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B01903-PNL-057 <sup>02</sup>

**START**

**0045389**

**200-BP-1 SITE INVESTIGATION  
ANALYTICAL CHEMISTRY SUPPORT PROJECT**

**TASK 7**

**DATA PACKAGE/REPORT No. 12**

**Revision 0**



**March 19, 1992**

**Prepared by: B.M. Gillespie**



**Pacific Northwest Laboratory**

**(PNL Project #16772)**

1 SW 5/24/96

## 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 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 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. 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, method blanks, 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

3-19-92

Date

TABLE 1: 200-BP-1 Sample Numbers

<u>WHC Sample Number</u>	<u>PNL ALO Sample Number</u>	<u>Sample Type</u>
B019Q3	92-01206	Water
B019Q4	92-01207	Water
B019J0	92-01678 (CN only)	Water
B019J4	92-01679 (CN only)	Water
B019H9	92-01680 (Free CN only)	Water
B019J3	92-01681 (Free CN only)	Water

## CYANIDE ANALYSIS RESULTS

Total cyanide analysis was performed in room 313 of building 325 in the Hanford Site 300 area. This data package includes cyanide results for four water samples. WHC submitted two additional samples for which only free cyanide was requested. Cyanide results are presented by colorimetric analysis run batch. The results are summarized in Table 2.

Total cyanide results for samples and corresponding duplicates (where applicable) were between 15.7 and 32.7  $\mu\text{g/L}$ , except for sample 92-01679 which had a cyanide concentration of 468  $\mu\text{g/L}$ . Sample 92-01207 and its duplicate did not meet the duplicate precision limit and the data was flagged ( \* ). The 12 day hold time specified for cyanide analysis under CLP protocol was met for all samples in this data package.

Average spiked sample cyanide recovery was 103% with a standard deviation of 4%. Average recovery of cyanide for the laboratory control /initial calibration verification standard (ICV-6) was 97% with a standard deviation of 8%. 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 this data package were below the IDL. Instrument detection limit for the colorimetric cyanide analysis procedure is 2  $\mu\text{g/l}$  using the EPA approved procedure for determining IDL.

Accuracy and precision of the colorimetric cyanide analysis can be inferred from cumulative recovery data for the distilled cyanide laboratory control standard (ICV-6). Average recovery of ICV-6, for the period of 10/91 to 2/92, was 103% with a standard deviation of 7%.

TABLE 2: TOTAL CYANIDE ANALYSIS DATA FOR TASK 7  
SDG #12

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 (ug)	Sample+ spike G3 (µg/L)	sample G4 (ICV) (mg/L)	Sample+ spike G3 recovery(%)	sample G4 (ICV) recovery(%)	Flags Q	Footnote#
B019Q3	91-01206	37.1													1,2,3,5 (ALL)
B019Q4	92-01207	15.7		32.5		70	2	U	49.1	277	8.3	106	89	*	4
B019J0	92-01678	23.6		23.6		0	2	U	48.9	218	9.8	99	105		4
B019J4	92-01679	468													4
												Mean	103	97	
												Std. Dev.	4	8	

Footnotes

1. Concentration of stock ICV-6=9.4 mg/L (18.8 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. Instrument detection limit for liquids is 2 µg/L, based on the EPA CLP method.
4. Used 250 mL of sample per distillation 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. Distilled less than 250 ml of sample B019Q4.

CLP FLAGS

U = Analyzed but not detected (less than IDL)

FREE CYANIDE ANALYSIS RESULTS

Free cyanide analysis is performed in the 325 building in the 300 Hanford Site area. The procedure followed in PNL-ALO-271, Procedure for Analysis of Free Cyanide in Water and Solid Sample Leachates.

The calibration standards were prepared using eluant instead of 0.02 N NaOH and the lowest calibration level was a 5 ppb standard rather than a method blank (0 ppb). The eluant, as noted in the procedure (PNL-ALO-271), is an aqueous solution of 0.5 M NaOAc, 0.1 M NaOH, and 0.5% ethylenediamine. The use of a 5 ppb standard instead of a method blank prevents the calibration from being forced to define a zero intercept. Both these changes are considered to be of very little impact to the quality of data being generated.

A cyanide stock standard, prepared on 10/15/91, standardized last on 11/18/91, and found to be at 978 ppm by the total cyanide analysis group was used to prepare all the working standards used with these samples. An aliquot of 0.102 mls of this stock solution was diluted to 10 mls with eluant to prepare a 10 ppm intermediate standard. This standard, diluted to a 1 ppm level using eluant, was then used to produce 5 mls of each of the working standards. In addition to six calibration standards at 100, 75, 50, 25, 10, and 5 ppb, a verification standard, nominally at 66.6 ppb, was also prepared.

Sample 92-1681 was found to contain 33 ppb of free CN in contrast to 468 ppb of total cyanide. The spike recovery on this sample was 100%. No other samples were found to have appreciable levels of the analyte. The samples were analyzed within the required hold time.

