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200-BP-1 SITE INVESTIGATION
ANALYTICAL CHEMISTRY SUPPORT PROJECT

TASKS 2 & 4

DATA PACKAGE/REPORT No. 9

Revision 0

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Pacific Northwest Laboratory

(PNL Project #16772)

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INTRODUCTION

This data package contains the results obtained by Pacific Northwest Laboratory (PNL) staff in the characterization of samples for the 200-BP-1 site investigation analytical chemistry support project. The samples were submitted for analysis by Westinghouse Hanford Company (WHC) under the Technical Project Plan (TPP) 16772 and the Quality Assurance Project Plan (QAPjP) ALO-001. The 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 329 Building, 200-BP-1 Sample Custodians.

The requested analyses for sample #92-00921 are the full suite as specified in the WHC SOW. The full suite analysis parameters of interest are; nitrate, nitrite, phosphate, sulfate, cyanide, free cyanide, complex cyanide, bismuth, the Contract Laboratory Program inorganic target analytes, total alpha, total beta, cesium-137, cobalt-60, ruthenium-106, plutonium-239/240, plutonium-238, strontium-90, technetium-99, total uranium activity, tritium, total organic carbon and the Contract Laboratory Program organic target compound list. The other eight samples were submitted for total cyanide and free cyandide analyses. Weight percent solid was also determined for soil samples, all data are corrected to dry weight except where otherwise stated. The quality control (QC) requirements for the samples 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/or matrix spike duplicates were analyzed. All QC data needed to support reported results are included in this Data Package/Report.

The data in this package are reported in separate tables or CLP Forms (Tables 2 through 16 and CLP Forms) for each analyte or method. Five appendices are provided; one for Test Instruction, one for Chain of Custody, Sample Analysis Request Forms and Sample Receipt Forms, one that contains the primary inorganic analytical data, one that contains the primary radiochemistry analytical data, and one that contains the primary organic analytical data and full CLP data tables.

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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

5-19-92
Date

TABLE 1: 200-BP-1 Sample Numbers

WHC Sample Number	PNL ALO Sample Number	Sample Type	*Analyses Requested
B015H8	92-00570	Soil	CN Suite
B015J8	92-00571	Soil	CN Suite
B015K0	92-00572	Soil	CN Suite
B015K3	92-00921	Soil	Full Suite
B015K2	92-00922	Soil	CN Suite
B015K6	92-00931	Soil	CN Suite
B00X88	92-00975	Water	CN Suite
B015H0	92-00976	Water	CN Suite
B015K8	92-00977	Soil	CN Suite

* CN Suite - Total CN, Free CN and Complex CN
Full Suite - Anions, Bismuth, CLP Inorganic Target Analytes, Radiochemistry Suite, TOC and CLP Organic Target Compounds (as defined in Introduction, pg 2.)

TABLE 2:

WEIGHT PERCENT SOLIDS SUMMARY SHEET

SAMPLE ID#	PNL LOG#	SAMPLE WT %	DUPLICATE WT %	AVERAGE WT %
B015H8	92-00570	96.70	97.07	96.9
B015J8	92-00571	96.73	96.80	96.8
B015K0	92-00572	96.90	95.40	96.1
B015K3	92-00921	95.35	93.41	94.3
B015K2	92-00922	96.80	96.57	96.7
B015K6	92-00931	96.97	97.02	97.0
B015K8	92-00977	94.55	93.98	94.3

Note: Weight Percent Solids were determined following the method outlined in PNL-ALO-504.

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ANION ANALYSIS RESULTS

Ion Chromatography

The samples in this sample delivery group were extracted using procedure PNL-ALO-108 and were analyzed using procedure PNL-ALO-212, in accordance with EPA Method 300.0. The sample preparation and analysis were performed in the 325 buiding in the 300 area.

Data presentation (see Table 3, and the notes below)

Each anion has been listed on a separate page with sample, sample duplicate, matrix spike and duplicate matrix spike, and control standard information.

%RPD values for samples analyzed in duplicate, spike recoveries for spiked samples and control standard recoveries have also been reported. For soil samples, all analyte values, spike levels, and recoveries were based on dry weights.

The control standard for all anions has been defined as the spiked blank.

CLP flags (C) and Quality control flags (Q) have also been appended, where appropriate.

