

START

9613497.2286

B005AB-PNL-017

0045488

1752

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

TASK 3

DATA PACKAGE/REPORT No. 1

Revision 0

June 3, 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 soil samples collected in support of Task 3, near surface soil samples. 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

6-6-91

Date

TABLE 1: 200-BP-1 Sample Numbers

SAMPLE DELIVERY GROUP #1

<u>WHC Sample Number</u>	<u>PNL ALO Sample Number</u>
B00J48	91-2828
B00J49	91-2829
B00J50	91-2830
B00J51	91-2831
B00J52	91-2832
B00J53	91-2833
B00J57	91-2834
B00J58	91-2835
B00J59	91-2836
B00J60	91-2837
B00J61	91-2838
B00J62	91-2839
B00J63	91-2840
B00J65	91-2841
B00J66	91-2842
B00J71	91-2843
B00J75	91-2844
B00J76	91-2845

RESULTS FOR TOTAL CYANIDE ANALYSIS OF SOIL SAMPLES IN TASK 3 (5/23/91)

Cyanide analysis was performed in room 419 of building 325 in the Hanford Site 300 area. The analytical method used to acquire data for this data package was PNL-ALO-270; a distillation/colorimetric analysis referenced to a plot of cyanide standard concentration vs. absorbance. The total cyanide results for this data package are summarized in Table 2.

All samples and duplicates were below the instrument detection limit (IDL) of 0.3 mg/Kg. Duplicate precision was within the accepted limit for all samples. Free cyanide analysis was not done as samples did not have detectable levels of total cyanide.

The 12 day hold time specified for cyanide analysis under the CLP protocol was met for all but two samples in this work package. Samples 91-2842 and 91-2843 missed hold times by one day. Sample backlog from these soil samples and water samples already in-house contributed to this analysis delay. This delay is not expected to affect the analyzed cyanide values.

Average spiked sample cyanide recovery was 101.3% with a standard deviation of 3.4%. We chose to calculate the spike recovery for task 3 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 laboratory control sample [LCS-CN(0689), ICF Technology, Inc., true value = 5.62 mg/kg, control limits = 4.3 to 6.9 mg/kg] was 110.3% with a standard deviation of 7.4%. Cyanide found in blanks analyzed in this work package were below the stated IDL.

TABLE 2: TOTAL CYANIDE ANALYSIS DATA FOR TASK 3
SDG #1

SOIL SAMPLES

Sample ID#	PNL Log#	G1 Sample (mg/Kg)	C	G2 Sample dup.(mg/Kg)	C	XRPD	G5 Blank (ug/L)	C	G3 Sample+ spike(mg/Kg)	G4 - LCS (mg/Kg)	G3 Sample+ spike recovery (%)	G4 - LCS sample recovery (%)	Flags Q	Footnote#
														1,2,3 (ALL)
B00J48	91-2828	0.3	U	0.3	U	N/A	5.9	U	12	6.58	101.2	117		
B00J49	91-2829	0.3	U											
B00J50	91-2830	0.3	U	0.3	U	N/A	5.9	U	12.2	5.84	102.4	103.9		
B00J51	91-2831	0.3	U											
B00J52	91-2832	0.3	U	0.3	U	N/A	5.9	U	12.5	6	101.5	106.7		
B00J53	91-2833	0.3	U											
B00J57	91-2834	0.3	U	0.3	U	N/A	5.9	U	11.9	6.12	100.7	108.9		
B00J58	91-2835	0.3	U											
B00J59	91-2836	0.3	U	0.3	U	N/A	5.9	U	11.0	5.6	97.8	99.6		
B00J60	91-2837	0.3	U											
B00J61	91-2838	0.3	U	0.3	U	N/A	5.9	U	11.8	6.65	109.3	118.4		
B00J62	91-2839	0.3	U											
B00J63	91-2840	0.3	U	0.3	U	N/A	5.9	U	11.9	6.53	97.7	116.1		
B00J65	91-2841	0.3	U											
B00J66	91-2842	0.3	U	0.3	U	N/A	5.9	U	11.5	6.77	103.2	120.4		
B00J71	91-2843	0.3	U											
B00J75	91-2844	0.3	U	0.3	U	N/A	5.9	U	10.9	5.72	97.8	101.9		
B00J76	91-2845	0.3	U											
											Mean	101.3	110.3	
											Std. Dev.	3.4	7.4	

1. Concentration of soil LCS-0689=5.62 mg/Kg(1-1.5g of LCS-0689 is added to each distillation flask and recovered in 250 mL of NaOH).
2. Concentration of spike added = 90.6 ug/L.
3. Contract required detection limit for soil = 0.5 mg/Kg.

CLP "Q" FLAGS

U = Analyzed but not detected (IDL or less than IDL)

9613497-2291

9613497.2292

FREE CYANIDE ANALYSIS RESULTS

Free cyanide analysis was not performed as samples must have a total cyanide concentration of greater than 20 ug/L before free cyanide analysis is required.

Table 3: Free Cyanide Analysis Data

NO DATA REQUIRED

9613497.2294

COMPLEX CYANIDE RESULTS

Complex cyanide cannot be determined from the existing total cyanide data as no free cyanide results were required.

9613497.2295

Table 4: Complex Cyanide Determination

NO DATA REQUIRED

9613497.2296

Westinghouse Hanford Company

CHAIN OF CUSTODY

Study Form Initiator C.E. Heiden

Company Contact Ron Mitchell

Telephone 370-2640

Project Designation/Sampling Locations 200-122-1
Near Surface Soil Sampling Project # 91-020

Collection Date 3/29/91 and
4/1/91

Ice Chest No. _____

Field Logbook No. _____

Bill of Lading/Airbill No. N/A

Offsite Property No. N/A

Method of Shipment _____

Shipped to PNL-314

Possible Sample Hazards/Remarks N/A

Sample Identification

BOO148
BOO149
BOO150
BOO151
BOO152
BOO153
BOO157
BOO158
BOO159
BOO160

soil, 60ml amber glass jars

BOO161
BOO162
BOO163
BOO165
BOO166
BOO171
BOO175
BOO176

soil, 60ml amber glass jars

Field Transfer of Custody

CHAIN OF POSSESSION

(Sign and Print Names)

Relinquished by:
C.E. Heiden
C.F. Heiden

Received by:
Harold Pool

Date/Time:
4/4/91 1430

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: **BO1-002**

9613497.2297

Westinghouse
Hanford Company

SAMPLE ANALYSIS REQUEST

PART I: FIELD SECTION

Collector _____ Date Sampled 3/29/91 & 4/1/91 Time _____ hours
 Company Contact Ron Mitchell Telephone () 376

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested		
Bcal 48	91-2828		Free Cyanide and Ferricyanide		
Bcal 49		2829			
Bcal 50		2830			
Bcal 51		2831			
Bcal 52		2832			
Bcal 53		2833			
Bcal 57		2834			
Bcal 58		2835			
Bcal 59		2836			
Bcal 60		Soil 10 ml		2837	
Bcal 61		amberglass jar		2838	
Bcal 62				2839	
Bcal 63				2840	
Bcal 65				2841	
Bcal 66				2842	
Bcal 71				2843	
Bcal 75		2844			
Bcal 76	2845				

Field Information** N/ASpecial Handling and/or Storage N/APossible Sample Hazards N/A

PART II: LABORATORY SECTION

Received by Karl Pool Title Senior Research Scientist Date 4/4/91

Analysis Required _____

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

B01-003

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

A-6000-406 (05/90)

