START
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0045375

200-BP-1 SITE INVESTIGATION
ANALYTICAL CHEMISTRY SUPPORT PROJECT

TASK 7

DATA PACKAGE/REPORT No. 10

Revision 0

OCT 1996
RECEIVED
EDMC

January 15, 1992

Prepared by: B.M. Gillespie

Pacific Northwest Laboratory

(PNL Project #16772)

JAN 1992
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5/29/96 M.H.

INTRODUCTION

This data package contains the results obtained by Pacific Northwest Laboratory (PNL) staff in the characterization of samples for the 200-BP-1 site investigation analytical chemistry support 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 samples 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 Custodian.

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 or 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.

9513179.1007

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

1-15-92

Date

9613479.1696

TABLE 1: 200-BP-1 Sample Numbers

WHC Sample Number	PNL ALO Sample Number	Sample Type
B01184	91-07901	Water
B01178	91-07902	Water
B01157	91-07903	Water
B01187	91-07904	Water
B01190	91-07905	Water

CYANIDE ANALYSIS RESULTS

Total cyanide analysis was performed in room 419 of building 325 in the Hanford Site 300 area. This data package includes cyanide results for five water samples. Cyanide results are presented by colorimetric analysis run batch. Data package #10 results are summarized in Table 2.

Total cyanide results for samples and corresponding duplicates (where applicable) were above the instrument detection limit (IDL) of 5.9 μg/l. Free cyanide analysis was done on all five sample as they had total cyanide concentrations of greater than than 20 μg/l. Sample 91-7904 had a notably high cyanide concentration of 716 μg/l.

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

Average spiked sample cyanide recovery was 98% with a standard deviation of 2%.

Average recovery of cyanide for the laboratory control /initial calibration verification sample (ICV-6) was 108% with a standard deviation of 1%. Recovery value for ICV-6 (LCS-0789, prepared by ICF Corporation) 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 for analysis groups within the data package were below the IDL. Algebraically correct blank cyanide values are found on page two of each run batch report.

TABLE 2: TOTAL CYANIDE ANALYSIS DATA FOR TASK 7
SDG #10

WATER SAMPLES

Sample ID#	PNL Log#	Sample G1 (ug/L)	C	Sample dup. G2 (ug/L)	C	%RPD	Blank G5 (ug/L)	C	Spike added (ug)	Sample+ spike G3 (ug/L)	sample G4 (ICV) (mg/L)	Sample+ spike G3 recovery(%)	sample G4 (ICV) recovery(%)	Flags Q	Footnote#
B01184	91-7901	27.5		27.5		0	5.9	U	39.5	181.3	10.14	97	108.0		1,2,3,4 (ALL)
B01178	91-7902	64.7													
B01157	91-7903	133.6		130.2		2.62	5.9	U	39.5	291.2	10.08	100	107.0		
B01187	91-7904	716.6													
B01190	91-7905	28.6		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 ug of cyanide is added to each distillation flask and recovered in 250 mL of NaOH).
2. Contract required detection limit for water = 10 ug/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.

CLP FLAGS

U = Analyzed but not detected (less than IDL)

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."

Results for samples analyzed during this analytical session are presented in Table 3.

The quality of the chromatograms developed during this analytical session was less than optimal but still useable. Based on chromatographic base-line instability considerations and the analyst's (KHP) judgement, the detection limit for this analytical session is estimated to be 2 μg CN^-/L.

Average spike recovery was 105% (Range 101 - 109%) and average recovery of check standard was 102% (Range 99.6 - 104.6%). The relative percent difference for duplicate analyses of sample 91-7905 was 1.4%.

Method precision and bias observed during the August 23, 1991, analytical session meet client requirements.

Required free-cyanide analyses were performed within the contract required maximum hold time of 12 days.