CRDL and IDL values

Analyte	CRDL ug/L	CRDL mg/kg	IDL ug/L	IDL mg/kg
Nitrite-N	15	1	8	0.8
Nitrate-N	15	1	7	0.8
Phosphate-P	60	5	30	1.7
Sulfate	250	20	51	4.0

Values for liquids are in ug/L and those in mg/kg for solids. The IDL values for liquid samples have been derived from the standard deviations of

analyses of multiple sets of the lowest calibration standard, CAL 1. For solid samples, at an extract buffer weight to sample weight ratio of 0.1, the IDL values have been estimated to be 0.8xCRDL for NO2-N and NO3-N, 0.33xCRDL for PO4-P, and 0.2xCRDL for SO4.

Hold Times

The hold time of 48 hours after extraction (for soils) was met for the samples analysed.

Accuracy and Precision in IC results

The IC anions analysis system was calibrated with six calibration standards ranging from 0.5 - 30 ppm for the oxy-anions (NO2, NO3, PO4, SO4). The accuracy of the calibration was checked by analyzing three independently derived verification standards at 17%, 50%, and 75% of the calibration range maximum. Unless noted otherwise, spike levels in the samples or extracts were nominally at 5 ppm for all oxyanions at the time of injection.

The accuracy of reported values between 20-80% of the calibration maximum has been estimated to be ±10%, unless otherwise noted in the Problems section of this report. The accuracy decreases and errors increase for lower analyte levels and may be 100% at the instrument detection limit.

Quality Control

A method blank and spiked blank were prepared using the extraction buffer. Unlike the samples, these solutions were not filtered through 0.45 um filters following the extraction step, for which 100% extraction efficiency has been assumed.

The criterion for the acceptance of data, that the spiked blank values for the anions of interest are quantitated within ±20%, has been met. The retention time (R.T.) window for all anions, set at ±10%, has been met.

A duplicate set of analyses, performed on 92-00358/B015H1 (not a sample in this SDG), was recovered with %RPD values within the appropriate windows for all anions.

The matrix spike and duplicate matrix spike recoveries, for 92-01246/B01515 (not a sample in this SDG), were within ±25% for NO2 and SO4 and considered acceptable. The NO3 spike level was less than 25% of the analyte level in the sample, therefore % recovery data can not be considered meaningful.

The low recovery of the PO4 spike, 20%, may be due to matrix components such as transition metals which can bind this anion. The acceptable recoveries for the spiked blank eliminates deterioration of the spike standard concentrate as an explanation for the low recoveries in the spiked sample.

Problems

No other problems have been identified.

TABLE 3: ANION IC ANALYSIS DATA
NITRITE (NO2-N)

SOIL SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (mg/kg)	C	C2 SAMPLE DUP (mg/kg)	C	RPD	C5 BLANK (mg/kg)	C	C3 SPIKE+SAMPLE (mg/kg)	C3 SPIKE (mg/kg)	C6 DUP+SPIKE (mg/kg)	C6 SPIKE (mg/kg)	% RECOVERIES C3 SAMPLE + SPIKE	% RECOVERIES C6 DUP+ SPIKE	% RECOVERIES C4 CONTROL	Q
B015G9	92-00306+	0.8	U				0.8	U								
B015H1	92-00358+	0.8	U	0.8	U											
B015K3	92-00921	0.8	U													
B015L5	92-01246+	0.8	U						12.8	16	12.5	15.7	80	80	82	
B015M9	92-01827+	0.8	U													

IDL= 0.8 (mg/Kg, solids)
CRDL= 1.0 (mg/Kg, solids)

NOTES:

1. + Not samples in this SDG but reported for QC purposes
2. 100% spike level in extract is expected to be 5ppm each for Nitrate, Nitrite, Phosphate, and Sulfate
3. 5ppm X dil. factor / frac. solids = spike level (mg/Kg) in solid for Nitrate, Nitrite, Phosphate, and Sulfate
4. 100% extraction efficiency assumed in defining dil. factor as (diluent vol / sample wt) X 1.00 gm/ml
5. Method blank used for C5; nominal sample wt=2.00 gm

C FLAGS

B: IDL ≤ Analyte level < CRDL
U: Analyte not detected; <IDL

Q FLAGS

E: Estimated value, interference present
N: Spike recovery not within control limits
*: Duplicate analysis not within control limits

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TABLE 3: ANION IC ANALYSIS DATA
NITRATE (NO3-N)