RADIONUCLIDE SAMPLE ANALYSIS REQUEST

REQUESTED BY: _____
 PHONE NO: _____
 WELL NO: B00J
 DATE: _____

SEND TO: _____
 PHONE NO: _____
 LOCATION: _____
 DATE: _____

SAMPLE NO (DEPTH)	SAMPLE DATE	SAMPLE DESCRIPTION	ANALYSIS DATE	LAB NO	RESULTS BETA/GAMMA (pCi/gm)	RESULTS ALPHA (pCi/gm)
48	4-1-91	Soil	4-2-91	0652-91	115.7	0.6
49	4-1-91	Soil	4-2-91	0653-91	24.1	0.4
50	4-1-91	Soil	4-2-91	0654-91	47.9	<D
51	4-1-91	Soil	4-2-91	0655-91	140.5	2.6
52	4-1-91	Soil	4-2-91	0656-91	105.0	0.9
53	4-1-91	Soil	4-2-91	0657-91	61.1	0.6
54	4-1-91	Soil	4-2-91	0658-91	27.4	<D
55	4-1-91	Soil	4-2-91	0659-91	33.6	3.5
56	4-1-91	Soil	4-2-91	0660-91	25.0	0.7
57	4-1-91	Soil	4-3-91	0661-91	25.1	1.3
58	4-1-91	Soil	4-3-91	0662-91	26.4	1.5
59	4-1-91	Soil	4-3-91	0663-91	34.1	1.7
60	4-1-91	Soil	4-3-91	0664-91	43.9	<D
61	4-1-91	Soil	4-3-91	0665-91	21.9	2.0
62	4-1-91	Soil	4-3-91	0666-91	21.0	0.9
63	4-1-91	Soil	4-3-91	0667-91	35.5	0.5
64	4-1-91	Soil	4-3-91	0668-91	67.9	0.6
65	4-1-91	Soil	4-3-91	0669-91	29.0	1.7
66	4-1-91	Soil	4-3-91	0670-91	29.2	<D
67	4-1-91	Soil	4-3-91	0671-91	107.6	0.4
68	4-1-91	Soil	4-3-91	0672-91	51.3	1.2
69	4-1-91	Soil	4-3-91	0673-91	27.3	0.9
70	4-1-91	Soil	4-3-91	0674-91	57.1	3.1
71	4-1-91	Soil	4-3-91	0675-91	35.4	<D
72	4-1-91	Soil	4-3-91	0676-91	39.5	0.8
73	4-1-91	Soil	4-3-91	0677-91	20.6	0.4

PERFORMED BY: _____

DATE: _____

SHEET _____ OF _____

SAMPLE RECEIPT FORMDelivered by: C.E. Heiden Date/Time: 4/4/91 1430Received by: K.H. PoolCustomer Sample Number(s): see attached COC form

ALO Sample Number(s): _____

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: _____

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.) Good Condition T=5.3°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

B01-005

9613497.2300



Westinghouse Hanford Company

SAMPLE ANALYSIS REQUEST

PART I: FIELD SECTION

Collector N/A Date Sampled 3/29/91 & 4/1/91 Time _____ hours
Company Contact Ron Mitchell Telephone (_____) 376-5122

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
B00148	Soil, 60ml amber glass		Total Cyanide and Ferrocyanide
B00149			
B00150			
B00151			
B00152			
B00153			
B00157			
B00158			
B00159			
B00160			
B00161			
B00162			
B00163			
B00165			
B00166			
B00171			
B00175			
B00176			

Field Information** N/A

Special Handling and/or Storage N/A

Possible Sample Hazards N/A

PART II: LABORATORY SECTION

Received by MW Title Thom Lead Date 4/1/91
Analysis Required _____

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

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

B01-006

9613497-2301

Westinghouse Hanford Company

CHAIN OF CUSTODY

Study Form Initiator C.E. Heiden

Company Contact Ren Mitchell Telephone 376-3640

Project Designation/Sampling Locations 90-PP-1 Collection Date 3-29-91, 4-1-91
Near Surface Soil Sampling Project # 91-020

Ice Chest No. N/A Field Logbook No. —

Bill of Lading/Airbill No. N/A Offsite Property No. N/A

Method of Shipment DOE vehicle

Shipped to PNL-325 (300 Area)

Possible Sample Hazards/Remarks N/A

Sample Identification

<u>B0048</u>		<u>B00461</u>	
<u>B0049</u>		<u>B00462</u>	
<u>B0050</u>		<u>B00463</u>	
<u>B0051</u>		<u>B00465</u>	
<u>B0052</u>	} soil, 60ml amber glass jars	<u>B00466</u>	} soil, 60 ml amber glass jars
<u>B0053</u>		<u>B00471</u>	
<u>B0057</u>		<u>B00475</u>	
<u>B0058</u>		<u>B00476</u>	
<u>B0059</u>			
<u>B0060</u>			

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

Relinquished by: <u>C.E. Heiden</u> <u>C.E. Heiden</u>	Received by: <u>Ren Mitchell</u>	Date/Time: <u>4/4/91 14:05</u>
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: B01-007

SAMPLE RECEIPT FORM

Delivered by: Ken [unclear] Date/Time: 2.2.91 14:05

Received by: MW Urie

Customer Sample Number(s): B00J48 *others see back*

ALO Sample Number(s): 91-2828 *18 samples*

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

2. Additional Shipping Forms (list):
ARF

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).

*Ice in chest but samples packed improperly
Ice in bag on top of samples - did not know where to
take temp readings*

6. Condition of Sample Vials.
GOOD

7. Verification of Agreement or Nonagreement of Information on Receiving Documents.
Agree with Rec. Doc.

8. Resolution of Problems or Discrepancies.
Informed shippers of proper ice packing -
Validity of samples must be negotiated -

RETURN COMPLETED FORM TO PROJECT MANAGER

Sample ID

Log #

B 00J49	91-2828	91-2829	30
50	30		31
51	30		32
52	31		33
53	32		34
57	33		35
58	34		36
59	35		37
60	36		38
61	37		39
62	38		40
63	39		41
65	40		42
66			43
71			44
75			
76		90-2845	

9613497.2304

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

B02-002

9613497.2305

DON'T SAY IT --- Write It!

DATE: January 26, 1993

TO: File B00X32-PNL-019
B00X39-PNL-018
B00X94-PNL-020
B00XB0-PNL-021
B015M8-PNL-023
B00XC8-PNL-022

FROM: S.D.L.A.

Telephone: 2-3206

CC:

SUBJECT:
VALIDATION DOCUMENTATION

Validation documentation for the above mentioned data package is filed with Data Package B00J48-PNL-017.

9613497.2306

Report To

**Westinghouse Hanford Company
Richland, Washington**

**Data Validation Report
200-BP-1 RI/FS**

**Data Package: B00J48-PNL-017, B00X32-PNL-019,
B00X39-PNL-018, B00X94-PNL-020, B00XB0-PNL-021,
B015M8-PNL-023, B00XC8-PNL-022**

**Matrix: Soil/Water
Analysis Type: Cyanide**

Prepared By

**Golder Associates Inc.
Redmond, Washington**

August 14, 1992

913-1719

TABLE OF CONTENTS

	<u>Page No.</u>
1. INTRODUCTION	1
2. DATA QUALITY OBJECTIVES	1
3. QUALIFIED DATA	3
3.1 Major Deficiencies	3
3.2 Minor Deficiencies	3
4. CONCLUSIONS	4
5. REFERENCES	5

LIST OF APPENDICES

APPENDIX A	As-Qualified Data Summary
APPENDIX B	Data Review Supporting Documentation, SDG B00J48-PNL-017
APPENDIX C	Data Review Supporting Documentation, SDG B00X32-PNL-019
APPENDIX D	Data Review Supporting Documentation, SDG B00X39-PNL-018
APPENDIX E	Data Review Supporting Documentation, SDG B00X94-PNL-020
APPENDIX F	Data Review Supporting Documentation, SDG B00XB0-PNL-021
APPENDIX G	Data Review Supporting Documentation, SDG B015M8-PNL-023
APPENDIX H	Data Review Supporting Documentation, SDG B00XC8-PNL-022

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 and field QC associated with this group by SDG are:

<u>Data Package ID</u>	<u>HEIS Sample Numbers</u>	<u>Matrix</u>
B00J48-PNL-017	B00J48, B00J49, B00J50, B00J51, B00J52, B00J53, B00J57, B00J58, B00J59, B00J60, B00J61, B00J62, B00J63, B00J65, B00J66, B00J71, B00J75, B00J76	Soil
B00X32-PNL-019	B00X32, B00X58, B00X62, B00X60	Soil
B00X39-PNL-018	B00X39, B00X40, B00X43 B00X33, B00X34, B00X47, B00X44, B00X42	Water Soil
B00X94-PNL-020	B00X94, B00X96, B00X98	Soil
B00XB0-PNL-021	B00XB0, B00XB2, B00XB4, B00XB6, B00XC2, B00XB8, B00XC4, B00XC6	Soil
B015M8-PNL-023	B015M8, B015M9, B015N2, B015N4, B015N6, B015N8	Soil
B00XC8-PNL-022	B00XC8, B00XD0, B00X80, B00XD2, B00XD4, B00XD6, B00XD8, B00X86	Soil/Water

Sample identifications, locations and sample dates are provided in the tabular data summary provided in Attachment 3. 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

Completeness

The data package was complete for all requested analyses and met the data quality objectives of the work plan with the exception of SDG B00J48-PNL-017. Data quality objectives for the project specified the use of method PNL-ALO-270, cyanide analysis by distillation/colorimetry, for all samples.