TABLE 3: FREE CYANIDE ANALYSIS TASK 7  
SDG #12

WATER SAMPLES		-----% Recovery-----													Flags		
Sample ID#	PNL Log#	Sample J1 (ug/L)	C	Sample dup. J2 (ug/L)	C	%RPD	--J5-- Matrix Blank (ug/L)	C	-----J3----- Sample+ Spike (ug/L)	Spike Added (ug/L)	Control Std. (ug/L)	J4 <sup>b</sup> Standard Added (ug/L)	-----J6----- Dup. + Spike (ug/L)	Spike Added (ug/L)		--J3-- Spike Rec.	--J6-- Dup. + Spike Rec.
B019Q3	92-1206	5	U														
B019Q4	92-1207	5	U	5	U		5	U									
B019H9	92-1680	5	U														
B019J3	92-1681	33.4							83.5	50	60	67			100%		90%

CRDL = 10 ug/L (ppb)  
EST. IDL = 5 ug/L

Footnotes

b. Ver. Std at 66.6 ug/L (Nominal)

CLP FLAGS

U = Analyzed but not detected (less than 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 indeterminate.

Samples are analyzed for free cyanide based on first determining that the total cyanide result 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 #12

Sample ID#	PNL Log#	Total CN ug/L	Free CN ug/L	Complex CN ug/L (1)
B019Q3	92-1206	37.1	0 (<IDL)	37.1
B019Q4	92-1207	15.7	0 (<IDL)	15.7
B019J0/B019H9	92-1678/92-1680	23.6	0 (<IDL)	24
B019J4/B019J3	92-1679/92-1681	468	33.4	435

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

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Westinghouse  
Hanford Company

### CHAIN OF CUSTODY

Custody Form Initiator PH BUTCHER

Company Contact PH BUTCHER

Project Designation/Sampling Locations 200-BP-1

Ice Chest No. 5ML-90

Bill of Lading/Airbill No.

Method of Shipment HAND DELIVER

Shipped to PNL/314

Possible Sample Hazards/Remarks N/A

Telephone (509)376-5045

Collection Date 10-31-91

Field Logbook No. WHC-N-4461

Offsite Property No. W92=  
PH Butcher  
11/6/91

#### Sample Identification

BO 19Q3

1, 1L, P, WATER, FREE CYANIDE

Field Transfer of Custody

Chain of Possession

(Sign and Print Names)

Relinquished by: <i>L.A. Walker</i> L.A. Walker	Received by: <i>PH Butcher</i> PH Butcher	Date/Time: 11/1/91 0635
Relinquished by: <i>PH Butcher</i> PH Butcher	Received by: <i>Robbins</i> J. ROBBINS	Date/Time: 11-6-91 0805
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

#### Final Sample Disposition

Disposal Method:	Disposed by:	Date/Time:
Comments:		

B01-002

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Westinghouse  
Hanford Company

CHAIN OF CUSTODY

Custody Form Initiator PH BUTCHER

Company Contact PH BUTCHER

Project Designation/Sampling Locations 200-BP-1

Ice Chest No. *SML-90*

Bill of Lading/Airbill No.

Method of Shipment HAND DELIVER

Shipped to PNL/325

Possible Sample Hazards/Remarks N/A

Telephone (509)376-5045

Collection Date 10-31-91

Field Logbook No. WMC-N-4461

Offsite Property No. ~~W92~~  
*PH Butcher*  
*11/6/91*

Sample Identification

B019Q4  
2, 1L, P, WATER, TOTAL CYANIDE

Field Transfer of Custody Chain of Possession (Sign and Print Names)

Relinquished by: <i>L.D. Walker</i>	Received by: <i>PH Butcher PH Butcher</i>	Date/Time: <i>11/1/91 0635</i>
Relinquished by: <i>PH Butcher PH Butcher</i>	Received by: <i>J. ROBBINS</i> <i>James Robbins</i>	Date/Time: <i>11-6-91 0805</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

Final Sample Disposition

Disposal Method:	Disposed by:	Date/Time:
Comments:		

B01-003





SAMPLE RECEIPT FORM

Delivered by: DUSTY BUTCHER Date/Time: 11-6-91 8:05

Received by: J. ROBBINS

Customer Name or Project: 200-BP-1 TASK 7

Customer Sample Number(s): BØ19Q3 BØ19Q4

ALO Sample Number(s): 92-01206 92-01207

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 (i.e., broken container, dented, breached plastic bag, temperature of sample container as defined in Section 3.0 in PNL-ALO-051, etc.)