SOIL SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (mg/kg)	C	C2 SAMPLE DUP (mg/kg)	C	RPD	C5 BLANK (mg/kg)	C	C3 SPIKE+SAMPLE (mg/kg)	C3 SPIKE (mg/kg)	C6 DUP+SPIKE (mg/kg)	C6 SPIKE (mg/kg)	% RECOVERIES C3 SAMPLE + SPIKE	% RECOVERIES C6 DUP+ SPIKE	% RECOVERIES C4 CONTROL	Q
B015G9	92-00306+	179					0.8	U								
B015H1	92-0035B+	3.7		4.4		17										
B015K3	92-00921	27.4														
B015L5	92-01246+	362							349	11.9	382	11.7	-109	171	106	
B015M9	92-01827+	30.9														

IDL= 0.8 (mg/Kg, solids)
CRDL= 1.0 (mg/Kg, solids)

NOTES:

1. + Not samples in this SDG but reported for QC purposes
2. 100% spike level in extract is expected to be 5ppm each for Nitrate, Nitrite, Phosphate, and Sulfate
3. 5ppm X dil. factor / frac. solids = spike level (mg/Kg) in solid for Nitrate, Nitrite, Phosphate, and Sulfate
4. 100% extraction efficiency assumed in defining dil. factor as (diluent vol / sample wt) X 1.00 gm/ml
5. Method blank used for C5; nominal sample wt=2.00 gm

C FLAGS

B: IDL ≤ Analyte level < CRDL
U: Analyte not detected; <IDL

Q FLAGS

E: Estimated value, interference present
N: Spike recovery not within control limits
*: Duplicate analysis not within control limits

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TABLE 3: ANION IC ANALYSIS DATA
PHOSPHATE (PO4-P)

SOIL SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (mg/kg)	C	C2 SAMPLE DUP (mg/kg)	C	RPD	C5 BLANK (mg/kg)	C	C3 SPIKE+SAMPLE (mg/kg)	C3 SPIKE (mg/kg)	C6 DUP+SPIKE (mg/kg)	C6 SPIKE (mg/kg)	% RECOVERIES C3 SAMPLE + SPIKE	% RECOVERIES C6 DUP+ SPIKE	% RECOVERIES C4 CONTROL	Q
B015G9	92-00306+	2.5	B				1.7	U								N
B015H1	92-00358+	3.9	B	3.8	B	2.6										N
B015K3	92-00921	4.2	B													N
B015L5	92-01246+	3.4	B						7.2	17.1	6	16.8	22	16	94	N
B015M9	92-01827+	11.2														N

IDL= 1.7 (mg/Kg, solids)
CRDL= 5.0 (mg/Kg, solids)

NOTES:

1. + Not samples in this SDG but reported for QC purposes
2. 100% spike level in extract is expected to be 5ppm each for Nitrate, Nitrite, Phosphate, and Sulfate
3. 5ppm X dil. factor / frac. solids = spike level (mg/Kg) in solid for Nitrate, Nitrite, Phosphate, and Sulfate
4. 100% extraction efficiency assumed in defining dil. factor as (diluent vol / sample wt) X 1.00 gm/ml
5. Method blank used for C5; nominal sample wt=2.00 gm

C FLAGS

B: IDL ≤ Analyte level < CRDL
U: Analyte not detected; <IDL

Q FLAGS

E: Estimated value, interference present
N: Spike recovery not within control limits
*: Duplicate analysis not within control limits

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TABLE 3: ANION IC ANALYSIS DATA
SULFATE (SO4)

SOIL SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (mg/kg)	C	C2 SAMPLE DUP (mg/kg)	C	RPD	C5 BLANK (mg/kg)	C	C3 SPIKE+SAMPLE (mg/kg)	C3 SPIKE (mg/kg)	C6 DUP+SPIKE (mg/kg)	C6 SPIKE (mg/kg)	% RECOVERIES C3 SAMPLE + SPIKE	% RECOVERIES C6 DUP+ SPIKE	% RECOVERIES C4 CONTROL	Q
B015G9	92-00306+	32					4	U								
B015H1	92-00358+	13	B	15	B	14										
B015K3	92-00921	20														
B015L5	92-01246+	30							69.4	52.6	71.1	51.6	75	80	96	
B015M9	92-01827+	101														

IDL= 4 (mg/Kg, solids)
CRDL= 20 (mg/Kg, solids)

NOTES:

1. + Not samples in this SDG but reported for QC purposes
2. 100% spike level in extract is expected to be 5ppm each for Nitrate, Nitrite, Phosphate, and Sulfate
3. 5ppm X dil. factor / frac. solids = spike level (mg/Kg) in solid for Nitrate, Nitrite, Phosphate, and Sulfate
4. 100% extraction efficiency assumed in defining dil. factor as (diluent vol / sample wt) X 1.00 gm/ml
5. Method blank used for C5; nominal sample wt=2.00 gm

C FLAGS

B: IDL ≤ Analyte level < CRDL
U: Analyte not detected; <IDL

Q FLAGS

E: Estimated value, interference present
N: Spike recovery not within control limits
*: Duplicate analysis not within control limits

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CYANIDE ANALYSIS RESULTS

Total cyanide analysis was performed in room 313 of building 325 in the Hanford Site 300 area. This data package includes cyanide results for seven soil-sediment samples and two water samples. Soil-sediment sample 92-01202 is not part of this data package. Cyanide results for Task 2&4 data package #9 are presented by colorimetric analysis run batch. Data package #9 results are summarized in table 4.

Total cyanide results for soil-sediment samples and corresponding duplicates (where applicable) were below the instrument detection limit (IDL) of 0.6 mg/kg except for sample 92-00977 and 92-00922. Both water samples had cyanide concentrations below the IDL.

The 12 day hold time specified for cyanide analysis under the CLP protocol was met for samples in this data package except for 92-00975, 92-00976 and 92-00977. The initial analysis of sample 92-00977 was done on 11-8-91, and met hold times. Unfortunately, the ICV exceeded the control limits and the sample was redistilled and reanalyzed. Cyanide values found in the initial and subsequent analyses were 1.4 and 1.2 mg/kg, respectively. Given the high sampling errors, these values are virtually identical, indicating no effect on data quality.

Average spiked soil-sediment sample cyanide recovery was 100% with a standard deviation of 3%.

Average recovery of cyanide for the laboratory control /initial calibration verification sample (ICV-6) was 103% with a standard deviation of 2% in the case of the soil-sediment samples. Recovery value for ICV-6 (LCS-0789, prepared by ICF Corporation) is based on the spiking of 2 ml of stock standard ICV-6 to 500 ml of deionized water and recovery back calculated to the original ICV-6 cyanide concentration.

Cyanide found in blanks analyzed for analysis groups within the data package were below the IDL.

TABLE 4a: TOTAL CYANIDE ANALYSIS DATA FOR TASK 2&4
SDG #9

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#
															1,2,3 (ALL)
B015H8	92-00570	0.6	U	0.6	U	N/A	5.9	U	48.55	10.0	9.67	99	103		
B015J8	92-00571	0.6	U												
B015K0	92-00572	0.6	U	0.6	U	N/A	5.9	U	48.55	9.7	9.59	95	102		
B015K2	92-00922	0.8	B												
B015K6	92-00931	0.6	U	0.6	U	N/A	5.9	U	48.55	10.1	10	101	106		
B015K3	92-00921	0.6	U												
B015L0	92-01202*	0.7	B	0.8	B	N/A	5.9	U	48.6	11	9.5	103	101	4,5	
B015K8	92-00977	1.2													5
B015L0	92-01202*	0.6	U	1.5		N/A	5.9	U	49.38	11.7	11.05	113	118	4,6	
B015K8	92-00977	1.4													6
											Mean	100	103		
											Std. Dev.	3	2		

* Not samples in the SDG but reported for QC purposes

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.
4. Sample B015L0 is not part of this data package.
5. Repeat of cyanide analyses for samples B015L0 and B015K8, as the ICV in initial analysis run (6) exceeded the CLP control limit of 115%
6. Initial analysis run for samples B015L0 and B015K8.

CLP Flags

U = Analyzed but not detected (less than IDL)
B = Less than CRDL but greater than or equal to IDL

TABLE 4b: TOTAL CYANIDE ANALYSIS DATA FOR TASK 2&4
SDG #9

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#
B00X88	92-00975	5.9	U	5.9	U	N/A	5.9	U	49.4	98.5	9.39	102.0	100.0		1,2,3
B015H0	92-00976	5.9	U												1,2,3
											Mean	102.0	100.0		
											Std. Dev.	NA	NA		

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 ug/L.
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)
B = Less than CRDL but greater than or equal to IDL

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FREE CYANIDE ANALYSIS RESULTS

Total cyanide results were below 2 mg/Kg for soils and below 20 μg/L for all samples, therefore free cyanide analysis was not performed on the samples in this set.

