The value reported is less than the contract required quantitation limit (CRQL) but greater than the instrument detection limit (IDL).
- U - Indicates the compound or analyte was analyzed for and not detected. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory. The data are usable for decision making purposes.
- UJ - Indicates the compound or analyte was analyzed for and not detected. Due to identified quality control deficiency identified during data validation the value reported may not accurately reflect the sample quantitation limit. The data are usable for decision making purposes.
- J - Indicates the compound or analyte was analyzed for and detected. The associated value is estimated but the data are usable for decision making processes.
- R - Indicates the compound or analyte was analyzed for and due to an identified quality control deficiency the data are unusable.
- NJ - Indicates presumptive evidence of a compound at an estimated value.
- N - Indicates presumptive evidence of a compound.

9613497.2495

ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

9613497.2497

ATTACHMENT 3
AS QUALIFIED DATA SUMMARY

TABLE TOTAL CYANIDE ANALYSIS DATA FOR TASK 7 DATA PACK - #6.

WATER SAMPLES														
Sample ID#	PNL Log#	G1 Sample (µg/L)	C	G2 Sample dup. (µg/L)	C	%RPD	G5 Blank (µg/L)	C	G3 Sample + spike (µg/L)	G4 - ICV (mg/L)	G3 Sample + spike recovery (%)	G4 - ICV sample recovery (%)	Flags Q	Footnote# 1,2,3, 4, 5 (ALL)
BOOXF5	91-4687	11.8 5.9	U	11.8 5.9	U	N/A	5.9	U	174.7	10.11	104.8	107.5		
BOOXF2	91-4688	128.7	J											
BOOXF8	91-4689	5.9	U	5.9	U	N/A	5.9	U	166.9	11.09	99.7	118		
BOOXG4	91-4690	5.9	U											
BOOXG7	91-4691	11.8 5.9	U	11.8 5.9	U	N/A	5.9	U	163.6	8.4	98.9	89.4		
BOOXG1	91-4692	11.8 5.9	U											
BOOXH0	91-4790	11.8 5.9	U	11.8 5.9	U	N/A	5.9	U	179.3	10.05	105.8	106.9		
BOOXH3	91-4791	52.1	J											
BOOXH6	91-4792	11.8 5.9	U	11.8 5.9	U	N/A	5.9	U	156.9	8.65	94.9	92.0		
BOOXH9	91-4793	26.2	J											
BOOXK4	91-4854	11.8 5.9	U	11.8 5.9	U	N/A	5.9	U	163.8	9.47	98.5	100.7		
BOOXK9	91-4855	11.8 5.9	U											
BOOXJ8	91-4856	11.8 5.9	U	11.8 5.9	U	N/A	5.9	U	174.2	8.95	104.7	95.2		
BOOXL0	91-4857	11.8 5.9	U											
BOOXK7	91-4858	11.8 10.1	U	11.8 9.4	U	N/A	5.9	U	155	9.32	87.0	99.2		
BOOXL6	91-4859	11.8 5.9	U											
BOOXJ2	91-4794	876.3	J	883.5	J	0.82	5.9	U	1117.2	9.3	144.7	99.0	N	
BOOXJ5	91-4795	26.4	J											
BOOXK1	91-4860	5.9	U	5.9	U	N/A	5.9	U	92.7	9.66	112.3	102.8		
BOOXL9	91-5165	5.9	U											
											Mean	105.1	101.1	
											Std. Dev.	14.7	7.9	

C03-003

9612497 2498

DKR
6/24/92

1.	Concentration of stock ICV-6=9.4 mg/L (9.4 µg of cyanide is added to each distillation flask and recovered in 250 mL of NaOH).
2.	Concentration of spike added = 41.6 µg.
3.	Contract required detection limit for water = 10 µg/L.
4.	Used 250 mL of sample per distillation for samples G1, G2 and G3 due to limited sample size of 1.5L of total sample.
5.	Duplicate precision under the CLP protocol must be within one CRDL when either sample or duplicate are below 5X CRDL.

C03-004

9613497-2499

WHL	PIL	JL	Flags	J2	RPD	J5	J3	J1	J6	J3	J6	J4	F	
Sample ID#	Sample ID#	Sample ug/L		Sample Diphthyl ug/L	%	Matrix Blank ug/L	Sample spike ug/L	spike added ug/L	Control spike ug/L	standard added ug/L	Det + spike ug/L	spike recovery %	Det + spike ug/L	Control standard recovery (%)
BocXF2	91-4688	37.9		39.6	4.3									
BocXH3	91-4791	21.4				0	40.7	18.9	18.6	18.9	37.4	18.9	102	85
BocXH9	91-4743	2	U											98
BocXS2	91-4714	110.												
BocXS5	91-4795	23.4	J	23.75	1.5	+0.13	32.96	9.6	19.08	19.2	41.01	19.2	92.6	91.7

C04-003

9613497.2500

9613497.2501

ATTACHMENT 4

DATA VALIDATION SUPPORTING DOCUMENTATION

WET CHEMISTRY DATA VALIDATION CHECKLIST - FORM A-7

PROJECT: 200-AP-1 DATA VALID	REVIEWER: D. Robina	DATE: 6/23/92
LABORATORY: PNL / Battelle	CASE: ^{TASK 7} Report 6	SDG: BOOKF5
SAMPLES/MATRIX: ^{for DKK 6/23/92} 20 Water 19 Water		
BOOKF5, BOOKF2, BOOKF8, BOOKG4, BOOKG7		
BOOKG1, BOOKH0, BOOKH2, BOOKH6, BOOKH9		
BOOKJ2, BOOKJ5, BOOKK4, BOOKP9 (Field Dup.), BOOKJ8		
BOOKL0 (Trip BIK), BOOKK7, BOOKL6, BOOKK1		

1. DATA PACKAGE COMPLETENESS

Review the data package for completeness and check off the items below. If any data review elements are missing contact the laboratory for submittal of the omitted data.

Data Package Item	Present?:	Yes	No	N/A
Case Narrative		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cover Page		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Traffic Reports/Chain-of-Custody		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample Analysis Data Report Forms		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Standards Data		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
QC Summary		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Blanks Summary Report Forms		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spike Sample Recovery Report Forms		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Duplicate Sample Analysis Report Forms		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Laboratory Control Sample Report Forms		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Raw Data		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ion Chromatograph Chromatograms		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TOC and TOX Instrument Printouts		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Laboratory Bench Sheets		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> DKK 6/24/92
Additional Data		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Laboratory Sample Preparation Logs		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Instrument Run Logs		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Internal Laboratory Chain-of-Custody		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Percent Solids Analysis Records		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Reduction Formulae		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chemist Notebook Pages		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

2. HOLDING TIMES

Were all samples analyzed within holding times? Yes No N/A

Action: If any holding times were exceeded qualify all affected results as estimated (J for detects and UJ for nondetects).

3. INITIAL CALIBRATIONS

Were all instruments calibrated daily, each set-up time and were the proper number of standards used?

Yes No N/A

Are the correlation coefficients ≥ 0.995 ?

Yes No N/A

Was a balance check conducted prior to the TDS analysis?

Yes No N/A

Was the titrant normality checked?

Yes No N/A

ACTION: Qualify all data as unusable (R) if reported from an analysis in which the above criteria were not met.

4. INITIAL AND CONTINUING CALIBRATION VERIFICATION

Have ICV and CCV been analyzed at the proper frequency?

Yes No N/A

ICV - yes CCV - no

Are ICV and CCV percent recoveries within control?

Yes No N/A

ICV - only

Are there calculation errors?

Yes No N/A

ACTION: Qualify all affected data in accordance with the validation requirements.

5. LABORATORY BLANKS

Are target analytes present in the laboratory blanks?

Yes No N/A

ACTION: Qualify all associated sample results for any analyte < 5 times the amount in any laboratory blank as nondetected (U) and list the affected samples and analytes below.

6. FIELD BLANKS

Are target analytes present in the field blanks?

Yes No N/A

ACTION: Qualify all sample results for any analyte < 5 times the amount in any valid field blank as nondetected (U).

7. MATRIX SPIKE SAMPLE ANALYSIS

Are spike recoveries within the acceptance limits?

Yes No N/A

ACTION: If the sample concentration exceeds the spike concentration by a factor of 4 or more, and spike recoveries are outside the acceptance limits, no qualification is necessary. If spike recovery is outside the control limits and the sample results are $> CRQL$, qualify the data as estimated (J). If the spike recovery is $< 30\%$ and the sample results are less than the IDL qualify the data as unusable (R).

8. LABORATORY CONTROL SAMPLE

Are percent recoveries within the acceptance limits?

No LCS - DRK
6/24/52
Analyzed →

Yes No ~~N/A~~

Are there calculation errors?

Method states ICV also serves as LCS.

Yes No ~~N/A~~

ACTION: Qualify the affected results according to the following requirements:

AQUEOUS LCS - Qualify as estimated (J), all sample results >IDL, for which the LCS %R falls within the range 50-79% or >120%. Qualify as estimated (UJ), all sample results <IDL, for which the LCS falls within the range of 50-79%. Qualify as unusable (R) all sample results, for which the LCS %R < 50%.

