

9613477.2440

BOX C8 - PNL-022  
20

**START**

0045328

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

**TASKS 2 & 4**

**DATA PACKAGE/REPORT No. 7**

**Revision 0**



**February 14, 1992**

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



**Pacific Northwest Laboratory**

**(PNL Project #16772)**

*i Kab 5/29/96*

## 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 soil samples collected in support of Tasks 2 and 4. 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.

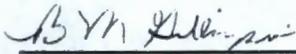
The samples (Table 1) were submitted with the appropriate WHC Chain of Custody (COC) and Sample Analysis Request Forms. The samples were delivered at refrigerated temperature to the 300 Area, 325 Building and 314 Building 200-BP-1 Sample Custodian.

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. 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.

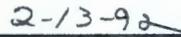
The data in this package are reported in separate tables (Tables 2 through 4) for each analyte or method. Three appendices are provided; one for Test Instruction, one for Chain of Custody, Sample Analysis Request Forms and Sample Receipt Forms and one that contains the primary inorganic analytical data.

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  
200-BP-1 Project Manager



\_\_\_\_\_  
Date

TABLE 1: 200-BP-1 Sample Numbers

<u>WHC Sample Number</u>	<u>PNL ALO Sample Number</u>	<u>Sample Type</u>
B00XC8(S)	91-10150	Soil
B00XD0(S)	91-10151	Soil
B00X80(S)	91-10484	Soil
B00XD2(S)	91-10485	Soil
B00XD4(S)	91-10486	Soil
B00XD6(S)	91-10786	Soil
B00XD8(S)	91-10787	Soil
B00X86(W)	91-10788	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 seven soil-sediment samples and one water sample. Cyanide results for Task 2&4 data package #7 are presented by colorimetric analysis run batch. Data package #7 results are summarized in Table 2.

Total cyanide results for soil-sediment samples and corresponding duplicates (where applicable) were below the instrument detection limit (IDL) of 0.6 mg/kg except for samples 91-10484, 91-10786 and 91-10787. Duplicate 91-10786 and sample 91-10787 had values just above the IDL. The water sample, 91-10788, did not have detectable cyanide levels.

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

Average spiked soil-sediment sample cyanide recovery was 97% with a standard deviation of 5%. Spiked water sample recovery was 97%.

Average recovery of cyanide for the laboratory control /initial calibration verification sample (ICV-6) was 105% with a standard deviation of 6% in the case of the soil-sediment samples. LCS recovery for the water samples was 110%. 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 TASKS 2 AND 4  
SDG#7

SOIL-SEDIMENT SAMPLES

Sample ID#	PNL Log#	Sample G1 (mg/kg)	C	Sample dup. G2 (mg/kg)	C	%RPD	Blank G5 (µg/L)	C	Spike added (µg)	Sample+ spike G3 (mg/kg)	sample G4 (ICV) (mg/L)	Sample+ spike G3 recovery(%)	sample G4 (ICV) recovery(%)	Flags Q	Footnote#
BOOXC8	91-10150	0.6	U	0.6	U	N/A	5.9	U	38.8	8.1	10.87	98	116		1,2,3 (ALL)
BOOXD0	91-10151	0.6	U												
BOOX80	91-10484	4.4		4.4		0.19	5.9	U	38.8	11.6	9.72	89	103		
BOOXD2	91-10485	0.6	U												
BOOXD4	91-10486	0.6	U	0.6	U	N/A	5.9	U	38.8	8.2	9.55	103	102		
BOOXD6	91-10786	0.6	U	0.62	B	N/A	5.9	U	38.8	8.3	9.5	97	101		
BOOXD8	91-10787	0.64	B												

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 soil-sediment = 1.0 mg/kg.
3. Duplicate precision under the CLP protocol must be within one CRDL when either sample or duplicate are below 5X CRDL.

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#
BOOX86	91-10788	5.9	U	5.9	U	N/A	5.9	U	38.8	151.2	10.36	97	110		1,2,4 (ALL)

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 sample size being limited to 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)

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FREE CYANIDE ANALYSIS RESULTS

This is the first sample being analyzed for free cyanide in this laboratory (325 Bldg., Rm. 400, IC System 2). PNL-ALO-107 was originally written for use with non-radioactive samples and will be modified. An ICN has been initiated. The IC analysis is being carried out using PNL-ALO-271.

Specifically, the sample (0.20 gm) is mixed with the leachate, eluant (20 mls), in a scintillation vial, sonicated for an hour, filtered thru a 0.45 um filter using a syringe, and injected. These modifications will reduce the amount of waste generated, improve leachate matching to the eluant, and will have no adverse effect on the chemistry of the extraction. For the record, the current eluant is 0.1 M NaOH, 0.5 M NaOAc, 0.5% ethylenediamine. The sample analysis has not been carried out within the 12 day hold time used for the total cyanide procedure (sample received on 9/17/91, analyzed 10/1/91).