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TABLE 5: FREE CYANIDE ANALYSIS DATA

No data necessary.

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COMPLEX CYANIDE ANALYSIS RESULTS

Total cyanide results were all below 2 mg/Kg and/or 20 μg/L, therefore free cyanide analysis was not performed on the samples in this set. A complex cyanide result is calculated as the difference between the total cyanide results and the free cyanide results.

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TABLE 6: COMPLEX CYANIDE ANALYSIS DATA

No data necessary.

GRAPHITE FURNACE ATOMIC ABSORPTION ANALYSIS RESULTS

Samples and their accompanying QC samples were prepared following acid extraction procedure PNL-ALO-101 "Acid Digestion for Metal Analysis". The methodology is consistent with the CLP procedure for acid digestion of waters and sediments. Extracts were analyzed by graphite furnace atomic absorption (GFAA) spectrometry following procedures PNL-ALO-214 (As), PNL-ALO-215 (Se), PNL-ALO-216 (Bi), PNL-ALO-217 (Pb), PNL-ALO-220 (Tl), and PNL-ALO-221 (Ag). The PNL GFAA procedures are consistent with CLP SOW 7/88 GFAA Methods. Digestion of samples and GFAAS analysis were performed in building 325. The CLP SOW 7/88 required hold times of 180 days and 120 days, respectively, were met.

All GFAA analyses were conducted on a Perkin-Elmer 5100 Atomic Absorbtion instrument, except Ag and Se analyses which were performed on a Perkin-Elmer 5000 Atomic Absorption instrument. The quaterly IDLs for these two instruments are on the data analyses sheet attached.

The accuracy of these analyses is briefly described in the following table :

	Ag	As	Bi	Pb	Se	Tl
Ave %Spike Recovery:	86%	98%	104%	86%	102%	93%
Standard Deviation:	±7%	±7%	±4%	±3%	±11%	±3%

Precision of sample duplicates (i.e., RPD) are omitted for Ag, Se, Tl and Bi since the measured concentrations are below the instrument detection limits. The RPDs for As and Pb are 11.2% and 2.5% respectively.

The low post-digestion spike recovery for the Ag, Pb, and Se in the LCS sample (B4) can not be explained, and the CLP does not require any remedial action in this case.

A low post-digestion spike recovery of 78% for the method blank B5 for the Arsenic was initially observed, and as a CLP-required corrective action this blank was reanalyzed with a new spike. The observed spike recovery for this reanalysis was 90% .

TABLE 7: GRAPHITE FURNACE AA ANALYSIS DATA FOR TASKS 2 & 4
SDG #9

SOIL SAMPLES

			B1				B2				B5			B3		*B6 B4		
Analyte	Sample ID#	PNL Log#	Sample mg/Kg	Post Spike %Rec	Flags C	Flags Q	Dupl. mg/Kg	Post Spike %rec	C	B1&B2 %RPD	Blank µg/L	Post Spike %rec	C	Sample+ Spike µg/L	Digest Spike %rec	LCS mg/Kg	LCS %rec	Post Spike %rec
Ag	B0015G9	92-00306**	0.04	89	U		0.04	91	U	N/A	0.04	90	U	30.2	76	18.2	81	74
As	B0015G9	92-00306**	6.47	101			5.75	104		11.2	0.15	90	U	73.5	102	787.4	86	88
Bi	B0015G9	92-00306**	0.17	102	U		0.17	102	U	N/A	0.17	102	U	42.2	85	46.5	92	109
Pb	B0015G9	92-00306**	3.11	88			3.17	87		2.5	1.70	90	B	35.1	96	230.7	98	80
Se	B0015G9	92-00306**	0.06	106	U		0.06	109	U	N/A	0.06	102	U	8.8	90	41.2	105	79
Tl	B0015G9	92-00306**	0.13	94	U		0.13	96	U	N/A	0.90	92	B	41.9	83	36.0	90	88
Ag	B0015H1	92-00358**	0.04	88	U													
As	B0015H1	92-00358**	5.44	105														
Bi	B0015H1	92-00358**	0.17	102	U													
Pb	B0015H1	92-00358**	2.93	85														
Se	B0015H1	92-00358**	0.06	109	U													
Tl	B0015H1	92-00358**	0.70	92	B													
Ag	B015K3	92-00921	0.04	85	U													
As	B015K3	92-00921	8.22	100														
Bi	B015K3	92-00921	0.17	96	U													
Pb	B015K3	92-00921	3.21	85														
Se	B015K3	92-00921	0.06	107	U													
Tl	B015K3	92-00921	0.13	95	U													