SOLID LCS - Qualify as estimated (J), all sample results >IDL for which the LCS %R is outside the established control limits. Qualify as estimated (UJ), all sample results <IDL for which the LCS %R are lower than the established control limits.

9. PERFORMANCE AUDIT ANALYSES

Are the performance audit sample results within the acceptance limits?

Yes No ~~N/A~~

ACTION: Note the results of the performance audit samples in the validation narrative.

10. DUPLICATE SAMPLE ANALYSIS

Are RPD values within the acceptance limits?

Yes No N/A

Action: Qualify the results for all associated samples of the same matrix as estimated (J) if the RPD falls outside the acceptance limits.

11. FIELD DUPLICATE SAMPLES

Do RPD values exceed the acceptance limits?

Yes ~~No~~ N/A

ACTION: Note the results of the field duplicate samples in the validation narrative.

12. FIELD SPLIT SAMPLES

Do RPD values exceed the acceptance limits?

Yes No ~~N/A~~

ACTION: Note the results of the field split samples in the validation narrative.

13. ANALYTE QUANTITATION AND DETECTION LIMITS

Have results been reported and calculated correctly?

Yes No N/A

Are instrument detection limits below the CRDL?

Yes No N/A

Action: If analyte quantitation is in error, contact the laboratory for explanation. If errors or deficiencies can not be resolved with the laboratory, qualify associated data as unusable (R).

14. OVERALL ASSESSMENT AND SUMMARY

Has the laboratory conducted the analysis in accordance with the analytical SOW?

Yes No N/A

Were project specific data quality objectives met for this analysis?

Yes No N/A

ACTION: Summarize all the data qualifications and complete the data validation narrative as specified in Section 10.0 of the data validation requirements.

COMMENTS (attach additional sheets as necessary): Laboratory did not distill and analyze mid-range standard as called for in method PNL-A10-270.

Laboratory does not include data to ^{date} indicate how "Actual CN. conc. of Stds. (ug/l)" were determined. 6/29/92

Laboratory data does not indicate that CV was analyzed as required.

Laboratory flagged result for BOOXJZ due to percent recovery of matrix spike being outside control limits, however, sample concentration is $> 4x$ spike added therefore, flag removed.

Samples BOOXK4 and BOOXPG are field duplicates.

Laboratory does not understand IDL concept, see page B-6.

HOLDING TIME SUMMARY - FORM B-1

SDG: BOOXFS		REVIEWER: D. Robinson		DATE: 6/23/92		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	
BOOXF5	CN	5/13/91	5/17/91	5/20/91	4	7	None	
BOOXF2	CN	5/13/91	5/17/91	5/20/91	4	7		
BOOXF8	CN	5/13/91	5/20/91	5/21/91	7	8		
BOOXG4	CN	5/14/91	5/20/91	5/21/91	6	7		
BOOXG7	CN	5/14/91	5/21/91	5/21/91	7	7		
BOOXG1	CN	5/14/91	5/21/91	5/21/91	7	7		
BOOXH0	CN	5/15/91	5/21/91	5/24/91	6	9		
BOOXH2	CN	5/15/91	5/21/91	5/24/91	6	9		
BOOXH6	CN	5/15/91	5/22/91	5/24/91	7	9		
BOOXH9	CN	5/16/91	5/22/91	5/24/91	6	8		
BOOXJ2	CN	5/16/91	5/22/91	5/30/91	6	14		
BOOXJ5	CN	5/16/91	5/22/91	5/30/91	6	14		
BOOXK4	CN	5/20/91	5/23/91	5/24/91	3	4		
BOOX P9	CN	5/20/91	5/23/91	5/24/91	3	4		
BOOXJ8	CN	5/20/91	5/23/91	5/24/91	3	4		
BOOX L0	CN	5/21/91	5/23/91	5/24/91	2	3		✓

B-1

9613497-2507
 WHC-SD-EN-SPP-002, Rev. 1

HOLDING TIME SUMMARY - FORM B-1

SDG: <i>BOOKFS</i>		REVIEWER: <i>D. Robinson</i>		DATE: <i>6/23/92</i>		PAGE <u>2</u> OF <u>2</u>	
COMMENTS:							
FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
<i>BOOK7</i>	<i>CN</i>	<i>5/21/91</i>	<i>5/28/91</i>	<i>5/29/91</i>	<i>7</i>	<i>8</i>	<i>NONE</i>
<i>BOOK6</i>	<i>CN</i>	<i>5/21/91</i>	<i>5/28/91</i>	<i>5/29/91</i>	<i>7</i>	<i>8</i>	
<i>BOOK1</i>	<i>CN</i>	<i>5/21/91</i>	<i>5/30/91</i>	<i>5/30/91</i>	<i>9</i>	<i>9</i>	
<i>BOOKFZ</i>	<i>Free CN</i>	<i>5/13/91</i>	<i>N/A</i>	<i>5/26/91</i>	<i>N/A</i>	<i>13</i>	
<i>BOOKH2</i>		<i>5/15/91</i>				<i>11</i>	
<i>BOOKH9</i>		<i>5/16/91</i>				<i>10</i>	
<i>BOOKJZ</i>		<i>5/16/91</i>				<i>10</i>	
<i>BOOKJS</i>		<i>5/16/91</i>		<i>7/11/91</i>		<i>57</i>	<i>RJ</i>
							<i>DKR</i> <i>6/23/92</i>

B-1

9613497-2509
 WMC-SD-EN-SPP-002, Rev. 1

CALCULATION SUMMARY - FORM B-6

SDG: BOOKF5	REVIEWER: DLR	DATE: 6/24/92	PAGE 1 OF 1
COMMENTS: Laboratory reported an IDL of 5.9 ug/L, however, ^{the} many ^{All data} of the samples were distilled using a volume of 250 ml instead of 500 ml with the exception of BOOKK1 and possibly (probably) BOOKF8 and BOOKG4 (distillation bench sheet indicates 500 ml were used, although data worksheet reports 250 ml were distilled for these two samples). Therefore all sample results reported as 5.9 μ ug/L with the exception of the three above mentioned samples should have been reported as 10.8 μ ug/L. In addition, samples BOOKK7 and BOOKL6 should also have been reported as 11.8 μ ug/L instead of 10.1 and 5.91 B ug/L respectively. All other sample calculations OK			
<p>The highlighted text on the attached sheet taken from the case narrative suggests that the laboratory does not understand the concept of Instrument Detection Limits. If the analyst(s) feels that the IDLs determined for the quarter are high, they should re-determine them. To state that the IDLs are ^{is} are ^{DLR} "arbitrary" begs the question, how was the IDL determined? The laboratory should be referred to: 40 CFR Part 136 Appendix B - Definition and Procedure for the Determination of the Method Detection Limit - Revision 1.11.</p>			

CYANIDE ANALYSIS RESULTS

Cyanide analysis was performed in room 419 of building 325 in the Hanford Site 300 area. The results are summarized by distillation/colorimetric analysis set (Procedure PNL-ALO-270).

Sample results for sample and duplicate were below the instrument detection limit (IDL) of 5.9 $\mu\text{g/L}$, except for seven samples. Free cyanide analysis was done for 5 samples that had a total cyanide concentrations of greater than 20 $\mu\text{g/L}$.

The 12 day hold time specified for total cyanide analysis under the CLP protocol was met for all samples in this work package.

Average spiked sample cyanide recovery was 100.7% with a standard deviation of 7.34%. We chose to calculate the spike recovery by subtracting the sample cyanide concentration from the sample + spike concentration. This is a deviation from the CLP protocol which calls for correcting the sample + spike concentration for just those samples where the sample concentration was above the IDL. This deviation was implemented to avoid biasing the cyanide recovery by the high IDL values we obtained in our quarterly IDL study. We thus prevented the reporting of high spike recovery values obtained where cyanide concentrations were detectable in the sample but were below the arbitrary IDL.

Recovery of cyanide for initial calibration verification sample [ICV-6, ICF Technology Inc., consensus value 9.4 mg/L] was 101.1% with a standard deviation of 7.9%. Recovery value for ICV-6 is based on the spiking of 1 mL of stock standard ICV-6 to 500 mL of deionized water and recovery back calculated to the original ICV-6 cyanide concentration. Cyanide found in blanks analyzed in the work package were below the stated IDL.