Sample Quantitation Limits

The sample quantitation limits for samples B00X33, B00X34, B00X47 and B00X44 were reported as 0.3 mg/Kg, and B00X39, B00X40, B00X43 and B00X86 were reported as 5.9 ug/L. However, these quantitation limits are not supported by the information supplied in the raw data. Therefore, the reported CRDLs have been corrected to the CLP required quantitation limits of 10 ug/L and 0.5 mg/Kg. The quantitation limits for the soil samples may vary due to the percent solids, since the 0.5 mg/Kg will be divided by the percent solids value.

The quantitation limits for the samples in SDG B00J48-PNL-017 and sample B00X42 in SDG B00X39-PNL-018, which were reported at 0.3 mg/Kg, were not corrected since these sample results have been rejected due to the absence of the raw data.

The sample quantitation limits for the samples not mentioned above were met with the exception of minor differences due to moisture content and dilution factors.

Calculations

The calculations submitted to determine the initial calibration verification (ICVs) concentrations are incorrect for the ICVs associated with the samples in the following SDGs:

- B00X94-PNL-020, B00XB0-PNL-021, B015M8-PNL-023, and B00XC8-PNL-022

The matrix spike recovery values for the following samples were incorrect. The calculation summaries are included in Attachment 4 of the respective SDG.

- SDG B00X32-PNL-019: B00X32 and B00X58
- SDG B00X39-PNL-018: B00X33, B00X47, and B00X42

The percent solids values for the following samples were incorrect. The calculation summaries are included in Attachment 4 of the respective SDG.

- SDG B00X32-PNL-019: B00X62
- SDG B00X39-PNL-018: B00X42
- SDG B00XC8-PNL-022: B00XD4

Laboratory Quality Control Samples

The initial calibration, laboratory control sample, and midrange cyanide were all considered the same sample which is labeled on the report forms as ICV-6.

Field Quality Control Samples

Trip Blanks and Field Blanks

Samples B00X39 and B00X43 in SDG B00X39-PNL-018 were identified as a trip blank and a field blank, respectively. Cyanide was not detected in either sample.

Equipment Blanks

Samples B00X40 in SDG B00X39-PNL-018 and B00X86 in SDG B00XC8-PNL-022 were identified as equipment blanks. Cyanide was not detected in either sample.

Field Duplicates

Samples B00X47 and B00X44 in SDG B00X39-PNL-018, B015N2 and B015N4 in SDG B015M8-PNL-023, and samples B00XD6 and B00XD8 in SDG B00XC8-PNL-022 were identified as field duplicates. However, all sample results were below the quantitation limit and therefore the relative percent differences were not determined.

The sample descriptions for all the samples included in SDG B00J48-PNL-017 were not available, therefore, the locations are not listed in the qualified data summary contained in Appendix A.

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

The following presents a summary of the rejected data.

The eighteen samples in SDG B00J48-PNL-017 and B00X42 in SDG B00X39-PNL-018 have been rejected since the cyanide raw data is absent from the data package and therefore cannot be validated.

3.2 Minor Deficiencies

The following qualifications were required as a result of the validation. Attachment 2 provides a summary of the samples affected.

Holding Times

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

- SDG B00X39-PNL-018: B00X42

The associated sample result has already been rejected due to an incomplete data package and therefore, further qualification is not required.

Initial Calibration

The following initial calibration recoveries exceeded the QC limits of 90% to 110%:

- SDG B00X32-PNL-019: B00X32, B00X58, and B00X62
- SDG B00X39-PNL-018: B00X39
- SDG B00X94-PNL-020: B00X96 and B00X98
- SDG B00XB8-PNL-021: B00XC4 and B00XC6
- SDG B015M8-PNL-023: B015N2 and B015N4
- SDG B00XC8-PNL-022: B00XC8, B00XD0, and B00X86

The associated sample results have been qualified as estimated (UJ).

Completeness

The percent solids worksheet for sample B00X94 in SDG B00X94-PNL-020 was not included in the data package and the value could not be confirmed. Therefore, the sample result was qualified as estimated (UJ).

Sample B015M9 was reported and the calculations were included in the data package, however, the narrative states that this sample is not part of the SDG. Since the chain of custody was absent from the data package, the holding time could not be determined. The sample result for total cyanide is 14 mg/Kg which requires free cyanide analysis. However, neither the free cyanide nor complexed cyanide was performed. The sample result has been qualified as estimated (J).

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 with the exception of the major deficiencies as reported in Section 3.1.

The appendices provide supporting documentation and tabular summary of the qualified data. The original, as-received data package is enclosed for submittal to the project QA record.

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.

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APPENDIX A
AS QUALIFIED DATA SUMMARY

LABORATORY: BATELLE-PACIFIC NORTHWEST LABORATORIES

SAMPLE DELIVERY GROUP	SAMPLE NUMBER	SAMPLE LOCATION/PURPOSE	SAMPLE DATE	TOTAL CYANIDE Q	FREE CYANIDE Q	COMPLEX CYANIDE Q	SAMPLE UNITS
B00J48-PNL-017	B00J48	---	04/01/92	0.3 R	---	---	mg/Kg
	B00J49	---	04/01/92	0.3 R	---	---	mg/Kg
	B00J50	---	04/01/92	0.3 R	---	---	mg/Kg
	B00J51	---	04/01/92	0.3 R	---	---	mg/Kg
	B00J52	---	04/01/92	0.3 R	---	---	mg/Kg
	B00J53	---	04/01/92	0.3 R	---	---	mg/Kg
	B00J57	---	04/01/92	0.3 R	---	---	mg/Kg
	B00J58	---	04/01/92	0.3 R	---	---	mg/Kg
	B00J59	---	04/01/92	0.3 R	---	---	mg/Kg
	B00J60	---	04/01/92	0.3 R	---	---	mg/Kg
	B00J61	---	04/01/92	0.3 R	---	---	mg/Kg
	B00J62	---	04/01/92	0.3 R	---	---	mg/Kg
	B00J63	---	04/01/92	0.3 R	---	---	mg/Kg
	B00J65	---	04/01/92	0.3 R	---	---	mg/Kg
	B00J66	---	04/01/92	0.3 R	---	---	mg/Kg
	B00J71	---	04/01/92	0.3 R	---	---	mg/Kg
B00J75	---	04/01/92	0.3 R	---	---	mg/Kg	
B00J76	---	04/01/92	0.3 R	---	---	mg/Kg	
B00X32-PNL-019	B00X32	216-B-57A 1.6-2.9	06/25/91	0.6 UJ	---	---	mg/Kg
	B00X58	216-B-57A 7.5-9.5	06/27/91	0.6 UJ	---	---	mg/Kg
	B00X62	216-B-57A 15.0-17.0	07/01/91	0.6 UJ	---	---	mg/Kg
	B00X60	216-B-57A 26.5-29.0	07/08/91	0.6 U	---	---	mg/Kg
B00X39-PNL-018	B00X39	216-B-61A TRIP BLANK	05/10/91	10.0 UJ	---	---	ug/L
	B00X40	216-B-61A EQUIP. BLANK	05/13/91	10.0 U	---	---	ug/L
	B00X43	216-B-61A FIELD BLANK	05/15/91	10.0 U	---	---	ug/L
	B00X33	216-B-61A 0.0-2.5	05/09/91	0.5 U	---	---	mg/Kg
	B00X34	216-B-61A 6.0-8.0	05/09/91	0.5 U	---	---	mg/Kg
	B00X47	216-B-61A 23.0-25.3 DUP	05/16/91	0.5 U	---	---	mg/Kg
	B00X44	216-B-61A 23.0-25.3 DUP	05/16/91	0.5 U	---	---	mg/Kg
	B00X42	216-B-61A 13.8-16.6	05/14/91	0.3 R	---	---	mg/Kg
B00X94-PNL-020	B00X94	216-B-57A 195.0-197.5	08/16/91	0.6 UJ	---	---	mg/Kg
	B00X96	216-B-57A 225.0-227.5	08/21/91	0.6 UJ	---	---	mg/Kg
	B00X98	216-B-57A 233.0-235.5	08/22/91	0.6 UJ	---	---	mg/Kg
B00XB0-PNL-021	B00XB0	216-B-57C 2.0-5.0	08/30/91	0.6 U	---	---	mg/Kg
	B00XB2	216-B-57C 9.0-12.0	09/03/91	0.6 U	---	---	mg/Kg