** Not samples in this SDG but reported for QC purposes
* B6 designation applies only to Bi analysis. The unit for B6 is in ug/L not in mg/Kg as all other elements are.
Ag and Se were analysed by the AA5000 PE, all other elements were analysed by the AA5100 PE.
The IDL (ug/L): for AA5000 PE (10/16/91) Ag=0.2,As=0.4,Bi=1.3,Pb=0.9,Se=0.3,Tl=0.5
The IDL (ug/L): for AA5100 PE (10/16/91) Ag=0.6,As=0.8,Bi=0.9,Pb=1.5,Se=1.0,Tl=0.7
The CRDL (ug/L): Ag=10,As=10,Bi=60,Pb=3,Se=5,Tl=10
The analytical spike levels in ug/L is 20 for Ag,As,Bi,Pb,Tl and 10 for Se.
The pre-digestion spike (ug/L):Ag=40,As=40,Bi=50,Pb=20,Se=10,Tl=50
Pre-digestion spike (µg/L): Ag=40, As=40, Bi=20, Pb=20, Se=10, Tl=50
LCS standard: Ag, As, Pb, Se, Tl -- ICF 0287; Bi -- NIST 3109
ICV/CCV used during analyses: Ag,Pb,Tl--ICF0389; As,Se--ICF 0590; Bi--NIST 3106.
RPD only calculated if both sample and duplicate are greater than IDL.

Flags

U Analyzed but not detected (less than IDL)
B Less than CRDL but greater than or equal to IDL

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MERCURY COLD VAPOR ATOMIC ABSORPTION ANALYSIS RESULTS

Samples and their accompanying QC samples were analyzed by cold vapor atomic absorption (CVAA) spectrometry following procedure PNL-ALO-213 (Mercury in Water, Solids, and Sludges by Manual Cold Vapor Technique). The PNL manual CVAA procedure is consistent with CLP SOW 7/88 CVAA Method. Digestion of samples and CVAA Hg analysis were performed in the 325 building, laboratory 313. The CLP SOW 7/88 and contract required hold times of 26 days was met on the original analyses which failed qualification; the samples were received on 10/23/91, the initial analysis was performed on 11/04/91 and follow up analysis was performed on 2/28/92.

Due to difficulties in obtaining consistent acceptance of the ICV/CCV analysis and also in meeting the recovery requirements of the LCS, minor modification of the procedure were implemented in early February 1992. These modification, which were primarily changes in the reaction chamber design and path length reductions, improved the detection limit by 10x and significantly improved reproducibility at the concentration levels required by the contract. These modifications have been incorporated into a new revision of the Hg procedure which is currently undergoing technical review. Another deviation noted is that the calibration standards were not digested as specified in the procedure. The failure to digest the standards could potentially bias the Hg results slightly low.

The CVAA Hg analyses were conducted on a Perkin-Elmer 5000 AA instrument. The results for sample B015K3 are reported in Table 8, along with the QC spike and duplicate from BOOX75 (not a sample in this SDG), ICV/CCV and LCS recoveries. Results from both the 2/28/92 analysis and the 11/04/91 analysis are included for comparison. The reliability and validity of the analyses conducted after the procedural modifications are considered to be significantly better than the original analysis.

For the 2/28/92 daily Hg analysis batch, which included 14 samples other than those in this SDG, the average recovery for five ICV/CCV analyses was 98.2% with a 1σ of 7.1%. The analysis of the LSC (0287) sample was 10.1 mg/kg

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(within the 8.5-17.0 certified range) and the recovery for an additional control standard, NIST SRM2704, was 88.3%. Precision, as indicated by the RPD of the sample and duplicate, was 5%. Reanalysis of the spike was required due to a paper jam on the recorder; the spike recovery was 71.3%.