APPENDIX C

DATA VALIDATION DOCUMENTATION

SDG: B00XL9

SAMPLES: B00XL9, B00XQ8, B00XM2, B00XM8,
B00XN1, B00XN4, B00XN7, B00XP3, B00XL3, B00XP6
B00XW8, B00XQ2, B00XQ5

CONTAINS:

- ATTACHMENT 1 - GLOSSARY OF DATA REPORTING QUALIFIERS
- ATTACHMENT 2 - SUMMARY OF DATA QUALIFICATIONS
- ATTACHMENT 3 - AS QUALIFIED LABORATORY DATA
- ATTACHMENT 4 - DATA VALIDATION SUPPORTING DOCUMENTATION

ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

- B - Indicates the compound or analyte was analyzed for and detected. The value reported is less than the contract required quantitation limit (CRQL) but greater than the instrument detection limit (IDL).
- U - Indicates the compound or analyte was analyzed for and not detected. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory. The data are usable for decision making purposes.
- UJ - Indicates the compound or analyte was analyzed for and not detected. Due to identified quality control deficiency identified during data validation the value reported may not accurately reflect the sample quantitation limit. The data are usable for decision making purposes.
- J - Indicates the compound or analyte was analyzed for and detected. The associated value is estimated but the data are usable for decision making processes.
- R - Indicates the compound or analyte was analyzed for and due to an identified quality control deficiency the data are unusable.
- NJ - Indicates presumptive evidence of a compound at an estimated value.
- N - Indicates presumptive evidence of a compound.

9613497.2517

ATTACHMENT 2
SUMMARY OF DATA QUALIFICATIONS

9613497.2519

ATTACHMENT 3
AS QUALIFIED DATA SUMMARY

9613497.2521

ATTACHMENT 4
DATA VALIDATION SUPPORTING DOCUMENTATION

WET CHEMISTRY DATA VALIDATION CHECKLIST - FORM A-7

PROJECT: 200-BP-1 DATA VALID.	REVIEWER: DKR	DATE: 6/24/92
LABORATORY: Ba Helle - PNL	CASE: Task Report 7	SDG: BOOXL9
SAMPLES/MATRIX: 13 water		
BOOXL9, BOOXQ8 (Field Dup), BOOXM2, BOOXM8		
BOOXN1, BOOXN4, BOOXN7, BOOX P3,		
BOOXL3 (Equip Blk), BOOX P6, BOOXW8 (Field Dup)		
BOOXQ2, BOOXQ5		

1. DATA PACKAGE COMPLETENESS

Review the data package for completeness and check off the items below. If any data review elements are missing contact the laboratory for submittal of the omitted data.

Data Package Item	Present?:	Yes	No	N/A
Case Narrative		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cover Page		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Traffic Reports/Chain-of-Custody		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample Analysis Data Report Forms		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Standards Data		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
QC Summary		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Blanks Summary Report Forms		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spike Sample Recovery Report Forms		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Duplicate Sample Analysis Report Forms		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Laboratory Control Sample Report Forms		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Raw Data		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Ion Chromatograph Chromatograms		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
TOC and TOX Instrument Printouts		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Laboratory Bench Sheets		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Additional Data		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Laboratory Sample Preparation Logs		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Instrument Run Logs		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Internal Laboratory Chain-of-Custody		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Percent Solids Analysis Records		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Reduction Formulae		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chemist Notebook Pages		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

2. HOLDING TIMES

Were all samples analyzed within holding times?

Yes No N/A

Action: If any holding times were exceeded qualify all affected results as estimated (J for detects and UJ for nondetects).

3. INITIAL CALIBRATIONS

Were all instruments calibrated daily, each set-up time and were the proper number of standards used?

Yes No N/A

Are the correlation coefficients ≥ 0.995 ?

Yes No N/A

Was a balance check conducted prior to the TDS analysis?

Yes No N/A

Was the titrant normality checked?

Yes No N/A

ACTION: Qualify all data as unusable (R) if reported from an analysis in which the above criteria were not met.

4. INITIAL AND CONTINUING CALIBRATION VERIFICATION

Have ICV and CCV been analyzed at the proper frequency?

Yes No N/A

Are ICV and CCV percent recoveries within control?

Yes No N/A

Are there calculation errors?

Yes No N/A

ACTION: Qualify all affected data in accordance with the validation requirements.

5. LABORATORY BLANKS

Are target analytes present in the laboratory blanks?

Yes No N/A

ACTION: Qualify all associated sample results for any analyte < 5 times the amount in any laboratory blank as nondetected (U) and list the affected samples and analytes below.

6. FIELD BLANKS

Are target analytes present in the field blanks?

Yes No N/A

ACTION: Qualify all sample results for any analyte < 5 times the amount in any valid field blank as nondetected (U).

7. MATRIX SPIKE SAMPLE ANALYSIS

Are spike recoveries within the acceptance limits?

Yes No N/A

ACTION: If the sample concentration exceeds the spike concentration by a factor of 4 or more, and spike recoveries are outside the acceptance limits, no qualification is necessary. If spike recovery is outside the control limits and the sample results are $> CRQL$, qualify the data as estimated (J). If the spike recovery is $< 30\%$ and the sample results are less than the IDL qualify the data as unusable (R).

8. LABORATORY CONTROL SAMPLE

Are percent recoveries within the acceptance limits?

Yes No N/A

Are there calculation errors?

Yes No N/A

ACTION: Qualify the affected results according to the following requirements:

AQUEOUS LCS - Qualify as estimated (J), all sample results >IDL, for which the LCS %R falls within the range 50-79% or > 120%. Qualify as estimated (UJ), all sample results <IDL, for which the LCS falls within the range of 50-79%. Qualify as unusable (R) all sample results, for which the LCS %R < 50%.

SOLID LCS - Qualify as estimated (J), all sample results >IDL for which the LCS %R is outside the established control limits. Qualify as estimated (UJ), all sample results <IDL for which the LCS %R are lower than the established control limits.

9. PERFORMANCE AUDIT ANALYSES

Are the performance audit sample results within the acceptance limits?

Yes No N/A

ACTION: Note the results of the performance audit samples in the validation narrative.

10. DUPLICATE SAMPLE ANALYSIS

Are RPD values within the acceptance limits?

Yes No N/A

Action: Qualify the results for all associated samples of the same matrix as estimated (J) if the RPD falls outside the acceptance limits.

11. FIELD DUPLICATE SAMPLES

Do RPD values exceed the acceptance limits?

Yes No N/A

ACTION: Note the results of the field duplicate samples in the validation narrative.

12. FIELD SPLIT SAMPLES

Do RPD values exceed the acceptance limits?

Yes No N/A

ACTION: Note the results of the field split samples in the validation narrative.

13. ANALYTE QUANTITATION AND DETECTION LIMITS

Have results been reported and calculated correctly? Yes No N/A

Are instrument detection limits below the CRDL? Yes No N/A

Action: If analyte quantitation is in error, contact the laboratory for explanation. If errors or deficiencies can not be resolved with the laboratory, qualify associated data as unusable (R).

14. OVERALL ASSESSMENT AND SUMMARY

Has the laboratory conducted the analysis in accordance with the analytical SOW? Yes No N/A

Were project specific data quality objectives met for this analysis? Yes No N/A

ACTION: Summarize all the data qualifications and complete the data validation narrative as specified in Section 10.0 of the data validation requirements.

COMMENTS (attach additional sheets as necessary): Laboratory used a sample volume of 250 ml instead of 500 ml for samples BOOXM8, BOOXN1, BOOXN4, BOOXN7, BOOXQ2, and BOOXQ5. Laboratory did not take into consideration this dilution factor when reporting sample detection limit.

Laboratory did not analyze distilled mid-range standard ~~and~~ nor continuing calibration verification samples.

Laboratory reported sample BOOXQ8 as BOOXQB throughout data report.

HOLDING TIME SUMMARY - FORM B-1

SDG: B00XL9		REVIEWER: DKR		DATE: 6/24/92		PAGE 1 OF 1	
COMMENTS: All samples analyzed within 14 day holding time.							
FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
B00XL9	Total CN-	5/22/91	5/30/91	5/30/91	8	8	NONE
B00XQ8	↓	↓	↓	6/4/91	8	13	↓
B00XM2	↓	↓	↓	↓	8	13	↓
B00XM8	↓	↓	5/31/91	↓	9	13	↓
B00XN1	↓	5/23/91	↓	↓	8	12	↓
B00XN4	↓	↓	↓	↓	8	12	↓
B00XN7	↓	↓	↓	↓	8	12	↓
B00XP3	↓	↓	6/3/91	↓	11	12	↓
B00XL3	↓	5/24/91	↓	↓	10	11	↓
B00XP6	↓	5/28/91	↓	6/5/91	6	8	↓
B00XW8	↓	↓	↓	↓	6	8	↓
B00XQ2	↓	↓	6/4/91	6/4/91	7	7	↓
B00XQ5	↓	↓	↓	6/4/91	7	7	↓

B-1

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 WHC-SD-EN-SPP-002, Rev. 1

9613497.2533

APPENDIX D

DATA VALIDATION DOCUMENTATION

SDG: B00XT4

SAMPLES: B00XT4, B00XY6, B00XS6, B00XS3
B00XS0, B00XR1, B00XR7, B00XT7, B00XR4

CONTAINS:

- ATTACHMENT 1 - GLOSSARY OF DATA REPORTING QUALIFIERS
- ATTACHMENT 2 - SUMMARY OF DATA QUALIFICATIONS
- ATTACHMENT 3 - AS QUALIFIED LABORATORY DATA
- ATTACHMENT 4 - DATA VALIDATION SUPPORTING DOCUMENTATION