TABLE 3: FREE CYANIDE ANALYSIS FOR TASK 7
SDG #10

WHC Sample ID#	PNL Sample ID#	J1 Sample ug/L	Flags	J2 Sample Duplicate ug/L	Flags	%RPD	J5 Matrix Blank ug/L	J3 Sample+ Spike ug/L	J3 Spike Added ug/L	J4 Control Std. ug/L	J4 Standard Added ug/L	J6 Dup. + Spike ug/L	J6 Spike Added ug/L	%recovery J3 Spike Rec.	%recovery J6 Dup. + Spike Rec.	%recovery J4 Control Std. Rec.	Flags
B01184	91-7901	2.0	U														
B01178	91-7902	3.0															
B01157	91-7903	6.0															
B01187	91-7904	83					-0.01	31.9 *	15.2	9.46	9.5	33.1 *	15.2	101	109	100	
B01190	91-7905	6.6		6.6		1.4	0.44			9.94	9.5					105	

* = Spike added to 5x diluted sample

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)
B = Less than CRDL but greater than or equal to IDL

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 is 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.

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

Sample ID#	Total CN ug/L (2)	Free CN ug/L	Complex CN ug/L (1)
91-7901	28	0	28
91-7902	65	3	62
91-7903	134	6	128
91-7904	717	83	634
91-7905	29	7	22

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

(2) Results of sample analysis not average of sample and duplicate.

9613479.1905

CHAIN OF CUSTODY

Company Contact	P.H. BUTCHER	Telephone	509-376-5045		
Sample Collected by	K. LEE	Date	8/7/91	Time	1010
Sample Locations	200-BP-1				
Ice Chest No.	SML-45	Field Logbook and Page No.	WHC-N-4461 p. 56		
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

B01184 PHB 8/8/91

~~12, 1L, P, WATER, TOTAL CYANIDE~~

2, 1L, P, Water, Total Cyanide

CHAIN OF POSSESSION

Relinquished by:	Received by:	Date/Time:
Kirby D. Lee K.D.L.	PHButcher PHButcher	8/7/91 1440
PHButcher PHButcher	J. ROBBINS J. Robbins	8/12/91 8/12/91 1400 8/12/91
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

mR 8/12/91

B01-002

9613479.1906

CHAIN OF CUSTODY

Company Contact	P.H. BUTCHER	Telephone	509-376-5045		
Sample Collected by	K. LEE	Date	8/7/91	Time	0810
Sample Locations	200-BP-1				
Ice Chest No.	SML-45	Field Logbook and Page No.	WHC-N-4461 p.56		
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

B01178
2X, 1L, P, WATER, ~~FREE~~ Total CYANIDE
PHB
8/12/91

CHAIN OF POSSESSION

Relinquished by: Kirby P. Lee K.D.L.	Received by: PHButcher PHButcher	Date/Time: 8/7/91 1440
Relinquished by: PHButcher PHButcher	Received by: J. ROBBINS J. Robbins	Date/Time: 8/12/91 1400
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-003

9613479.1907

CHAIN OF CUSTODY

Company Contact	P.H. BUTCHER	Telephone	509-376-5045		
Sample Collected by	K. LEE	Date	8/5/91	Time	1030
Sample Locations	200-BP-1				
Ice Chest No.	SML-45	Field Logbook and Page No.	WHC-N-		
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

B01157
2X, 1L, P, WATER, ~~FREE~~ Total CYANIDE
PH Butcher
8/12/91

CHAIN OF POSSESSION

Relinquished by:	Received by:	Date/Time:
K.D.L Kathy A-Lee	PH Butcher PH Butcher	8/5/91 1551
PH Butcher PH Butcher	J. ROBBINS J. Robbins	8/12/91 1400

B01-004

9613479.1908

CHAIN OF CUSTODY

Company Contact	P.H. BUTCHER	Telephone	509-376-5045		
Sample Collected by	K. LEE	Date	8/8/91	Time	0900
Sample Locations	200-BP-1				
Ice Chest No.	SML-45	Field Logbook and Page No.	WHC-N-4461 p.57		
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