TEMP ≤ 2.5°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

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Westinghouse  
Hanford Company

CHAIN OF CUSTODY

Custody Form Initiator PH BUTCHER  
 Company Contact PH BUTCHER  
 Project Designation/Sampling Locations 200-BP-1  
 Ice Chest No.  
 Bill of Lading/Airbill No.  
 Method of Shipment HAND DELIVER  
 Shipped to PNL/325  
 Possible Sample Hazards/Remarks N/A

Telephone (509)376-5045  
 Collection Date 11/6/91  
 Field Logbook No. WHC-N-4461 p 85  
 Offsite Property No. W92-N/A  
 PHS  
 11/5/91

Sample Identification

BO 1950  
 2, 1L, P, WATER, TOTAL CYANIDE

Field Transfer of Custody		Chain of Possession	(Sign and Print Names)
Relinquished by: <i>Kathy D. Lee K.D. Lee</i>	Received by: <i>PH Butcher PH Butcher</i>	Date/Time: 11/6/91 1302	
Relinquished by: <i>PH Butcher PH Butcher</i>	Received by: J. ROBBINS <i>J. Robbins</i>	Date/Time: 11-15-91 12:50	
Relinquished by:	Received by:	Date/Time:	
Relinquished by:	Received by:	Date/Time:	
Final Sample Disposition			
Disposal Method:	Disposed by:	Date/Time:	
Comments:			

Westinghouse  
Hanford Company

CHAIN OF CUSTODY

Custody Form Initiator PH BUTCHER  
 Company Contact PH BUTCHER  
 Project Designation/Sampling Locations 200-BP-1  
 Ice Chest No.  
 Bill of Lading/Airbill No.  
 Method of Shipment HAND DELIVER  
 Shipped to PNL/325  
 Possible Sample Hazards/Remarks N/A

Telephone (509)376-5045  
 Collection Date 11-7-91  
 Field Logbook No. W4C-N-4461  
 Offsite Property No. ~~W92~~ PMS N/A  
 11/15/91

Sample Identification

BO 19J4  
 2, 1L, P, WATER, TOTAL CYANIDE

<input type="checkbox"/> Field Transfer of Custody		Chain of Possession	(Sign and Print Names)	
Relinquished by: <i>L.D. Walker</i> L.D. Walker	Received by: <i>PH Butcher</i> PH Butcher	Date/Time: 11/17/91	1500	
Relinquished by: <i>PH Butcher</i> PH Butcher	Received by: <i>J. Robbins</i> J. ROBBINS	Date/Time: 11-15-91	12:50	
Relinquished by:	Received by:	Date/Time:		
Relinquished by:	Received by:	Date/Time:		

Final Sample Disposition

Disposal Method:	Disposed by:	Date/Time:
Comments:		

B01-008



Westinghouse  
Hanford Company

CHAIN OF CUSTODY

Custody Form Initiator PH BUTCHER  
 Company Contact PH BUTCHER  
 Project Designation/Sampling Locations 200-BP-1  
 Ice Chest No.  
 Bill of Lading/Airbill No.  
 Method of Shipment HAND DELIVER  
 Shipped to PNL/314  
 Possible Sample Hazards/Remarks N/A

Telephone (509)376-5045  
 Collection Date 11/6/91  
 Field Logbook No. WHZ-N-4461285  
 Offsite Property No. W92-

Sample Identification

BO 1949  
 1, 1L, P, WATER, FREE CYANIDE

Field Transfer of Custody Chain of Possession (Sign and Print Names)

Relinquished by: <i>Shirley D. Lee K. Lee</i>	Received by: <i>PH Butcher PH Butcher</i>	Date/Time: <i>11/6/91 1302</i>
Relinquished by: <i>PH Butcher PH Butcher</i>	Received by: <i>J. ROBBINS Robbins</i>	Date/Time: <i>11-15-91 12:50</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

Final Sample Disposition

Disposal Method:	Disposed by:	Date/Time:
Comments:		

Westinghouse  
Hanford Company

CHAIN OF CUSTODY

custody Form Initiator PH BUTCHER  
 Company Contact PH BUTCHER  
 Project Designation/Sampling Locations 200-BP-1  
 Ice Chest No.  
 Bill of Lading/Airbill No.  
 Method of Shipment HAND DELIVER  
 Shipped to PNL/314  
 Possible Sample Hazards/Remarks N/A

Telephone (509)376-5045  
 Collection Date 11-7-91  
 Field Logbook No. WHC-N-4461  
 Offsite Property No. W92-

Sample Identification

BO 19J3  
 1, 1L, P, WATER, FREE CYANIDE

Field Transfer of Custody Chain of Possession (Sign and Print Names)

Relinquished by: <i>L. D. Walker</i>	Received by: <i>PH Butcher PH Butcher</i>	Date/Time: <i>11/7/91 1500</i>
Relinquished by: <i>PH Butcher PH Butcher</i>	Received by: J. ROBBINS <i>J. Robbins</i>	Date/Time: <i>11-15-91 12:50</i>
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

Final Sample Disposition

Disposal Method:	Disposed by:	Date/Time:
Comments:		



SAMPLE RECEIPT FORM

Delivered by: DUSTY BUTCHER Date/Time: 11-15-91

Received by: J. ROBBINS

Customer Name or Project: 200BP-1 TASK 7.0

Customer Sample Number(s): BØ19 J0, BØ19 J4, BØ19 H9, BØ19 J3

ALO Sample Number(s): 92-01678 TO 92-01681

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 (i.e., broken container, dented, breached plastic bag, temperature of sample container as defined in Section 3.0 in PNL-ALO-051, etc.)

OK 1°C [ WATER IN CONTACT (w) ICE ]  
IS AT 0°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

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

**B02-002**