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LABORATORY: BATELLE-PACIFIC NORTHWEST LABORATORIES

SAMPLE DELIVERY GROUP	SAMPLE NUMBER	SAMPLE LOCATION/PURPOSE	SAMPLE DATE	TOTAL CYANIDE Q	FREE CYANIDE Q	COMPLEX CYANIDE Q	SAMPLE UNITS
B00XB0-PNL-021	B00XB4	216-B-57C 18.5-20.0	09/05/91	0.6 U	---	---	mg/Kg
	B00XB6	216-B-57C 30.0-33.0	09/05/91	0.6 U	---	---	mg/Kg
	B00XC2	216-B-57C 47.0-50.0	09/06/91	0.6 U	---	---	mg/Kg
	B00XB8	216-B-49A 25.0-27.5	09/06/91	0.8 B	---	---	mg/Kg
	B00XC4	216-B-57B 2.0-4.5	09/13/91	0.6 UJ	---	---	mg/Kg
	B00XC6	216-B-57B 9.0-12.0	09/13/91	0.6 UJ	---	---	mg/Kg
B015M8-PNL-023	B015M8	216-B-49B 27.0-29.5	11/20/91	0.6 U	---	---	mg/Kg
	B015M9	216-B-49B 17.0-19.5	---	14 J	---	---	mg/Kg
	B015N2	216-B-46A 3.0-6.0 DUP	12/02/91	0.6 UJ	---	---	mg/Kg
	B015N4	216-B-46A 3.0-6.0 DUP	12/02/91	0.6 UJ	---	---	mg/Kg
	B015N6	216-B-46A 8.0-10.5	12/02/91	0.6 U	---	---	mg/Kg
	B015N8	216-B-46A 15.0-17.5	12/03/91	0.6 U	---	---	mg/Kg
B00XC8-PNL-022	B00XC8	216-B-57B 17.0-18.0	09/16/91	0.6 UJ	---	---	mg/Kg
	B00XD0	216-B-57B 27.0-29.5	09/16/91	0.6 UJ	---	---	mg/Kg
	B00X80	216-B-49A 46.5-49.0	09/19/91	4.4	0.6 B	3.8	mg/Kg
	B00XD2	216-B-57B 31.0-34.0	09/18/91	0.6 U	---	---	mg/Kg
	B00XD4	216-B-57B 47.0-50.0	09/19/91	0.6 U	---	---	mg/Kg
	B00XD6	216-B-49A 75.0-77.5 DUP	09/25/91	0.6 U	---	---	mg/Kg
	B00XD8	216-B-49A 75.0-77.5 DUP	09/25/91	0.64 B	---	---	mg/Kg
	B00X86	216-B-49A EQUIP. BLANK	09/25/91	10.0 UJ	---	---	ug/L

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APPENDIX B

DATA REVIEW SUPPORTING DOCUMENTATION

SDG: B00J48-PNL-017

**Samples: B00J48, B00J49, B00J50, B00J51, B00J52,
B00J53, B00J57, B00J58, B00J59, B00J60, B00J61, B00J62,
B00J63, B00J65, B00J66, B00J71, B00J75, B00J76**

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.

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ATTACHMENT 2
SUMMARY OF DATA QUALIFICATIONS

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ATTACHMENT 3

AS QUALIFIED LABORATORY DATA

TABLE 2: TOTAL CYANIDE ANALYSIS DATA FOR TASK 3
SDG #1

SDG 800548-PNL-017

SOIL SAMPLES

Sample ID#	PNL Log#	G1 Sample (mg/Kg)	C	G2 Sample dup.(mg/Kg)	C	XRPD	G5 Blank (ug/L)	C	G3 Sample+ spike(mg/Kg)	G4 - LCS (mg/Kg)	G3 Sample+ spike recovery (%)	G4 - LCS sample recovery (%)	Flags Q	Footnote#
B00J48	91-2828	0.3	H	R	0.3	U	N/A	5.9	U	12	6.58	101.2	117	1,2,3 (ALL)
B00J49	91-2829	0.3	H	R										
B00J50	91-2830	0.3	H	R	0.3	U	N/A	5.9	U	12.2	5.84	102.4	103.9	
B00J51	91-2831	0.3	H	R										
B00J52	91-2832	0.3	H	R	0.3	U	N/A	5.9	U	12.5	6	101.5	106.7	
B00J53	91-2833	0.3	H	R										
B00J57	91-2834	0.3	H	R	0.3	U	N/A	5.9	U	11.9	6.12	100.7	108.9	
B00J58	91-2835	0.3	H	R										
B00J59	91-2836	0.3	H	R	0.3	U	N/A	5.9	U	11.0	5.6	97.8	99.6	
B00J60	91-2837	0.3	H	R										
B00J61	91-2838	0.3	H	R	0.3	U	N/A	5.9	U	11.8	6.65	109.3	118.4	
B00J62	91-2839	0.3	H	R										
B00J63	91-2840	0.3	H	R	0.3	U	N/A	5.9	U	11.9	6.53	97.7	116.1	
B00J65	91-2841	0.3	H	R										
B00J66	91-2842	0.3	H	R	0.3	U	N/A	5.9	U	11.5	6.77	103.2	120.4	
B00J71	91-2843	0.3	H	R										
B00J75	91-2844	0.3	H	R	0.3	U	N/A	5.9	U	10.9	5.72	97.8	101.9	
B00J76	91-2845	0.3	H	R										
											Mean	101.3	110.3	
											Std. Dev.	3.4	7.4	

1. Concentration of soil LCS-0689=5.62 mg/Kg(1-1.5g of LCS-0689 is added to each distillation flask and recovered in 250 mL of NaOH).
2. Concentration of spike added = 90.6 ug/L.
3. Contract required detection limit for soil = 0.5 mg/Kg.

CLP "Q" FLAGS

U = Analyzed but not detected (IDL or less than IDL)

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ATTACHMENT 4

DATA VALIDATION SUPPORTING DOCUMENTATION

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WET CHEMISTRY DATA VALIDATION CHECKLIST - FORM A-7

PROJECT: 200-BP-1	REVIEWER: <i>[Signature]</i>	DATE: 8/7/92
LABORATORY: PNL	CASE:	SDG: 800348-PNL-017
SAMPLES/MATRIX: 800348, 800349, 800350, 800351,		
800352, 800353, 800357, 800358, 800359,		
800360, 800361, 800362, 800363, 800365,		
800366, 800371, 800375, 800376 / Soils		

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 type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample Analysis Data Report Forms <i>pg 7 of report</i>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Standards Data		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
QC Summary		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Blanks Summary Report Forms		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Spike Sample Recovery Report Forms		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Duplicate Sample Analysis Report Forms		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Laboratory Control Sample Report Forms		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Raw Data		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ion Chromatograph Chromatograms		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
TOC and TOX Instrument Printouts		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Laboratory Bench Sheets		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Additional Data		<input type="checkbox"/>	<input 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 type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Chemist Notebook Pages		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

The sample results in this SDG have been rejected due to the absence of all supporting raw data.