A 775.5 ppm CN standard (2 gm KOH / L; last standardized on 9/6/91-LRB 54341-28) was received from the total cyanide analysis group and used for the preparation of the working standards. 0.129 mls of this standard was diluted with eluant to make 10 mls of a 10 ppm std. This standard was further diluted to make a 1000 ppb std. using the IC eluant. The six working calibration standards at 100, 75, 50, 25, 10, and 5 ppb and a verification standard at 67 ppb, all in eluant, were prepared from this solution.

The calibration quality is evaluated using a digested cyanide source which should nominally be at 37.6 ppb. This standard, ICV-6 (0.25 N NaOH; received by JLD on 4/16/91), is digested with every batch by the total cyanide analysis group.

The digestate of 9/30/91, used for verification with this sample set, was recovered at 93 % of the true value. The variation in the samples (% RPD = 39) is for an analyte level below the CRDL (1 ug/g). At this low analyte level, CLP guidelines allow the sample and duplicate analyte levels to be within 1 CRDL.

The spike, at 50 ppb, will be generated by the addition of 0.1 mls of the 10 ppm std. to 20 mls of the eluant/leachate mentioned above. The spike recovery (110%) is within the acceptance windows.

TABLE 3: FREE CYANIDE ANALYSIS TASKS 2 & 4  
SDG #7

SOIL		-----% Recovery-----														
Sample ID#	PNL Log#	Sample J1 (mg/kg)	Flags	Sample dup. J2 (mg/kg)	%RPD	--J5-- Matrix Blank ug/L	-----J3----- Sample+ Spike mg/kg	Spike Added mg/kg	-----J4 <sup>b</sup> ----- 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
B00X80	91-10484	0.6	B	0.8	39 <sup>a</sup>	0	6.1	5.4	35	38			102%		93%	HT

Footnotes

1. a = duplicates within 1 CRDL
2. b = J4: ICV-6 distilled on 9/30/91  
TRUE VALUE = 37.6 PPB  
AS DETD. BY TOTAL CN<sup>-</sup> GROUP = 38 PPB
3. CRDL = 1.0 mg/kg
4. IDL (est) = 0.5 mg/kg

CLP FLAGS

U = Analyzed but not detected (less than IDL)  
N = Spiked sample recovery not within control limits  
B = <CRDL but ≥IDL  
HT= 12 day holdtime (total CN<sup>-</sup>) not met

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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.

Soil samples are analyzed for free cyanide based on first determining that the total cyanide results is greater than 2 mg/kg. Samples below 2 mg/kg 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 was only one sample (91-10484) requiring free cyanide determination.

TABLE 4: COMPLEX CYANIDE DETERMINATION  
FOR TASKS 2 & 4 SDG #7

Sample ID#	Total CN mg/kg	Free CN mg/kg	Complex CN mg/kg (1)
91-10484	4.4	0.6	3.8

(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 M.C. Douglas

Project #: 91-019

Company Contact W.S. Thompson

Telephone (509) 376-2153

Project Designation/Sampling Locations 200-BP-1 Operable Unit

Collection Date 9/16/91

Boring: 216-B-57XB WED 9/16/91

Time 0742, 1224

Ice Chest No. PACE/KS 22

Field Logbook No. WHC-N-287-3

Bill of Lading/Airbill No. N/A

Offsite Property No. N/A

Method of Shipment Hand Carry

Shipped to 325 PNL Laboratory (300 Area)

Possible Sample Hazards/Remarks NO Chemical or radiological hazards detected using hand-held instruments

Sample Identification

① Box C8  
1; 120 ml; Glass; Soil; CLP - Total Cn, Free Cn, Ferro Cn

② Box D0  
1; 120 ml; Glass; Soil; CLP - Total Cn, Free Cn, Ferro Cn

Field Transfer of Custody CHAIN OF POSSESSION (Sign and Print Names)

Relinquished by: M.C. Douglas Received by: W.S. Thompson Date/Time: 9/17/91 1030  
Matthew C. Douglas Jenny S. Thompson

Relinquished by: W.S. Thompson Received by: MW Date/Time: 9/17/91 12:05  
Jenny S. Thompson

Relinquished by: Received by: Date/Time:

Relinquished by: Received by: Date/Time:

Final Sample Disposition

Disposal Method: Disposed by: Date/Time:

Comments:

B01-002



SAMPLE RECEIPT FORMDelivered by: Thompson Date/Time: 9/12/91 12:05pmReceived by: UrreCustomer Sample Number(s): B00XC8 B00XD0ALO Sample Number(s): 91-10150 91-101511. 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).