ATTACHMENT 1**GLOSSARY OF DATA REPORTING QUALIFIERS**

- B - Indicates the compound or analyte was analyzed for and detected. The value reported is less than the contract required quantitation limit (CRQL) but greater than the instrument detection limit (IDL).**
- U - Indicates the compound or analyte was analyzed for and not detected. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory. The data are usable for decision making purposes.**
- UJ - Indicates the compound or analyte was analyzed for and not detected. Due to identified quality control deficiency identified during data validation the value reported may not accurately reflect the sample quantitation limit. The data are usable for decision making purposes.**
- J - Indicates the compound or analyte was analyzed for and detected. The associated value is estimated but the data are usable for decision making processes.**
- R - Indicates the compound or analyte was analyzed for and due to an identified quality control deficiency the data are unusable.**
- NJ - Indicates presumptive evidence of a compound at an estimated value.**
- N - Indicates presumptive evidence of a compound.**

9613497.2535

ATTACHMENT 2
SUMMARY OF DATA QUALIFICATIONS

9613497.2537

ATTACHMENT 3
AS QUALIFIED DATA SUMMARY

TABLE : TOTAL CYANIDE ANALYSIS DATA FOR TASK 7 DATA PACKAGE #8.

WATER SAMPLES														
Sample ID#	PNL Log#	G1 Sample (µg/L)	C	G2 Sample dup. (µg/L)	C	%RPD	G5 Blank (µg/L)	C	G3 Sample+ spike (µg/L)	G4 - ICV (mg/L)	G3 Sample+ spike recovery (%)	G4 - ICV sample recovery (%)	Flags Q	Footnote# 1,2,3, 4, 5 (ALL)
BOOXT4	91-5504	5.9	H U J	5.9	U	N/A	5.9	U	88.4	9.72	105	103.4		
BOOXY6	91-5505	5.9	H U J											
BOOXS6														
BOOXS6	91-5506	5.9	H U J	5.9	U	N/A	5.9	U	86.6	10.62	103.9	113		
BOOXS9	91-5507	5.9	H U J											
BOOXS3														
BOOXS0														
BOOXS0	91-5508	5.9	H U J	5.9	U	N/A	5.9	U	88.3	10.62	105.5	113		
BOOXR1	91-5509	5.9	H U J											
BOOXR7	91-5510	5.9	H U J	5.9	U	N/A	5.9	U	82.2	10.57	99.3	112.4		
BOOXT7	91-5511	5.9	H U J											
BOOXR4	91-5512	5.9	H U J	5.9	U	N/A	5.9	U	85.7	9.64	104.3	102.6		
										Mean	103.6	108.9		
										Std. Dev.	2.2	4.8		

DAR
12/25/92

1. Concentration of stock ICV-6=9.4 mg/L (9.4 µg of cyanide is added to each distillation flask and recovered in 250 mL of NaOH).
2. Concentration of spike added = 41.6 µg/L.
3. Contract required detection limit for water = 10 µg/L.
4. Used 250 mL of sample per distillation for samples G1, G2 and G3 due to limited sample size of 1.5L of total sample.
5. Duplicate precision under the CLP protocol must be within one CRDL when either sample or duplicate are below 5X CRDL.

C03-002

9613497-2538

9613497.2539

ATTACHMENT 4

DATA VALIDATION SUPPORTING DOCUMENTATION

WET CHEMISTRY DATA VALIDATION CHECKLIST - FORM A-7

PROJECT: 200 - BP-1	REVIEWER: DKR	DATE: 6/25/92
LABORATORY: Battelle/PNL	CASE: ^{TASK 7} Report 8	SDG: BOOXT4
SAMPLES/MATRIX: 9 water		
BOOXT4, BOOXY6 (Field Dup.), BOOXS6, BOOXS3		
BOOXS0, BOOXR1, BOOXR7 (Equip BIK 2)		
BOOXT7, BOOXR4 (Trap BIK 2)		

1. DATA PACKAGE COMPLETENESS

Review the data package for completeness and check off the items below. If any data review elements are missing contact the laboratory for submittal of the omitted data.

Data Package Item	Present?:	Yes	No	N/A
Case Narrative		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cover Page		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Traffic Reports/Chain-of-Custody		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample Analysis Data Report Forms		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Standards Data		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
QC Summary		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Blanks Summary Report Forms		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spike Sample Recovery Report Forms		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Duplicate Sample Analysis Report Forms		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Laboratory Control Sample Report Forms		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Raw Data		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Ion Chromatograph Chromatograms		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
TOC and TOX Instrument Printouts		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Laboratory Bench Sheets		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Additional Data		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Laboratory Sample Preparation Logs		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Instrument Run Logs		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Internal Laboratory Chain-of-Custody		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Percent Solids Analysis Records		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Reduction Formulae		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chemist Notebook Pages		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

2. HOLDING TIMES

Were all samples analyzed within holding times? Yes No N/A

Action: If any holding times were exceeded qualify all affected results as estimated (J for detects and UJ for nondetects).

3. INITIAL CALIBRATIONS

Were all instruments calibrated daily, each set-up time and were the proper number of standards used?

Yes No N/A

Are the correlation coefficients ≥ 0.995 ?

Yes No N/A

Was a balance check conducted prior to the TDS analysis?

Yes No N/A

Was the titrant normality checked?

Yes No N/A

ACTION: Qualify all data as unusable (R) if reported from an analysis in which the above criteria were not met.

4. INITIAL AND CONTINUING CALIBRATION VERIFICATION

Have ICV and CCV been analyzed at the proper frequency?

Yes No N/A

Are ICV and CCV percent recoveries within control?

Yes No N/A

Are there calculation errors?

Yes No N/A

ACTION: Qualify all affected data in accordance with the validation requirements.

5. LABORATORY BLANKS

Are target analytes present in the laboratory blanks?

Yes No N/A

ACTION: Qualify all associated sample results for any analyte < 5 times the amount in any laboratory blank as nondetected (U) and list the affected samples and analytes below.

6. FIELD BLANKS

Are target analytes present in the field blanks?

Yes No N/A

ACTION: Qualify all sample results for any analyte < 5 times the amount in any valid field blank as nondetected (U).

7. MATRIX SPIKE SAMPLE ANALYSIS

Are spike recoveries within the acceptance limits?

Yes No N/A

ACTION: If the sample concentration exceeds the spike concentration by a factor of 4 or more, and spike recoveries are outside the acceptance limits, no qualification is necessary. If spike recovery is outside the control limits and the sample results are $> CRQL$, qualify the data as estimated (J). If the spike recovery is $< 30\%$ and the sample results are less than the IDL qualify the data as unusable (R).

8. LABORATORY CONTROL SAMPLE

Are percent recoveries within the acceptance limits?

Yes No N/A

Are there calculation errors?

Yes No N/A

ACTION: Qualify the affected results according to the following requirements:

AQUEOUS LCS - Qualify as estimated (J), all sample results > IDL, for which the LCS %R falls within the range 50-79% or > 120%. Qualify as estimated (UJ), all sample results < IDL, for which the LCS falls within the range of 50-79%. Qualify as unusable (R) all sample results, for which the LCS %R < 50%.

SOLID LCS - Qualify as estimated (J), all sample results > IDL for which the LCS %R is outside the established control limits. Qualify as estimated (UJ), all sample results < IDL for which the LCS %R are lower than the established control limits.

9. PERFORMANCE AUDIT ANALYSES

Are the performance audit sample results within the acceptance limits?

Yes No N/A

ACTION: Note the results of the performance audit samples in the validation narrative.

10. DUPLICATE SAMPLE ANALYSIS

Are RPD values within the acceptance limits?

Yes No N/A ^{DKR} 6/25/82

Action: Qualify the results for all associated samples of the same matrix as estimated (J) if the RPD falls outside the acceptance limits.

11. FIELD DUPLICATE SAMPLES

Do RPD values exceed the acceptance limits?

Yes No N/A

ACTION: Note the results of the field duplicate samples in the validation narrative.

12. FIELD SPLIT SAMPLES

Do RPD values exceed the acceptance limits?

Yes No N/A

ACTION: Note the results of the field split samples in the validation narrative.

13. ANALYTE QUANTITATION AND DETECTION LIMITS

Have results been reported and calculated correctly?

 Yes No N/A

Are instrument detection limits below the CRDL?

 Yes No N/A

Action: If analyte quantitation is in error, contact the laboratory for explanation. If errors or deficiencies can not be resolved with the laboratory, qualify associated data as unusable (R).

14. OVERALL ASSESSMENT AND SUMMARY

Has the laboratory conducted the analysis in accordance with the analytical SOW?

Yes No N/A

Were project specific data quality objectives met for this analysis?

 Yes No N/A

ACTION: Summarize all the data qualifications and complete the data validation narrative as specified in Section 10.0 of the data validation requirements.