2. HOLDING TIMES

Were all samples analyzed within holding times?

~~Yes No N/A~~

See comments

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).

see comments
8/17/92

See comments
 (P) 8/7/19

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?

See comments
Yes No N/A

Are instrument detection limits below the CRDL?

~~Yes No N/A~~

8/7

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):

The certification for this document was not signed by the 200-PP-1 Project Manager at PNL (B.M. Gillespie).

① The reported results (Table 2 on page 7) are the assoc. sample results for CN.

The raw data submitted with this data package is for total organic carbon, not cyanide. The raw data is also not associated with the samples in this SDG.

The chain of custody form was included in this data package and the request for analysis was total ~~free~~ and ~~ferrocyanide~~. The report Table 2 (page 7) includes the CN results for these samples; however, there is not any raw data to verify the reported results.

Therefore, all CN results in this SDG were rejected due to insufficient raw data.

The doc states the date of collection as 2/29/91 & 4/11/91, however, the actual doc of each sample was not specified.

8/2/91

HOLDING TIME SUMMARY - FORM B-1

800348-PNL-017

SDG: REVIEWER: *[Signature]* DATE: 8/11/92 PAGE 1 OF 2

COMMENTS: Cyanide Holding Time

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
800348	CN	4/01/91	Not included in package	Not included in package		All raw data is missing	R
800349		4/01/91					
800350		4/01/91					
800351		4/01/91					
800352		4/01/91					
800353		4/01/91					
800357		4/01/91					
800358		4/01/91					
800359		4/01/91					
800360		4/01/91					
800361		4/01/91					
800362		4/01/91					
800363		4/01/91					
800365		4/01/91					
800366		4/01/91					
800371	∇	4/01/91	∇	∇		∇	∇

B-1

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

APPENDIX C

DATA REVIEW SUPPORTING DOCUMENTATION

SDG: B00X32-PNL-019

Samples: B00X32, B00X58, B00X62, B00X60

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.

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ATTACHMENT 2
SUMMARY OF DATA QUALIFICATIONS

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ATTACHMENT 3
AS QUALIFIED LABORATORY DATA

SOG B00X32-PNL-019
SOIL-SEDIMENT SAMPLES

TABLE 2: TOTAL CYANIDE ANALYSIS DATA FOR TASKS 2 AND 4
SDG #2

Sample ID#	PNL Log#	G1 Sample (mg/kg)	C	G2 Sample dup. (mg/kg)	C	XRPD	G5 Blank (ug/L)	C	G3 Sample+ spike (mg/kg)	G4 - ICV (mg/L)	G3 Sample+ spike recovery (%)	G4 - ICV sample recovery (%)	Flags	Footnote#
B00X32	91-6173	0.6	U	0.6	U	N/A	5.9	U	9.0	11.05	105.3 107.6	117.5	⊗ 8/10/92	1,2,3,4 (ALL)
B00X58	91-6301	0.6	U	0.6	U	N/A	5.9	U	8.3	10.39	96.0 99.5	110.5	⊗ 8/10/92	
B00X62	91-6339	0.6	U											
B00X60	91-6395	0.6	U	0.6	U	N/A	5.9	U	8.9	9.58	107.5	101.9		
Mean											104.9	110.0		
Std. Dev.											3.8	6.4		

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. Spike added = 41.6 ug.
3. Contract required detection limit for soil-sediment = 1.0 mg/kg.
4. Duplicate precision under the CLP protocol must be within one CRDL when either sample or duplicate are below 5X CRDL.

CLP "Q" FLAGS

U = Analyzed but not detected (less than IDL)

Sample locations

B00X32 216-B-57A 1.6-2.9'
B00X58 216-B-57A 7.5-9.5'
B00X62 216-B-57A 15.0-17.0'
B00X60 216-B-57A 26.5-29.0'

[Signature]
8/10/92

9613197-2355

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ATTACHMENT 4

DATA VALIDATION SUPPORTING DOCUMENTATION

9613497.2337

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

WET CHEMISTRY DATA VALIDATION CHECKLIST - FORM A-7

BOOK32-PNL-019

PROJECT: 200-RR-1	REVIEWER: [Signature]	DATE: 8/10/92
LABORATORY: PNL	CASE: NIA	SDG: BOOK32-PNL-019
SAMPLES/MATRIX: BOOK32, BOOK58, BOOK62, BOOK60/Soils		

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	ITC-6	✓	—	—
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).

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

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~~ ^{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? *ICU*

Yes No N/A

Are there calculation errors? *20%*

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): _____

The CCV was not performed since all sample size contained less than 10 samples.

Since all sample results were non-detects, the free CN analysis was not performed.

Allen K
8/10/13

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CALCULATION SUMMARY - FORM B-6

B00X32

SDG:	REVIEWER: <i>[Signature]</i>	DATE: 8/10/92	PAGE 1 OF 2
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COMMENTS:

$$MS\%R = \frac{CN^{spiked} \text{ in Sample (mg/kg)} - CN \text{ in original sample} \times 100}{\left(\frac{CN \text{ spike added}}{\text{sample wt} \cdot \% \text{ solids}} \right) \times 100}$$

B00X32

$$MS\%R = \frac{9.02 - \phi}{\left(\frac{41.63}{(5.0075)(0.9701)} \right)} \times 100 = 105.25\% \approx 105\%$$

B00X58

$$MS\%R = \frac{8.29 - \phi}{\left(\frac{41.63}{(5.0097)(0.9621)} \right)} \times 100 = 96\%$$

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

CALCULATION SUMMARY - FORM B-6

BOOK 32-PNL-019

SDG:	REVIEWER: <i>J. White</i>	DATE: 8/10/92	PAGE 2 OF 2
COMMENTS:			
Sample Book 32			
Percent Solids			
= $\frac{\text{Dry Sample wt (g)}}{\text{Wet Sample wt (g)}} \times 100$			
$\text{Dry Sample wt} = (\text{Cucurible + Dry Sample}) - (\text{Cucurible})$ $\text{Wet Sample wt} = (\text{Cucurible + Wet Sample}) - (\text{Cucurible})$			
Book 32			
$\text{Dry Sample wt} = 33.5344 - 24.1592 = 9.3752$ $\text{Wet Sample wt} = 34.1688 - 24.1592 = 10.0096$			
$\% \text{ Solids} = \frac{9.3752}{10.0096} \times 100 = 93.66\%$			
$\text{Average } \% \text{ Solids} = \frac{\% \text{ Solids (1)} + \% \text{ Solids (2)}}{2}$			
$= \frac{93.66 + 94.18}{2} = 93.92\%$			

APPENDIX D

DATA REVIEW SUPPORTING DOCUMENTATION

SDG: B00X39-PNL-018

**Samples: B00X39, B00X40, B00X43,
B00X33, B00X34, B00X47, B00X44, B00X42**

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.

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ATTACHMENT 2
SUMMARY OF DATA QUALIFICATIONS

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ATTACHMENT 3

AS QUALIFIED LABORATORY DATA

SOG: BOOK39-PNL-018

TABLE 2: TOTAL CYANIDE ANALYSIS DATA FOR TASKS 2 AND 4
SDG #1

WATER SAMPLES

Sample ID#	PNL Log#	G1 Sample (g/L)	C	G2 Sample dup. (ug/L)	C	XRPD	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#	
BOOK39	91-4321	10 5.9	✓	4.5	5.9	U	N/A	5.9	U	166.6	10.41	99.7	110.7		1,2,3,4 (ALL)
BOOK40	91-4584	10 5.9	U	5.9	U	N/A	5.9	U	176.8	10.29	105.6	109.5			
BOOK43	91-4694	10 5.9	U												
											Mean	102.7	110.1		
											Std. Dev.	4.2	0.8		

⊗ skllg2

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. Quantity of cyanide spike added = 41.6 ug
3. Contract required detection limit for water = 10 ug/L.
4. Duplicate precision under the CLP protocol must be within one CRDL when either sample or duplicate are below 5X CRDL.