B01187
2 X, 1L, P, WATER, ~~FREE~~ Total CYANIDE
PHB
8/12/91

CHAIN OF POSSESSION

Relinquished by:	Received by:	Date/Time:
Ruby D. Lee K.D.L.	PHButcher PHButcher	8/8/91 1444
Relinquished by: PHButcher PHButcher	Received by: J. ROBBINS J. Robbins	Date/Time: 8/12/91 1400
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

9613479.1909

CHAIN OF CUSTODY

Company Contact	P.H. BUTCHER	Telephone	509-376-5045		
Sample Collected by	K. LEE	Date	8/8/91	Time	1120
Sample Locations	200-BP-1				
Ice Chest No.	SML-45	Field Logbook and Page No.	WHC-N-4461 p. 57		
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

B01190
2X, 1L, P, WATER, ~~FREE~~ Total CYANIDE
PHB
8/12/91

CHAIN OF POSSESSION

Relinquished by:	Received by:	Date/Time:
Shirley D. Lee K.D.L.	PHButcher PHButcher	8/8/91 1438
Relinquished by: PHButcher PHButcher	Received by: J. ROBBINS J. Robbins	Date/Time: 8/12/91 1400
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-006

9613479.1910

Westinghouse Hanford Company

SAMPLE ANALYSIS REQUEST

PART I: FIELD SECTION

Collector K D Lee Date Sampled *** Time *** hours

Company Contact B. H. Ford Telephone (509) 376-6465

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested	***	
[redacted] B01184	2, 1L, P	W	Total Cyanide	8/7/91	10:10
[redacted] B01176	2, 1L, P	W	Total Cyanide	8/7/91	0810
[redacted] B01157	2, 1L, P	W	Total Cyanide	8/5/91	1030
[redacted] B01187	2, 1L, P	W	Total Cyanide	8/8/91	0900
[redacted] B01190	2, 1L, P	W	Total Cyanide	8/8/91	1120

Field Information**

Special Handling and/or Storage

Possible Sample Hazards

PART II: LABORATORY SECTION

Received by J. ROBBINS Title SR. RES. SCIENTIST Date 8/12/91

Analysis Required TOTAL CN

B01-007

*Indicate whether sample is soil, sludge, water, etc.

**Use back of page for additional information relative to sample location

A-6000-406 (05/90)

9613479.1911

SAMPLE RECEIPT FORM

Delivered by: DUSTY BUTCHER Date/Time: 8/12/91 1400

Received by: J. ROBBINS

Customer Sample Number(s): B01184, B01178, B01157, B01187, B01190 BMB 8-12-91

ALO Sample Number(s): 91-7901 TO 91-7905

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). 4°C
   OK

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

9613479.1912

CHAIN OF CUSTODY

Company Contact	P.H. BUTCHER	Telephone	509-376-5045		
Sample Collected by	K. LEE	Date	8/5/91	Time	1030
Sample Locations	200-BP-1				
Ice Chest No.	Hill	Field Logbook and Page No.	WAC-N - 4461		
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

B01157
1, 1L, P, WATER, ~~TOTAL~~ FREE CYANIDE KP 8/12/91

CHAIN OF POSSESSION

Relinquished by: K.D.C. Kelly D. Lee	Received by: PHButcher PHButcher	Date/Time: 8/5/91 1552
Relinquished by: PHButcher PHButcher	Received by: Karl Pool PNL	Date/Time: 8/12/91 1330
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

9613479.1913

CHAIN OF CUSTODY

Company Contact	P.H. BUTCHER	Telephone	509-376-5045		
Sample Collected by	K. LEE	Date	8/7/91	Time	0810
Sample Locations	200-BP-1				
Ice Chest No.	Hill	Field Logbook and Page No.	WIC-N-4461 p 56		
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