COMMENTS (attach additional sheets as necessary): Per chain-of-custody
Forms, samples were not delivered to laboratory
until 6/11/91 although all samples had been collected
as of 5/31/91. This delay resulted in all samples
except BOOXT7 being analyzed outside the 14 day
technical holding time.

Laboratory has used sample numbers BOOX56, BOOX53
and BOOX50 for samples BOOX56, BOOX53 and
BOOX50, respectively, throughout the data package.

Laboratory did not analyze distilled mid-
range standard nor continuing calibration
verification samples.

Laboratory incorrectly calculated percent recoveries
of matrix spike samples, however, recoveries ~~with~~^{DKK}
correctly calculated are still within acceptance
criteria. ^{6/25/92}

9613497.2551

APPENDIX E

DATA VALIDATION DOCUMENTATION

SDG: B00XW2

SAMPLES: B00XW2, B00XZ8, B00XV9, B00XV6
B00XX1, B00XX4, B00XX7, B00XZ5, B00XP0, B00XV0
B00XZ2, B00XT1, B00XY9

CONTAINS:

- ATTACHMENT 1 - GLOSSARY OF DATA REPORTING QUALIFIERS
- ATTACHMENT 2 - SUMMARY OF DATA QUALIFICATIONS
- ATTACHMENT 3 - AS QUALIFIED LABORATORY DATA
- ATTACHMENT 4 - DATA VALIDATION SUPPORTING DOCUMENTATION

ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

- B - Indicates the compound or analyte was analyzed for and detected. The value reported is less than the contract required quantitation limit (CRQL) but greater than the instrument detection limit (IDL).
- U - Indicates the compound or analyte was analyzed for and not detected. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory. The data are usable for decision making purposes.
- UJ - Indicates the compound or analyte was analyzed for and not detected. Due to identified quality control deficiency identified during data validation the value reported may not accurately reflect the sample quantitation limit. The data are usable for decision making purposes.
- J - Indicates the compound or analyte was analyzed for and detected. The associated value is estimated but the data are usable for decision making processes.
- R - Indicates the compound or analyte was analyzed for and due to an identified quality control deficiency the data are unusable.
- NJ - Indicates presumptive evidence of a compound at an estimated value.
- N - Indicates presumptive evidence of a compound.

9613497.2553

ATTACHMENT 2
SUMMARY OF DATA QUALIFICATIONS

9613497.2555

ATTACHMENT 3
AS QUALIFIED DATA SUMMARY

TABLE : AL CYANIDE ANALYSIS DATA FOR TASK 7 DATA PACKAGE #5.

WATER SAMPLES													
Sample ID#	PNL Log#	G1 Sample (µg/L)	G2 Sample C dup. (µg/L)	C	%RPD	G5 Blank (µg/L)	G3 Sample+ C spike (µg/L)	G4 - ICV (mg/L)	G3 Sample+ spike recovery (%)	G4 - ICV sample recovery (%)	Flags	Footnote#	
												1,2,3,4 (ALL)	
BOOXW2	91-6543	10.4	J	10	B	3.53	5.9	U	97.6	10.56	104.8	112.3	
BOOXZ8	91-6544	14.7	J										
BOOXV9	91-6545	5.9	UJ	5.9	U	N/A	5.9	U	86.4	11.1	102.2	118.1	
BOOXV6	91-6546	5.9	UJ										
BOOXO4	91-6548	34.0	J	33.3		2.11	5.9	U	207.1	10.99	103.9	116.9	
BOOXO1	91-6547	16.3	J										
BOOXO7	91-6549	38.8	J	38.4		0.92	5.9	U	125.6	10.34	104.3	110	
BOOXZ5	91-6550	39.8	J										
BOOXPO	91-6551	39.7	J	40.4		1.77	5.9	U	210.6	10.63	102.7	113.1	
BOOXV0	91-6552	11.9	BUJ										
BOOXZ2	91-6553	11.9 11.1	UJ	9.6	B	13.7	5.9	U	163.4	9.85	91.5	104.8	
BOOXO1	91-6600	11.9 5.8	BUJ										
BOOXO9	91-6601	5.9	UJ	5.9	U	N/A	5.9	U	171.6	10.21	101.4	108.7	
									Mean	101.5	112.0		
									Std. Dev.	4.2	4.3		
Footnotes													
1. Concentration of stock ICV-6-9.4 mg/L (9.4 µg of cyanide is added to each distillation flask and recovered in 250 mL of NaOH).													
2. Spike added = 41.6 µg.													
3. Contract required detection limit for water = 10 µg/L.													
4. Duplicate precision under the CLP protocol must be within one CRDL when either sample or duplicate are below 5X CRDL.													

DKR
6/25/91

9613497.2556

TABLE 3: FREE CYANIDE ANALYSIS FOR TASK ___
SDG # _

WJIC Sample ID#	PNL Sample ID#	J1 Sample µg/L	Flags	J2 Sample Duplicate µg/L	%RPD	J5 Matrix Blank µg/L	J3		J4		J6		% Recovery			Flags
							Sample + Spike µg/L	Spike Added µg/L	Control Std. µg/L	Standard Added µg/L	Dup. + Spike µg/L	Spike Added µg/L	J3 Spike Rec.	J6 Dup. + Spike Rec.	J4 Control Std. Rec.	
B00XW2	91-6543	1	U													
B00XZ8	91-6544	1	U													
B00XX1	91-6547	1.6														
B00XX4	91-6548	8.36	/	8.43	0.8	0			18.6	18.9						98
B00XX7	91-6549	3.66	/				7.62	4.77			8.36	4.77	83	98.5		
B00XP0	91-6551	11.1	/						9.46	9.54						99
B00XY9	91-6601	1	U													

- J1 = Sample
- J2 = Duplicate Sample
- J3 = Spike Sample
- J4 = Standard
- J5 = Methods Blank
- J6 = Spike Duplicate

DRR
6/25/91

CLP Flags

U = Analyzed but not detected (less than IDL)

C04-003

9613497-2557

TABLE 4: COMPLEX CYANIDE DETERMINATION
FOR TASK 7, SDG #9

Sample ID#	Total CN Sample ug/L	Free CN Sample ug/L	Complex CN Sample ug/L (1)
91-6548	34	8	26
91-6549	39	4	35
91-6550	40	2	38
91-6551	40	11	29

Sample was not analyzed for Free Cyanide.

DKR
6/25/92

(1) Results calculated by subtracting the Free cyanide results from the Total cyanide results.

RESULTS CALCULATED BY

B.M. Gillespie 9/12/91

CALCULATIONS CHECKED BY

M. Wilke 9/15/91

005 002

9613497-2558

9613497-2559

ATTACHMENT 4
DATA VALIDATION SUPPORTING DOCUMENTATION

WET CHEMISTRY DATA VALIDATION CHECKLIST - FORM A-7

PROJECT: 200BP-1	REVIEWER: DKR	DATE: 6/25/92
LABORATORY: Battelle / PNL	CASE: Task 7 Report 9	SDG: BOOXWZ
SAMPLES/MATRIX: 13 Water		
BOOXWZ, BOOXZ8, BOOXV9, BOOXV6, BOOXX1		
BOOXX4, BOOXX7, BOOXZ5, BOOXPO (Spike 1)		
BOOXVO (Spike 2), BOOXZ2, BOOXT1, BOOXY9		

1. DATA PACKAGE COMPLETENESS

Review the data package for completeness and check off the items below. If any data review elements are missing contact the laboratory for submittal of the omitted data.

Data Package Item	Present?:	Yes	No	N/A
Case Narrative		/	—	—
Cover Page		/	—	—
Traffic Reports/Chain-of-Custody		/	—	—
Sample Analysis Data Report Forms		/	—	—
Standards Data		/	—	—
QC Summary				
Blanks Summary Report Forms		/	—	—
Spike Sample Recovery Report Forms		/	—	—
Duplicate Sample Analysis Report Forms		/	—	—
Laboratory Control Sample Report Forms		/	—	—
Raw Data				
Ion Chromatograph Chromatograms		—	—	/
TOC and TOX Instrument Printouts		—	—	/
Laboratory Bench Sheets		/	—	—
Additional Data				
Laboratory Sample Preparation Logs		—	/	—
Instrument Run Logs		—	/	—
Internal Laboratory Chain-of-Custody		—	/	—
Percent Solids Analysis Records		—	—	/
Reduction Formulae		/	—	—
Chemist Notebook Pages		/	—	—

2. HOLDING TIMES

Were all samples analyzed within holding times?

Yes No N/A

Action: If any holding times were exceeded qualify all affected results as estimated (J for detects and UJ for nondetects).

3. INITIAL CALIBRATIONS

Were all instruments calibrated daily, each set-up time and were the proper number of standards used?

Yes No N/A

Are the correlation coefficients ≥ 0.995 ?

Yes No N/A

Was a balance check conducted prior to the TDS analysis?

Yes No N/A

Was the titrant normality checked?

Yes No N/A

ACTION: Qualify all data as unusable (R) if reported from an analysis in which the above criteria were not met.