SOIL SAMPLES

Sample ID#	PNL Log#	G1 Sample (mg/Kg)	C	G2 Sample dup. (mg/Kg)	C	XRPD	G5 Blank (ug/L)	C	G3 Sample+ spike (mg/Kg)	G4 - ICV (mg/L)	G3 Sample+ spike recovery (%)	G4 - ICV sample recovery (%)	Flags Q	Footnote#	
BOOK33	91-4322	0.52 0.3	U	0.3	U	N/A	5.9	U	8.91	9.53	103.9 106.7	101.3	⊗ skllg2	1,2,3,4 (ALL)	
BOOK34	91-4323	0.52 0.3	U												
BOOK47	91-4760	0.51 0.3	U	0.3	U	N/A	5.9	U	8.84	9.9	103.4 106.6	105.3	⊗ skllg2		
BOOK44	91-4759	0.52 0.3	U												
BOOK42	91-4695	0.3	✓ R	0.3	U	N/A	5.9	U	8.54 8.56	10.11	97.9 103.4	107.6	⊗ skllg2		
											Mean	105.6	104.7		
											Std. Dev.	1.9	3.2		

⊗ skllg2

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. Quantity of cyanide spike added = 41.6 ug
3. Contract required detection limit for soil = 5 mg/Kg.
4. Duplicate precision under the CLP protocol must be within one CRDL when either sample or duplicate are below 5X CRDL.

CLP "Q" FLAGS

U = Analyzed but not detected (IDL or less than IDL)

Sample Locations

BOOK39	216-B-61A	Tr. p. Blank	BOOK47	216-B-61A	23.0-25.3' ap.
BOOK40	216-B-61A	Eq. p. Blank	BOOK44	216-B-61A	23.0-25.3' ap.
BOOK43	216-B-61A	Field Blank			
BOOK33	216-B-61A	0-2.5'	BOOK42	216-B-61A	13.8-16.6
BOOK34	216-B-61A	6.0-8.0'			

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8/10/92

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ATTACHMENT 4

DATA VALIDATION SUPPORTING DOCUMENTATION

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WET CHEMISTRY DATA VALIDATION CHECKLIST - FORM A-7

PROJECT: 200-BP-1	REVIEWER: <i>[Signature]</i>	DATE: 8/10/92
LABORATORY: PNL	CASE: NIA	SDG: B00X39-PNL-018
SAMPLES/MATRIX: B00X39, B00X40, B00X43 / <i>Water</i>		
B00X33, B00X34, B00X42, B00X44, B00X47 / <i>Soil</i>		

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 (ICV)		<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 <i>No Free on req'd.</i>		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
TOC and TOX Instrument Printouts		<input 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 type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Laboratory Sample Preparation Logs <i>See comments</i>		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Instrument Run Logs		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Internal Laboratory Chain-of-Custody		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Percent Solids Analysis Records		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reduction Formulae		<input checked="" type="checkbox"/>	<input checked="" 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).

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

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 ^{10/10/92}CCV been analyzed at the proper frequency?

Yes No N/A

Are ICV and CCV percent recoveries within control?

CCV was not performed, less than 10 samples were analyzed at one time. 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? (ICV=6) 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?

8/11/92
 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?

w/ the exception of raw data missing for Box 42. 8/11/92

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):

Since all sample results for total CN were below the reporting limit, the Free CN analysis was not performed.

This data package is missing the sample prep and total CN data sheets for sample B00X42. The data sheets for B00X60 were submitted instead, however B00X60 is not a designated sample in this SOR. Since the sample results for B00X42 cannot be validated, the sample result has been rejected.

Samples B00X39, ~~B00X40~~ ^{was identified} as a trip blank, B00X40 as an equipment blank, and B00X43 as a field blank. All samples results were non-detects.

Samples B00X47 and B00X44 were identified as field duplicates. Since both results were non-detects, the RPD was not calculated.

HOLDING TIME SUMMARY - FORM B-1

BOOK39-PNL-018

SDG: REVIEWER: *[Signature]* DATE: 08/10/92 PAGE 1 OF 1

COMMENTS: *Cygnide Holding Times*

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
BOOK39	CN	5/10/91	5/14/91	5/15/91		5	none
BOOK33		5/09/91	5/13/91	5/15/91		6	
BOOK34		5/09/91	5/13/91	5/15/91		6	
BOOK40		5/13/91	5/16/91	5/20/91		7	
BOOK43		5/15/91	5/16/91	5/20/91		5	↓
BOOK42		5/14/91	6/11/91	6/11/91		28	US
BOOK44		5/16/91	5/20/91	5/21/91		5	none
BOOK47	↓	5/16/91	5/20/91	5/21/91		5	↓

9613497-2358
 WHC-SD-EN-SPP-002, Rev. 1

B-1

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

CALCULATION SUMMARY - FORM B-6

BOOK39-PNL-018

SDG:	REVIEWER: <i>J. White</i>	DATE: 8/07/92	PAGE 1 OF 3
COMMENTS:			
Drop			
Percent Solids Avg = $\frac{\% \text{ Solids}_1 + \% \text{ Solids}_2}{2}$			
Sample BOOK 42			
$\% \text{ Solids Avg} = \frac{95.39 + 95.37}{2} = \boxed{95.38\%}$			
BOOK 42 MS			
CN Result = $\frac{\text{total CN recovered (ug)}}{(\text{sample wt g}) \left(\frac{\% \text{ Solids}}{100} \right)} = \frac{\text{mg CN}}{\text{Kg}}$			
= $\frac{40.75 \text{ ug}}{(5.0012)(0.9538)} = 8.54 \text{ mg/Kg}$			

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

CALCULATION SUMMARY - FORM B-6

B00X39-PNL-018

SDG:	REVIEWER: <i>J. White</i>	DATE: 8/7/92	PAGE 2 OF 3
COMMENTS:			
2 nd Spike Recovery			
$= \frac{\text{Sample result (mg/kg)} \times 100}{\left(\frac{\text{ug CN spike added}}{(\text{Sample wt g}) \left(\frac{\% \text{ solids}}{100} \right)} \right)}$			
Sample B00X33			
$\text{MSR} = \frac{8.91}{\left(\frac{41.63}{(5.0017)(0.9702)} \right)} \times 100 = 103.86 \approx 103.9\%$			
Sample B00X44 47 @ 8/11/92			
$\text{MSR} = \frac{8.84}{\left(\frac{41.63}{(5.0086)(0.9720)} \right)} \times 100 = 103.38 \approx 103.4\%$			
Sample B00X42 @ 8/17/92			
$\text{MSR} = \frac{(8.56)(8.54)}{\left(\frac{41.63}{(5.0012) \left(\frac{95.38}{100} \right)} \right)} \times 100 = 97.886 \approx 97.9\%$			

CALCULATION SUMMARY - FORM B-6

BOOK39-PNL-018

SDG:	REVIEWER: <i>J. White</i>	DATE: 8/11/92	PAGE 3 OF 3
COMMENTS:			
CROL Soils = $\frac{0.5 \text{ mg/kg}}{\left(\frac{2 \text{ Solids}}{100}\right)}$			
Sample BOOK33			
CROL = $\frac{0.5}{(0.9702)} = 0.5154 \approx 0.52 \text{ mg/kg}$			
Sample BOOK34			
CROL = $\frac{0.5}{0.969} = 0.5160 \approx 0.52 \text{ mg/kg}$			
Sample BOOK47			
CROL = $\frac{0.5}{0.972} = 0.5144 \approx 0.51 \text{ mg/kg}$			
Sample BOOK44			
CROL = $\frac{0.5}{0.9699} = 0.5155 \approx 0.52 \text{ mg/kg}$			

APPENDIX E

DATA REVIEW SUPPORTING DOCUMENTATION

SDG: B00X94-PNL-020

Sample: B00X94, B00X96, B00X98

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.