Sample under ice in Bag

6. Condition of Sample Vials.

Good

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

Agree

8. Resolution of Problems or Discrepancies.

N/A

RETURN COMPLETED FORM TO PROJECT MANAGER

Westinghouse Hanford Company

CHAIN OF CUSTODY

ody Form Initiator Wendy S. Thompson

Project #: 91-019

Company Contact Wendy S. Thompson

Telephone (509) 376-2153

Project Designation/Sampling Locations 200-BP-1 Operable Unit

Collection Date 0822 ~~wt~~

Boring: 216-B-49A ; 216-B-57B

9/18/91 9/19/91  
0849 1118 Time 0822

Ice Chest No. #22 Coleman B

Field Logbook No. WHC-N-287-3

Bill of Lading/Airbill No. N/A

Offsite Property No. N/A

Method of Shipment Hand carry

Shipped to 325 PNL Laboratory

Possible Sample Hazards/Remarks Radioactive samples, 40.5 mR/hr outside package; no chemical hazards indicated per field instruments  
keep chilled

Sample Identification

① BOOX 80 wt 9/20/91 (0822 hr 9/19/91) (216-B-49A)

1, 120ml; amber glass; soil; CLP - total CN; free CN; Ferro CN

② BOOX DZ (0849 hr; 9/18/91) (216-B-57B)

1, 120ml; glass; soil - CLP - total CN; free CN; Ferro CN

③ BOOX D4 (1118 hrs at 9/19/91) (216-B-57B)

1, 120ml; glass; soil - CLP - total CN; free CN; Ferro CN

/

Field Transfer of Custody

CHAIN OF POSSESSION

(Sign and Print Names)

Relinquished by: W.S. Thompson

Received by: J. ROBBINS

Date/Time:

Wendy S. Thompson

James Robbins

9/20/91 0120 pm

Relinquished by:

Received by:

Date/Time:

Relinquished by:

Received by:

Date/Time:

Relinquished by:

Received by:

Date/Time:

Final Sample Disposition

Disposal Method:

Disposed by:

Date/Time:

Comments:



SAMPLE RECEIPT FORMDelivered by: WENDY THOMPSON Date/Time: 9/20/91 1:20Received by: JIM ROBBINSCustomer Sample Number(s): B00X80, B00XD2, B00XD4ALO Sample Number(s): 91-10484, 91-10485, 91-104861. 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

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

9613477.2456

Westinghouse Hanford  
Company

CHAIN OF CUSTODY

Body Form Initiator W.S. Thompson

Project #: 91-019

Company Contact W.S. Thompson

Telephone (509) 376-2153

Project Designation/Sampling Locations 200-BP-1 Operable Unit

Collection Date 9/25/91

Boring: 216-B-49A

Time 1010; 1010; 1132

Ice Chest No. \_\_\_\_\_

Field Logbook No. WHC-N-287-3

Bill of Lading/Airbill No. N/A

Offsite Property No. N/A

Method of Shipment Hand Carry

Shipped to 325 PNL Laboratory

Possible Sample Hazards/Remarks No hazards indicated with hand-held field instruments.

Sample Identification

- ① BOOXD6  
1, 125ml; glass; soil; CLP- Total cyanide; free CN; ferrocN
- ② BOOXD8  
1, 125ml; glass; soil; CLP- Total cyanide; free CN; ferrocN
- ③ ~~BOOX86~~ BOOX86 wst 9/25/91  
3x 1,000ml; plastic; water; (NaOH); CLP- total CN; free CN; ferrocN

Field Transfer of Custody

CHAIN OF POSSESSION

(Sign and Print Names)

Relinquished by: <u>W.S. Thompson</u> <u>Gandy S. Thompson</u>	Received by: <u>J.G. HOGAN</u> <u>J. Hogan</u>	Date/Time: <u>9-25-91 / 1252</u>
Relinquished by: <u>J.G. HOGAN</u> <u>J. Hogan</u>	Received by: <u>J. ROBBINS</u> <u>J. Robbins</u>	Date/Time: <u>9/26/91 2:30 pm</u>
Relinquished by: _____	Received by: _____	Date/Time: _____
Relinquished by: _____	Received by: _____	Date/Time: _____

Final Sample Disposition

Disposal Method: \_\_\_\_\_ Disposed by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Comments: B01-008



SAMPLE RECEIPT FORMDelivered by: J. HOEAM Date/Time: 9/26/91 1430Received by: J. ROBBINSCustomer Sample Number(s): ~~B00~~XD6, ~~B00~~XD8, ~~B00~~X86ALO Sample Number(s): 91-10786, 91-10787, 91-107881. 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 (WATER IN CONTACT WITH ICE WAS FOUND TO BE 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

RETURN COMPLETED FORM TO PROJECT MANAGER

9613477.2459

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

B02-002