4. INITIAL AND CONTINUING CALIBRATION VERIFICATION

Have ICV and CCV been analyzed at the proper frequency?

Yes No N/A

Are ICV and CCV percent recoveries within control?

Yes No N/A

Are there calculation errors?

Yes No N/A

ACTION: Qualify all affected data in accordance with the validation requirements.

5. LABORATORY BLANKS

Are target analytes present in the laboratory blanks?

Yes No N/A

ACTION: Qualify all associated sample results for any analyte < 5 times the amount in any laboratory blank as nondetected (U) and list the affected samples and analytes below.

6. FIELD BLANKS

Are target analytes present in the field blanks?

Yes No N/A

ACTION: Qualify all sample results for any analyte < 5 times the amount in any valid field blank as nondetected (U).

7. MATRIX SPIKE SAMPLE ANALYSIS

Are spike recoveries within the acceptance limits?

Yes No N/A

ACTION: If the sample concentration exceeds the spike concentration by a factor of 4 or more, and spike recoveries are outside the acceptance limits, no qualification is necessary. If spike recovery is outside the control limits and the sample results are $> CRQL$, qualify the data as estimated (J). If the spike recovery is $< 30\%$ and the sample results are less than the IDL qualify the data as unusable (R).

8. LABORATORY CONTROL SAMPLE

Are percent recoveries within the acceptance limits?

Yes No N/A

Are there calculation errors?

Yes No N/A

ACTION: Qualify the affected results according to the following requirements:

AQUEOUS LCS - Qualify as estimated (J), all sample results > IDL, for which the LCS %R falls within the range 50-79% or > 120%. Qualify as estimated (UJ), all sample results < IDL, for which the LCS falls within the range of 50-79%. Qualify as unusable (R) all sample results, for which the LCS %R < 50%.

SOLID LCS - Qualify as estimated (J), all sample results > IDL for which the LCS %R is outside the established control limits. Qualify as estimated (UJ), all sample results < IDL for which the LCS %R are lower than the established control limits.

9. PERFORMANCE AUDIT ANALYSES

Are the performance audit sample results within the acceptance limits?

Yes No N/A

ACTION: Note the results of the performance audit samples in the validation narrative.

10. DUPLICATE SAMPLE ANALYSIS

Are RPD values within the acceptance limits?

Yes No N/A

Action: Qualify the results for all associated samples of the same matrix as estimated (J) if the RPD falls outside the acceptance limits.

11. FIELD DUPLICATE SAMPLES

Do RPD values exceed the acceptance limits?

Yes No N/A

ACTION: Note the results of the field duplicate samples in the validation narrative.

12. FIELD SPLIT SAMPLES

Do RPD values exceed the acceptance limits?

Yes No N/A

ACTION: Note the results of the field split samples in the validation narrative.

13. ANALYTE QUANTITATION AND DETECTION LIMITS

Have results been reported and calculated correctly?

Yes No N/A

Are instrument detection limits below the CRDL?

Yes No N/A

Action: If analyte quantitation is in error, contact the laboratory for explanation. If errors or deficiencies can not be resolved with the laboratory, qualify associated data as unusable (R).

14. OVERALL ASSESSMENT AND SUMMARY

Has the laboratory conducted the analysis in accordance with the analytical SOW?

Yes No N/A

Were project specific data quality objectives met for this analysis?

Yes No N/A

ACTION: Summarize all the data qualifications and complete the data validation narrative as specified in Section 10.0 of the data validation requirements.

COMMENTS (attach additional sheets as necessary): Laboratory did not analyze sample BOOXZ5 for free cyanide as required, total cyanide concentration was greater than 20 ug/L.

Laboratory did not analyze distilled mid-range sample, nor continuing calibration verification samples.

Although samples BOOXPO and BOOXVO are indicated to be field spike samples, documentation does not indicate that 6 sample bottles were prepared for collection of Total and Free Cyanide sample fractions for two samples. Additionally, sample results for indicated spikes are the same as the unspiked samples. Without additional documentation from sampler it is not possible to evaluate field blanks.

Laboratory did not consider dilution effect of distilling a sample volume of 250 ml instead of 500 ml when ^{DKR 6/25/12} reporting sample detection to ^{DKR 6/25/12} results for BOOXVO, BOOXZZ and BOOXT1. The reported result for these three samples should be 11.8 μ g/L.

HOLDING TIME SUMMARY - FORM D-1

SDG: BOOXW2		REVIEWER: DKR		DATE: 6/25/92		PAGE 1 OF 1	
COMMENTS: Cyanide technical holding time from collection to analysis is 14 days							
FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
BOOXW2	Total Cyanide	7/8/91	N/A	7/17/91	N/A	9	NONE
BOOXZ8	↓	↓	↓	↓	↓	9	↓
BOOXV9	↓	7/9/91	↓	↓	↓	8	↓
BOOXV6	↓	↓	↓	↓	↓	8	↓
BOOXX1	↓	7/10/91	↓	7/19/91	↓	9	↓
BOOXX4	↓	↓	↓	↓	↓	9	↓
BOOXX7	↓	↓	↓	7/17/91	↓	7	↓
BOOXZ5	↓	7/11/91	↓	↓	↓	6	↓
BOOXPO	↓	↓	↓	7/19/91	↓	8	↓
BOOXVO	↓	↓	↓	↓	↓	8	↓
BOOXZ2	↓	↓	↓	↓	↓	8	↓
BOOXT1	↓	7/12/91	↓	↓	↓	7	↓
BOOXY9	↓	↓	↓	7/24/91	↓	12	↓
BOOXX4	Free Cyanide	7/10/91	N/A	7/23/91	N/A	13	NONE
BOOXX7	↓	↓	↓	↓	↓	13	↓
BOOXPO	↓	7/11/91	↓	↓	↓	12	↓

BOOXZ5 should have been analyzed for free cyanide but was not.

B-1

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9613497.2571

[3] From: Parley H (Dusty) Butcher at -WHC250 2/11/92 1:28PM (1015 bytes: 14 ln)
 To: Mark A Buckmaster at -WHC68
 Receipt Requested
 Subject: POLY BOTTLES PREPARED FOR SAMPLING TEAM

----- Forwarded -----

From: SUSAN K FLINT at -WHC32 2/10/92 1:50PM (800 bytes: 14 ln)
 To: Parley H (Dusty) Butcher at -WHC250
 Subject: POLY BOTTLES PREPARED FOR SAMPLING TEAM

----- Message Contents -----

ON 7/11/91 THE FOLLOWING BOTTLES WERE PREPARED BY THE
 STANDARDS LABORATORY AT 222-SA FOR THE SAMPLING TEAM (R.S.):

- 2 - 1 LITER POLY BOTTLES
 0.300 ML CN + 0.700 ML H2O = 27 PPM CN
- 2 - 8 OZ BOTTLES
 0.050 ML OF NO3 + 0.200 ML H2O = 345 PPM NO3
- 2 - 1 LITER POLY BOTTLES
 0.200 ML OF SO4 + 0.800 ML H2O = 1406 PPM SO4

THIS HAS BEEN RECORDED IN OUR LOGBOOK, 5S4.
 IF WE CAN BE OF FURTHER SERVICE, PLEASE LET US KNOW.

Becky
 Here are the
 200-87-1 Spike samples
 you requested
 Mark
 2/12

APPENDIX F

DATA VALIDATION DOCUMENTATION

SDG: B01184

SAMPLES: B01184, B01178, B01157, B01187
B01190

CONTAINS:

- ATTACHMENT 1 - GLOSSARY OF DATA REPORTING QUALIFIERS
- ATTACHMENT 2 - SUMMARY OF DATA QUALIFICATIONS
- ATTACHMENT 3 - AS QUALIFIED LABORATORY DATA
- ATTACHMENT 4 - DATA VALIDATION SUPPORTING DOCUMENTATION

ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

- B - Indicates the compound or analyte was analyzed for and detected. The value reported is less than the contract required quantitation limit (CRQL) but greater than the instrument detection limit (IDL).
- U - Indicates the compound or analyte was analyzed for and not detected. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory. The data are usable for decision making purposes.
- UJ - Indicates the compound or analyte was analyzed for and not detected. Due to identified quality control deficiency identified during data validation the value reported may not accurately reflect the sample quantitation limit. The data are usable for decision making purposes.
- J - Indicates the compound or analyte was analyzed for and detected. The associated value is estimated but the data are usable for decision making processes.
- R - Indicates the compound or analyte was analyzed for and due to an identified quality control deficiency the data are unusable.
- NJ - Indicates presumptive evidence of a compound at an estimated value.
- N - Indicates presumptive evidence of a compound.

9613497.2574

ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

9613497.2576

ATTACHMENT 3
AS QUALIFIED DATA SUMMARY

TABLE : TOTAL CYANIDE ANALYSIS DATA FOR PROJECT 200BP-1, TASK 7, DATA PACKAGE #10.