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ATTACHMENT 2
SUMMARY OF DATA QUALIFICATIONS

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ATTACHMENT 3
AS QUALIFIED LABORATORY DATA

SOG:

BOOK 94-PNL-020

TABLE 2: TOTAL CYANIDE ANALYSIS DATA FOR TASKS 2 AND 4
SDG #5

SOIL-SEDIMENT SAMPLES

Sample ID#	PNL Log#	Sample G1 (mg/kg)	C	Sample dup. G2 (mg/kg)	C	XRPD	Blank G5 (ug/L)	C	Spike added (ug)	Sample+ spike G3 (mg/kg)	sample G4 (ICV) (mg/L)	Sample+ spike G3 recovery(%)	sample G4 (ICV) recovery(%)	Flags	Footnote#
BOOK72	* 91-7504	0.6	U	0.6	U	N/A	5.9	U	39.5	8.1	10.27	99	109		1,2,3 (ALL)
BOOK94	91-8352	0.6	U												
BOOK96	91-8615	0.6	U	0.6	U	N/A	5.9	U	39.5	7.9	10.96	98	117		
BOOK98	91-8616	0.6	U												
												Mean	98.5	113	
												Std. Dev.	0.5	4	

* = Not a sample in this sample delivery group but reported for QC purposes.

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 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.

CLP FLAGS

U = Analyzed but not detected (less than IDL)

Sample Locations

BOOK 94	216-B-57A	195.0-197.5
BOOK 96	216-B-57A	225.0-227.5
BOOK 98	216-B-57A	233.0-235.5

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8/10/92

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ATTACHMENT 4

DATA VALIDATION SUPPORTING DOCUMENTATION

9613497.2370

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

WET CHEMISTRY DATA VALIDATION CHECKLIST - FORM A-7

PROJECT: 200-BP-1	REVIEWER: [Signature]	DATE: 8/10/92
LABORATORY: W PNL	CASE: NIA	SDG: B00X94-PNL-020
SAMPLES/MATRIX: B00X94, B00X96, B00X98 / Soils		

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	ICV	✓		
Raw Data				
Ion Chromatograph Chromatograms	No FCC CU req'd.			✓
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	see comments	✓		✓
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).

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

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).

9613497 2372

8. LABORATORY CONTROL SAMPLE

Are percent recoveries within the acceptance limits? ^{±20%} ~~ICV~~ 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.

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

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):

Since all the CN results for all three samples are ND, the free cyanide analysis was not performed.

The Percent Solids data is missing for sample B00X94.

The CCV was not performed since all sample runs contained fewer than 10 samples.

W. J. ...
1/10/92

APPENDIX F

DATA REVIEW SUPPORTING DOCUMENTATION

SDG: B00XB0-PNL-021

**Samples: B00XB0, B00XB2, B00XB4, B00XB6,
B00XC2, B00XB8, B00XC4, B00XC6**

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.

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ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

9613497.2381

ATTACHMENT 3
AS QUALIFIED LABORATORY DATA

SDG: BOOXB0-PNL-021

TABLE 2: TOTAL CYANIDE ANALYSIS DATA FOR TASKS 2 AND 4
SDG #6

SOIL-SEDIMENT SAMPLES

Sample ID#	PNL Log#	Sample G1 (mg/kg)	C	Sample dup. G2 (mg/kg)	C	%RPD	Blank G5 (ug/L)	C	Spike added (ug)	Sample+ spike G3 (mg/kg)	sample G4 (ICV) (mg/L)	Sample+ spike G3 recovery(%)	sample G4 (ICV) recovery(%)	Flags	Footnote#
BOOXB0	91-9289	0.6	U	0.6	U	N/A	5.9	U	38.8	7.2	9.75	93	104		1,2,3 (ALL)
BOOXB2	91-9323	0.6	U												
BOOXB4	91-9399	0.6	U	0.6	U	N/A	5.9	U	38.8	7.8	9.4	98	100		
BOOXB6	91-9400	0.6	U												
BOOXC2	91-9479	0.6	U	0.6	U	N/A	5.9	U	38.8	7.6	9.49	99	101		
BOOXB8	91-9480	0.8	B												
BOOXC4	91-9757	0.6	NUS	0.6	U	N/A	5.9	U	38.8	8.1	10.51	103	112		
BOOXC6	91-9758	0.6	NUS												
												Mean	98	104	
												Std. Dev.	3	5	

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 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.

CLP FLAGS

U = Analyzed but not detected (less than IDL)

Sample Locations

BOOXB0	216-B-57C	2.0-5.0
BOOXB2	216-B-57C	9.0-12.0
BOOXB4	216-B-57C	18.5-20.0
BOOXB6	216-B-57C	30.0-33.0
BOOXC2	216-B-57C	47.0-50.0
BOOXB8	216-B-49A	25.0-27.5
BOOXC4	216-B-57B	2.0-4.5
BOOXC6	216-B-57B	9.0-12.0

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9613197-2302

9613497-2383

ATTACHMENT 4

DATA VALIDATION SUPPORTING DOCUMENTATION

WET CHEMISTRY DATA VALIDATION CHECKLIST - FORM A-7

PROJECT: 200-BP-1	REVIEWER: [Signature]	DATE: 8/10/92
LABORATORY: PNL	CASE: NIA	SDG: BOOK80-PNL-021
SAMPLES/MATRIX: BOOK80, BOOK82, BOOK84, BOOK86, BOOK88, BOOK88, BOOK84, BOOK86 / Soil		

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 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 type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Laboratory Sample Preparation Logs		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Instrument Run Logs		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Internal Laboratory Chain-of-Custody		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Percent Solids Analysis Records		<input checked="" type="checkbox"/>	<input 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 ≥ 0.9957 ?

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~~^{estimated} 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? *ICU*
± 20% 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.

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

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.

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

COMMENTS (attach additional sheets as necessary):

CCU was not required since all sample runs contained less than 10 samples.

Free CN was not performed since all sample results were less than 2 mg/kg.

[Signature]
8/10/92

HOLDING TIME SUMMARY - FORM B-1

BOOKBO-PNL-021

SDG: REVIEWER: *[Signature]* DATE: 8/06/92 PAGE 1 OF 1

COMMENTS:

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
BOOKB0	Total CN	08/30/91	9/10/91	9/13/91		14	none
BOOKB2		09/03/91	9/10/91	9/13/91		14	
BOOKB4		09/05/91	9/10/91	9/13/91		8	
BOOKB6		09/05/91	9/10/91	9/13/91		8	
BOOKB8		09/06/91	9/12/91	9/12/91		6	
BOOKC2		09/06/91	9/12/91	9/12/91		6	
BOOKC4		09/13/91	9/17/91	9/18/91		5	
BOOKC6	∇	09/13/91	9/17/91	9/18/91		5	∇

B-1

9613497-2389
WHC-SD-EN-SPP-002, Rev. 1

APPENDIX G

DATA REVIEW SUPPORTING DOCUMENTATION

SDG: B015M8-PNL-023

**Samples: B015M8, B015M9, B015N2,
B015N4, B015N6, B015N8**

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.

9613497.2393

ATTACHMENT 2
SUMMARY OF DATA QUALIFICATIONS

9613497.2395

ATTACHMENT 3

AS QUALIFIED LABORATORY DATA

SOG: B015M8-PNL-023

TABLE 2: TOTAL CYANIDE ANALYSIS DATA FOR TASKS 2 AND 4
SDG #11

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#
B015M8	92-01984	0.6	U	0.6	U	N/A	5.9	U	48.9	10.7	8.63	106	92		1,2,3 (ALL)
B015M9	92-01827	14	J												4
B015N2	92-02224	0.6	U	0.6	U	N/A	5.9	U	48.6	10.2	8.1	100	86		
B015N4	92-02225	0.6	U												
B015N6	92-02226	0.6	U	0.6	U	N/A	5.9	U	48.6	9.5	8.8	94	94		
B015N8	92-02227	0.6	U												
												Mean	100	91	
												Std. Dev.	5	3	

Footnotes

1. Concentration of stock ICV-6=9.4 mg/L (18.4 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.
4. Sample B015M9 is not part of this data package.