B01178
1 1, 1L, P, WATER, ~~TOTAL~~ FREE CYANIDE KP 8/12/91

CHAIN OF POSSESSION

Relinquished by: Kathy D Lee K.D.L.	Received by: PHButcher PHButcher	Date/Time: 8/7/91 1440
Relinquished by: PHButcher PHButcher	Received by: Karl Pool PNL	Date/Time: 8/12/91 1330
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-010

9613479.1914

CHAIN OF CUSTODY

Company Contact	P.H. BUTCHER	Telephone	509-376-5045		
Sample Collected by	K. LEE	Date	8/8/91	Time	0900
Sample Locations	200-BP-1				
Ice Chest No.	Hill	Field Logbook and Page No.	WHC-N-4461 p.57		
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

B01187
1 ~~7~~, 1L, P, WATER, ~~TOTAL~~ FREE CYANIDE RHP 8/12/91

CHAIN OF POSSESSION

Relinquished by: Kelly D Lee K.D.L.	Received by: PHButcher PHButcher	Date/Time: 8/8/91 1444
Relinquished by: PHButcher PHButcher	Received by: Carl Pool PNL	Date/Time: 8/12/91 1330
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

9613479.1915

CHAIN OF CUSTODY

Company Contact	P.H. BUTCHER	Telephone	509-376-5045		
Sample Collected by	K. LEE	Date	8/8/91	Time	1120
Sample Locations	200-BP-1				
Ice Chest No.	Hill	Field Logbook and Page No.	WHC-N-4461 p.57		
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

B01190 FREE KP
1%, 1L, P, WATER, ~~TOTAL~~ CYANIDE 8/12/91

CHAIN OF POSSESSION

Relinquished by: Kirby D. Lee K.D.C.	Received by: PHButcher PHButcher	Date/Time: 8/8/91 1438
Relinquished by: PHButcher PHButcher	Received by: Karl Pool PNL	Date/Time: 8/12/91 1330
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

B01-012

9613479.1916

CHAIN OF CUSTODY

Company Contact	P.H. BUTCHER	Telephone	509-376-5045		
Sample Collected by	K. LEE	Date	8/7/91	Time	1010
Sample Locations	200-BP-1				
Ice Chest No.	Hill	Field Logbook and Page No.	WHCN-4461 p. 56		
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

B01184
1, 1L, P, WATER, FREE CYANIDE

CHAIN OF POSSESSION

Relinquished by: Kristy D. Lee K.D.L.	Received by: PHButcher PHButcher	Date/Time: 8/7/91 1440
Relinquished by: PHButcher PHButcher	Received by: Karl Pool PNL	Date/Time: 8/12/91 1330
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

9613479.1917

Westinghouse Hanford Company

SAMPLE ANALYSIS REQUEST

PART I: FIELD SECTION

Collector K.D. Lee Date Sampled _____ Time _____ hours

Company Contact R. H. Ford Telephone (509) 376-6465

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
[redacted] B01184	1, 1L, P	W	Free Cyanide 8/7/91, 1010
[redacted] B01178	1, 1L, P	W	Free Cyanide 8/7/91, 0810
[redacted] B01157	1, 1L, P	W	Free Cyanide 8/5/91, 1030
[redacted] B01187	1, 1L, P	W	Free Cyanide 8/8/91, 0900
[redacted] B01190	1, 1L, P	W	Free Cyanide 8/8/91, 1120

Field Information** _____

Special Handling and/or Storage _____

Possible Sample Hazards _____

PART II: LABORATORY SECTION

Received by Karl Pool Title Senior Research Scientist Date 8/12/91

Analysis Required _____

B01-014

*Indicate whether sample is soil, sludge, water, etc.

**Use back of page for additional information relative to sample location.

A-6000-406 (05/90)

9613479.1918

6-4784

SAMPLE RECEIPT FORM

Delivered by: P. H. Butcher Date/Time: 8/12/91 1330

Received by: K. H. Pool

Customer Sample Number(s): 91-7901, through 91-7905

ALO Sample Number(s): B01184, B01178, B01157, B01187, B01190

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: OK

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 O.K., T = 4.0°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

9613479.1919

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