WATER SAMPLES															
Sample ID#	PNL Log#	Sample G1 (µg/L)	C	Sample dup. G2 (µg/L)	C	%RPD	Blank G5 (µg/L)	C	Spike added (µg)	Sample+ spike G3 (µg/L)	sample G4 (ICV) (mg/L)	Sample+ spike G3 recovery(%)	sample G4 (ICV) recovery(%)	Flags Q	Footnote# 1,2,3,4 (ALL)
BO1184	91-7901	27.5	J	27.5		0	5.9	U	39.5	181.3	10.14	97	108.0		
BO1178	91-7902	64.7	J												
BO1157	91-7903	133.6	J	130.2		2.62	5.9	U	39.5	291.2	10.08	100	107.0		
BO1187	91-7904	716.6	J												
BO1190	91-7905	28.6	J	27.2		4.96	5.9	U	39.5	179.9	10.25	96	109		
											Mean	98	108		
											Std. Dev.	2	1		
Footnotes															
1. Concentration of stock ICV-6=9.4 mg/L (9.4 µg of cyanide is added to each distillation flask and recovered in 250 mL of NaOH).															
2. Contract required detection limit for water = 10 µg/L.															
3. Used 250 mL of sample (G1, G2 and G3) per distillation due to limited sample size of only 1.5L.															
4. Duplicate precision under the CLP protocol must be within one CRDL when either sample or duplicate are below 5X CRDL.															

DKR
6/26/92

CO3-003

9613497-2537

C05-002

9613497.2578

TABLE 4: COMPLEX CYANIDE DETERMINATION
FOR TASK 7, SDG #10

Sample ID#	Total CN Sample ug/L	Free CN Sample ug/L	Complex CN Sample ug/L (1)
91-7901	28	2 uJ	26
91-7902	65	3 J	62
91-7903	134	6 J	128
91-7904	717	83 J	634
91-7905	29	7 J	22

(1) Results calculated by subtracting the Free cyanide results from the Total cyanide results.

DKR
6/26/92

RESULTS CALCULATED BY

A. M. Dillman 12-30-91

CALCULATIONS CHECKED BY

MW [Signature]

9613497.2579

ATTACHMENT 4

DATA VALIDATION SUPPORTING DOCUMENTATION

9613497-2580

WET CHEMISTRY DATA VALIDATION CHECKLIST - FORM A-7

PROJECT: 200-BP-1	REVIEWER: DKR	DATE: 6/26/92
LABORATORY: Battelle/PNL	CASE: Task ? Report 10	SDG: B01184
SAMPLES/MATRIX: 5 Water		
B01184, B01178, B01157		
B01187, B01190		

1. DATA PACKAGE COMPLETENESS

Review the data package for completeness and check off the items below. If any data review elements are missing contact the laboratory for submittal of the omitted data.

Data Package Item	Present?:	Yes	No	N/A
Case Narrative		✓	—	—
Cover Page		✓	—	—
Traffic Reports/Chain-of-Custody		✓	—	—
Sample Analysis Data Report Forms		✓	—	—
Standards Data		✓	—	—
QC Summary		✓	—	—
Blanks Summary Report Forms		✓	—	—
Spike Sample Recovery Report Forms		✓	—	—
Duplicate Sample Analysis Report Forms		✓	—	—
Laboratory Control Sample Report Forms		✓	—	—
Raw Data		—	—	—
Ion Chromatograph Chromatograms		—	—	✓
TOC and TOX Instrument Printouts		—	—	✓
Laboratory Bench Sheets		—	—	—
Additional Data		—	—	—
Laboratory Sample Preparation Logs		—	✓	—
Instrument Run Logs		—	✓	—
Internal Laboratory Chain-of-Custody		—	✓	—
Percent Solids Analysis Records		—	—	✓
Reduction Formulae		—	—	—
Chemist Notebook Pages		—	—	—

2. HOLDING TIMES

Were all samples analyzed within holding times?

Yes No N/A

Action: If any holding times were exceeded qualify all affected results as estimated (J for detects and UJ for nondetects).

3. INITIAL CALIBRATIONS

Were all instruments calibrated daily, each set-up time and were the proper number of standards used?

Yes No N/A

Are the correlation coefficients ≥ 0.995 ?

Yes No N/A

Was a balance check conducted prior to the TDS analysis?

Yes No N/A

Was the titrant normality checked?

Yes No N/A

ACTION: Qualify all data as unusable (R) if reported from an analysis in which the above criteria were not met.

4. INITIAL AND CONTINUING CALIBRATION VERIFICATION

Have ICV and CCV been analyzed at the proper frequency?

Yes No N/A

Are ICV and CCV percent recoveries within control?

Yes No N/A

Are there calculation errors?

Yes No N/A

ACTION: Qualify all affected data in accordance with the validation requirements.

5. LABORATORY BLANKS

Are target analytes present in the laboratory blanks?

Yes No N/A

ACTION: Qualify all associated sample results for any analyte < 5 times the amount in any laboratory blank as nondetected (U) and list the affected samples and analytes below.

6. FIELD BLANKS

Are target analytes present in the field blanks?

Yes No N/A

ACTION: Qualify all sample results for any analyte < 5 times the amount in any valid field blank as nondetected (U).

7. MATRIX SPIKE SAMPLE ANALYSIS

Are spike recoveries within the acceptance limits?

Yes No N/A

ACTION: If the sample concentration exceeds the spike concentration by a factor of 4 or more, and spike recoveries are outside the acceptance limits, no qualification is necessary. If spike recovery is outside the control limits and the sample results are $> CRQL$, qualify the data as estimated (J). If the spike recovery is $< 30\%$ and the sample results are less than the IDL qualify the data as unusable (R).

8. LABORATORY CONTROL SAMPLE

Are percent recoveries within the acceptance limits?

Yes No N/A

Are there calculation errors?

Yes No N/A

ACTION: Qualify the affected results according to the following requirements:

AQUEOUS LCS - Qualify as estimated (J), all sample results >IDL, for which the LCS %R falls within the range 50-79% or >120%. Qualify as estimated (UJ), all sample results <IDL, for which the LCS falls within the range of 50-79%. Qualify as unusable (R) all sample results, for which the LCS %R <50%.

SOLID LCS - Qualify as estimated (J), all sample results >IDL for which the LCS %R is outside the established control limits. Qualify as estimated (UJ), all sample results <IDL for which the LCS %R are lower than the established control limits.

9. PERFORMANCE AUDIT ANALYSES

Are the performance audit sample results within the acceptance limits?

Yes No N/A

ACTION: Note the results of the performance audit samples in the validation narrative.

10. DUPLICATE SAMPLE ANALYSIS

Are RPD values within the acceptance limits?

Yes No N/A

Action: Qualify the results for all associated samples of the same matrix as estimated (J) if the RPD falls outside the acceptance limits.

11. FIELD DUPLICATE SAMPLES

Do RPD values exceed the acceptance limits?

Yes No N/A

ACTION: Note the results of the field duplicate samples in the validation narrative.

12. FIELD SPLIT SAMPLES

Do RPD values exceed the acceptance limits?

Yes No N/A

ACTION: Note the results of the field split samples in the validation narrative.

13. ANALYTE QUANTITATION AND DETECTION LIMITS

Have results been reported and calculated correctly?

Yes No N/A

Are instrument detection limits below the CRDL?

Yes No N/A

Action: If analyte quantitation is in error, contact the laboratory for explanation. If errors or deficiencies can not be resolved with the laboratory, qualify associated data as unusable (R).

14. OVERALL ASSESSMENT AND SUMMARY

Has the laboratory conducted the analysis in accordance with the analytical SOW?

No CEV or distilled ml - range Yes No N/A
std analyzed.

Were project specific data quality objectives met for this analysis?

Yes No N/A

ACTION: Summarize all the data qualifications and complete the data validation narrative as specified in Section 10.0 of the data validation requirements.

COMMENTS (attach additional sheets as necessary): All samples were analyzed for free cyanide outside of 14 day technical holding time. All Free Cyanide results qualified for U.S.

Laboratory did not analyze distilled mid-range standard nor continuing calibration verification samples.