Sample Locations

B015M8 216-B-49B 27.0-29.5
 B015M9 216-B-49B 17.0-19.5
 B015N2 216-B-49B^{46A} 3.0-6.0 Soil Duplicate
 B015N4 216-B-46A^{216A1/2} 3.0-6.0 Soil Duplicate
 B015N6 216-B-46A 8.0-10.5
 B015N8 216-B-46A 15.0-17.5

[Signature]
8/10/92

B015M9-2106

9613497.2397

ATTACHMENT 4

DATA VALIDATION SUPPORTING DOCUMENTATION

WET CHEMISTRY DATA VALIDATION CHECKLIST - FORM A-7

PROJECT: 200-RR-1	REVIEWER: <i>[Signature]</i>	DATE: 8/05/91
LABORATORY: PNL	CASE:	SDG: B015M8-PNL-023
SAMPLES/MATRIX: B015M8, B015M9, B015N2, B015N4, B015N6, B015N8 / soils		

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 <i>ICU</i>		<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 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 type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Laboratory Sample Preparation Logs		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Instrument Run Logs		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Internal Laboratory Chain-of-Custody		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Percent Solids Analysis Records		<input type="checkbox"/>	<input 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?

Except B015M9 - see comments.

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 ≥ 0.9957 ?

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

ICV only; CCV was not analyzed.
8/14/92
ICV only

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? *ICU* Yes No N/A

Are there calculation errors? *±20%* 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.

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

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):

The CRC for Sample B015M9 was not included in this data package. The sample results and raw data for B015M9 were included, and yet the narrative states that this sample is not part of this data package - in which case, it should not have been reported under this SDG. Since the date of collection or date of receipt of sample B015M9 is reported on a contractual document, the sample holding time cannot be determined and therefore the result has been qualified as estimated (E).

On the form titled "Report of Analysis for Total Cyanide in Solid Samples", the date Rec'd for B015M8 is recorded as 11/2/91. However, the sample receipt form for this sample is dated 11/11/91 and according to the CRC the date of collection was 11/2/91. Since it appears that the date 11/2/91 is a typographical error, the date was corrected to read 11/11/91.

Sample B015M9 value for CN was 14.0 mg/kg. Free CN is to be analyzed after total CN is found to be ≥ 2 mg/kg. The Free CN analysis was not performed on this sample.

Samples B015N2 and B015N4 were identified as field duplicates. Since both sample results are ND, the RPD has not been calculated.

APPENDIX H

DATA REVIEW SUPPORTING DOCUMENTATION

SDG: B00XC8-PNL-022

Samples: B00XC8, B00XD0, B00X80, B00XD2,
B00XD4, B00XD6, B00XD8, B00X86

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.

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ATTACHMENT 2
SUMMARY OF DATA QUALIFICATIONS

9613497.2409

ATTACHMENT 3
AS QUALIFIED LABORATORY DATA

SOG: BOOXCB-PNL-023 ⁰²² (8/11/92)

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#
BOOXCB	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												
												Mean	97	105	
												Std. Dev.	5	6	

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)
												Mean	96.5	110.2	
												Std. Dev.	0.0	0.0	

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.

Sample Locations

CLP FLAGS

U = Analyzed but not detected (less than IDL)

BOOXCB 216-B-57B 17.0-18.0
 BOOXD0 216-B-57B 27.0-29.5
 BOOXD2 216-B-57B 31.0-34.0
 BOOXD4 216-B-57B 47.0-50.0

BOOX80 216-B-49A 46.5-49.0
 BOOXD6 216-B-49A 75.0-77.5
 BOOXD8 216-B-49A 75.0-77.5
 BOOX86 216-B-49A 75.0-77.5

[Signature]
8/10/92

9613497-2410

TABLE 3: FREE CYANIDE ANALYSIS

SOG: BOOXCB-PNL-~~023~~ ⁰²² 08/14/92

WNC		PNL		J1		J2		--J5--		J3		J4		J6		-----%recovery-----		
Sample ID#	Sample ID#	Sample ug/g	Flags	Sample Duplicate ug/g	XRPD	Matrix Blank ug/L	Sample Spike ug/g	Spike Added ug/g	Control Std. ug/L	Standard Added ug/L	Dup. + Spike ug/L	Spike Added ug/L	J3 Spike Rec.	J6 Dup. + Spike Rec.	J4 Control Std. Rec.	Flags		
BOOX80	91-10484	0.6	B	0.8	39a	0.0	6.1	5.4	35	38			100%	102%	95%			

from 1/29

Sample Location

BOOX80 216-B-49A 46.5-49.0

- J1 = SAMPLE
- J2 = DUPLICATE SAMPLE
- J3 = SPIKE SAMPLE
- J4 = STANDARD
- J5 = METHODS BLANK
- J6 = SPIKE DUPLICATE, IF PERFORMED

CLP Flags
 U = Analyzed but not detected (IDL or less than IDL)
 N = Spiked sample recovery not within control limits

B = < CRDL BUT ≥ IDL

FOOTNOTES:
 a DUPPLICATES WITHIN 1CRDL

b J4: ICV-6 DISTILLED ON 9/30/91
 TRUE VALUE = 37.6 PPB
 AS DETD. BY TOTAL CN GROUP = 38 PPB

pheneltil
 1/27/92

Add, per telecon
 J20 / Phm 1/12
 "Est IDL =
 0.5 ug/g"

[Signature]
 8/10/92

CO4-004 10

96131972

SDG: B00XCB-PNL-023
 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
B00X80 91-10484 8/12/92	4.4	0.6	3.8

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

Sample Location
 216-B-49A
 B00X80 216-B-49A 46.5-49.0
 8/14/92

RESULTS CALCULATED BY

pkneethal 2/1/92

CALCULATIONS CHECKED BY

MW then 2/1/92

8/10/92

005-002

96 149 2412

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ATTACHMENT 4

DATA VALIDATION SUPPORTING DOCUMENTATION

WET CHEMISTRY DATA VALIDATION CHECKLIST - FORM A-7

PROJECT: 200-BP-1	REVIEWER: [Signature]	DATE: 8/10/92
LABORATORY: PNL	CASE: N/A	SDG: B00XCB-PNL-920
SAMPLES/MATRIX: B00XC8, B00XD0, B00XD8, B00XD2, B00XD4, B00XD6, B00XD8 / Soil B00X86 / water		

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	JCN	✓		
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 ^{8/21/92}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? *ICV*

Yes No N/A

Are there calculation errors? *±20%*

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?

8/11/92
 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.

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

COMMENTS (attach additional sheets as necessary):

Sample B00X80 only was analyzed for free cyanide.

CCV was not performed since all sample cans include less than 10 samples.

Samples B00X06 and B00X08 were identified as field duplicates. Since both results were ND, the RPD was not calculated.

Winters
Shelton

HOLDING TIME SUMMARY - FORM B-1

BOOKS - PNL-027

SDG: REVIEWER: *S. White* DATE: *8/10/92* PAGE 1 OF 1

COMMENTS: *Cyanide Holding Time*

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
BOOKB	CN	9/16/91	9/18/91	9/18/91		2	none
BOOKD0		9/16/91	9/18/91	9/18/91		2	
BOOK80		9/19/91	9/23/91	9/24/91		5	
BOOK02		9/18/91	9/23/91	9/24/91		6	
BOOK04		9/19/91	9/23/91	9/24/91		5	
BOOK06		9/25/91	9/30/91	9/30/91		5	
BOOK08		9/25/91	9/30/91	9/30/91		5	
BOOK86	↓	9/25/91	9/27/91	9/30/91		5	↓

B-1

9613497-2419
WHC-SD-EN-SPP-002, Rev. 1

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

CALCULATION SUMMARY - FORM B-6

BOOK 08-PNL-012

SDG:	REVIEWER: <i>[Signature]</i>	DATE: 8/10/92	PAGE 1 OF 1
COMMENTS:			
Percent Solids			
= $\frac{(\text{crucible} + \text{dry wt g}) - \text{Crucible g}}{(\text{crucible} + \text{wet wt g}) - \text{Crucible g}} \times 100$			
BOOK 04 @ 8/10/92			
Sample BOOK 94 % Solids			
= $(34.7904 - 24.0683) \times 100$			
= $\frac{(34.4517 - 24.0683)}{(34.7904 - 24.0683)} = 10.3834 \times 100$			
= $\frac{10.7221}{10.7221} = 96.84\%$			
Average % Solids			
= $\frac{\% \text{ Solids (H}_1) + \% \text{ Solids (H}_2)}{2}$			
= $\frac{96.84 + 96.99}{2} = 96.92\% = \% \text{ Solids Avg.}$			