HOLDING TIME SUMMARY - FORM B-1

SDG: B01184		REVIEWER: DKR		DATE: 6/26/92		PAGE 1 OF 1	
COMMENTS: Cyanide Holding Time is 14 days.							
FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
B01184	Total Cyanide	8/7/91	N/A	8/15/91	N/A	8	NONE
B01178	↓	↓	↓	↓	↓	8	↓
B01157	↓	8/5/91	↓	8/16/91	↓	11	↓
B01187	↓	8/8/91	↓	↓	↓	8	↓
B01190	↓	↓	↓	↓	↓	8	↓
B01184	Free Cyanide	8/7/91	N/A	8/23/91	N/A	16	UJ
B01198	↓	↓	↓	↓	↓	16	J
B01157	↓	8/5/91	↓	↓	↓	18	↓
B01187	↓	8/8/91	↓	↓	↓	15	↓
B01190	↓	↓	↓	↓	↓	15	↓

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APPENDIX G

DATA VALIDATION DOCUMENTATION

SDG: B01199

SAMPLES: B01199, B011J8, B011D0, B011K1
B011D3, B011D6, B011C7

CONTAINS:

- ATTACHMENT 1 - GLOSSARY OF DATA REPORTING QUALIFIERS
- ATTACHMENT 2 - SUMMARY OF DATA QUALIFICATIONS
- ATTACHMENT 3 - AS QUALIFIED LABORATORY DATA
- ATTACHMENT 4 - DATA VALIDATION SUPPORTING DOCUMENTATION

ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

- B -** Indicates the compound or analyte was analyzed for and detected. The value reported is less than the contract required quantitation limit (CRQL) but greater than the instrument detection limit (IDL).
- U -** Indicates the compound or analyte was analyzed for and not detected. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory. The data are usable for decision making purposes.
- UJ -** Indicates the compound or analyte was analyzed for and not detected. Due to identified quality control deficiency identified during data validation the value reported may not accurately reflect the sample quantitation limit. The data are usable for decision making purposes.
- J -** Indicates the compound or analyte was analyzed for and detected. The associated value is estimated but the data are usable for decision making processes.
- R -** Indicates the compound or analyte was analyzed for and due to an identified quality control deficiency the data are unusable.
- NJ -** Indicates presumptive evidence of a compound at an estimated value.
- N -** Indicates presumptive evidence of a compound.

9613497.2593

ATTACHMENT 2
SUMMARY OF DATA QUALIFICATIONS

9613497.2595

ATTACHMENT 3
AS QUALIFIED DATA SUMMARY

TABLE : TOTAL CYANIDE ANALYSIS DATA FOR PROJECT 200BP-1, TASK 7, DATA PACKAGE #11.

WATER SAMPLES															
Sample ID#	PNL Log#	Sample G1 (µg/L)	C	Sample dup. G2 (µg/L)	C	%RPD	Blank G5 (µg/L)	C	Spike added (µg)	Sample+ spike G3 (µg/L)	sample G4 (ICV) (mg/L)	Sample+ spike G3 recovery(%)	sample G4 (ICV) recovery(%)	Flags Q	Footnote# 1,2,3,4 (ALL)
BO1199	91-9129	10.7	J	10.7		0	5.9	U	39.5	164.8	9.73	98	104		
BO11J8	91-9130	16.9	J												
BO11D0	91-9131	11.8 5.9	UJ	5.9	U	N/A	5.9	U	39.5	160.7	10.59	100	113		
BO11K1	91-9132	40.3	J												
BO11D3	91-9133	11.8 5.9	UJ	5.9	U	N/A	5.9	U	39.5	167	10.44	104	111		
BO11D6	91-9134	11.8 5.9	UJ												
BO11C7	91-9135	11.8 5.9	UJ	5.9	U	N/A	5.9	U	38.8	159.3	9.92	103	106		
												Mean	101.0	108.2	
												Std. Dev.	2.4	3.7	
Footnotes															
1. Concentration of stock ICV-6=9.4 mg/L (9.4 µg of cyanide is added to each distillation flask and recovered in 250 mL of NaOH).															
2. Contract required detection limit for water = 10 µg/L.															
3. Used 250 mL of sample (G1, G2 and G3) per distillation due to limited sample size of only 1.5L.															
4. Duplicate precision under the CLP protocol must be within one CRDL when either sample or duplicate are below 5X CRDL.															

C03-003

9613497-2596

TABLE 4: COMPLEX CYANIDE DETERMINATION
FOR TASK 7, SDG #11

Sample ID#	Total CN Sample ug/L	Free CN Sample ug/L	Complex CN Sample ug/L (1)
91-9132	40	7	33

(1) Results calculated by subtracting the Free cyanide results from the Total cyanide results.

RESULTS CALCULATED BY

Michael W. Chen

CALCULATIONS CHECKED BY

B. J. Wilcox 1/10/92

C05-002

9613497.2597

9613497.2598

ATTACHMENT 4
DATA VALIDATION SUPPORTING DOCUMENTATION

3. INITIAL CALIBRATIONS

Were all instruments calibrated daily, each set-up time and were the proper number of standards used?

Yes No N/A

Are the correlation coefficients ≥ 0.995 ?

Yes No N/A

Was a balance check conducted prior to the TDS analysis?

Yes No N/A

Was the titrant normality checked?

Yes No N/A

ACTION: Qualify all data as unusable (R) if reported from an analysis in which the above criteria were not met.

4. INITIAL AND CONTINUING CALIBRATION VERIFICATION

Have ICV and CCV been analyzed at the proper frequency?

Yes No N/A

Are ICV and CCV percent recoveries within control?

Yes No N/A

Are there calculation errors?

Yes No N/A

1/10/42

ACTION: Qualify all affected data in accordance with the validation requirements.

5. LABORATORY BLANKS

Are target analytes present in the laboratory blanks?

Yes No N/A

ACTION: Qualify all associated sample results for any analyte < 5 times the amount in any laboratory blank as nondetected (U) and list the affected samples and analytes below.

6. FIELD BLANKS

Are target analytes present in the field blanks?

Yes No N/A

ACTION: Qualify all sample results for any analyte < 5 times the amount in any valid field blank as nondetected (U).

7. MATRIX SPIKE SAMPLE ANALYSIS

Are spike recoveries within the acceptance limits?

Yes No N/A

ACTION: If the sample concentration exceeds the spike concentration by a factor of 4 or more, and spike recoveries are outside the acceptance limits, no qualification is necessary. If spike recovery is outside the control limits and the sample results are $> CRQL$, qualify the data as estimated (J). If the spike recovery is $< 30\%$ and the sample results are less than the IDL qualify the data as unusable (R).

8. LABORATORY CONTROL SAMPLE

Are percent recoveries within the acceptance limits?

 Yes No N/A

Are there calculation errors?

Yes No N/A

ACTION: Qualify the affected results according to the following requirements:

AQUEOUS LCS - Qualify as estimated (J), all sample results > IDL, for which the LCS %R falls within the range 50-79% or > 120%. Qualify as estimated (UJ), all sample results < IDL, for which the LCS falls within the range of 50-79%. Qualify as unusable (R) all sample results, for which the LCS %R < 50%.

SOLID LCS - Qualify as estimated (J), all sample results > IDL for which the LCS %R is outside the established control limits. Qualify as estimated (UJ), all sample results < IDL for which the LCS %R are lower than the established control limits.

9. PERFORMANCE AUDIT ANALYSES

Are the performance audit sample results within the acceptance limits?

Yes No N/A

ACTION: Note the results of the performance audit samples in the validation narrative.

10. DUPLICATE SAMPLE ANALYSIS

Are RPD values within the acceptance limits?

 Yes No N/A

Action: Qualify the results for all associated samples of the same matrix as estimated (J) if the RPD falls outside the acceptance limits.

11. FIELD DUPLICATE SAMPLES

Do RPD values exceed the acceptance limits?

Yes No N/A

ACTION: Note the results of the field duplicate samples in the validation narrative.

12. FIELD SPLIT SAMPLES

Do RPD values exceed the acceptance limits?

Yes No N/A

ACTION: Note the results of the field split samples in the validation narrative.

13. ANALYTE QUANTITATION AND DETECTION LIMITS

Have results been reported and calculated correctly?

Yes No N/A

Are instrument detection limits below the CRDL?

 Yes No N/A

Action: If analyte quantitation is in error, contact the laboratory for explanation. If errors or deficiencies can not be resolved with the laboratory, qualify associated data as unusable (R).

14. OVERALL ASSESSMENT AND SUMMARY

Has the laboratory conducted the analysis in accordance with the analytical SOW?

Yes No N/A

Were project specific data quality objectives met for this analysis?

 Yes No N/A

ACTION: Summarize all the data qualifications and complete the data validation narrative as specified in Section 10.0 of the data validation requirements.

COMMENTS (attach additional sheets as necessary): Laboratory did not analyze distilled mid-range standard nor continuing calibration verification samples as required.

Laboratory did not account for dilution effect of distilling only 250 ml of sample rather than 500ml when reporting sample detection limits for samples B011D0, B011D3, B011D4 and B011D7. The reported result for these samples should be 11.8 μ g/L.

HOLDING TIME SUMMARY - FORM B-1

SDG: B01199		REVIEWER: DKR		DATE: 6/26/92		PAGE 1 OF 1	
COMMENTS: Cyanide technical holding time is 14 days.							
FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
B01199	Total Cyanide	8/28/91	N/A	9/5/91	N/A	8	NONE
B01158	↓	8/27/91	↓	↓	↓	9	↓
B011D0	↓	8/21/91	↓	↓	↓	15	UJ
B011K1	↓	8/27/91	↓	↓	↓	9	NONE
B011D3	↓	8/21/91	↓	↓	↓	15	UJ
B011D6	↓	↓	↓	↓	↓	15	↓
B011C7	↓	↓	↓	9/6/91	↓	16	↓
B011K1	Free Cyanide	8/27/91	N/A	9/9/91	N/A	13	NONE

B-1

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