TABLE 8: Hg COLD VAPOR AA ANALYSIS DATA FOR TASKS 2 & 4
SDG #9

SOLID SAMPLES

Sample ID#	PNL Log#	B1 Sample mg/Kg	B1 Flags C	B1 Flags Q	B2 Dupl. mg/Kg	B2 C	B1&B2 %RPD	85 Blank ug/L	85 C	B3 (a) Sample +Spike mg/Kg	B3 (a) Digest Spike %rec	B4 (b,c) LCS mg/Kg	B4 (b,c) LCS %rec
BOOX75 (h)	91-07815	0.14		N	0.15		5.0%	0.04	U	0.23	71.3%	10.1	79.3%
	10/16/91	(0.10)		N									
NIST SRM2704												1.3	88.3%
B015K3	92-00921	0.09		N									
	11/04/91	(0.06)	B	N	(0.06)	U							

(a) B3 Predigestion Spike Level = 0.05 ug Hg
(b) LCS 0287 Hg certified at 12.7 mg/Kg (Range 8.5 to 17.0 mg/Kg)
(c) NIST SRM2704 certified at 1.47 ug/g Hg
(d) RPD only calculated if both sample and duplicate are >IDL
(e) IDL = 0.04 ug/L [or 0.005 mg/kg -> 0.2g sample, 25 mL analysis aliquot]
(f) CRDL = 0.2 ug/L [or 0.1 mg/kg -> 0.2g sample, 100 mL analysis aliquot]
(g) Calibration standards NIST SRM3133, ICV/CCV standard Johnson-Matthey 14395
(h) BOOX75 not part of SDG; sample used for QC during batch analysis.
(i) Values in ( ) were analyzed originally on the date indicated.

CLP Forms

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

INDUCTIVELY COUPLED PLASMA ATOMIC EMISSION SPECTROPHOTOMETRIC

ANALYSIS RESULTS

Samples and their accompanying quality control samples were prepared following acid digestion by procedure PNL-ALO-101, Acid Digestion for Metal Analysis. The methodology is consistent with the CLP procedure for the acid digestion of waters and sediments. Digestates were then analyzed by Inductively Coupled Plasma Atomic Emission Spectrophotometry (ICP-AES) following procedure PNL-ALO-211. This method is comparable to EPA method 200.7 CLP-M. The analysis was performed in ICP lab 405, building 325 in the 300 area. The CLP hold time of 180 days was met for all analytes.

The data is presented following U.S. EPA - CLP reporting format according to the SOW 7/88 protocol. Analyte concentrations are reported as dry weight corrected concentrations on "FORM I - IN, INORGANIC ANALYSES DATA SHEET". Spike sample recoveries are reported on "FORM V (Part 1) - IN, SPIKE SAMPLE RECOVERY". Duplicates and RPD's (Relative Percent Differences) are reported on "FORM VI - IN, DUPLICATES". Laboratory quality control sample results are reported on "FORM VII - IN, LABORATORY CONTROL SAMPLE". CRDL (Contract Required Detection Limits) and IDL (Instrument Detection Limits) are reported on "FORM X - IN, INSTRUMENT DETECTION LIMITS (QUARTERLY)". All CLP Forms may be found in Appendix C10.

This discussion is relative to the following samples (ACL Log-In #'s) 92-0306B, 92-0358B, 92-0921B, 92-1246B, 92-1827B (last three samples listed not a part of this SDG).

There are two report packages. The first report contains the results of the original or 1st sample analysis run. The second report contains the "Post-Digestion Spike" recovery. The second analytical analysis was necessary because one analyte, antimony, failed to meet predigestion spike recovery limits. The post digestion spiked sample showed acceptable recovery results for antimony. This is the second group of samples that have failed the spike

recovery test which indicates that the EPA sample solubilization procedure may not be adequate.

Precision and accuracy for all samples and quality control samples, with the exception of cadmium in the preparation blank and antimony in the Pre-Digestion Spike recovery test discussed above, were within EPA acceptance limits. Instrument detection limits for all analytes reported were below EPA contract required detection limits as defined in SOW 7/88. Quarterly linear range verification results were analyzed and reported in the 1st report package (20 Dec. 1991).

Cadmium in the preparation blank was reported to be about 4.7 mg/Kg. The upper limit for this analyte is 2 mg/Kg. The reported cadmium concentrations in all of the samples are very low and are also about the same concentration as the preparation blank. The cause of the apparent cadmium contamination in the preparation blank is not known therefore the reported sample cadmium concentrations are suspect.

Note that the maximum concentration standard (LRA2) for nickel was low (ca. 94%) instead of 95% to 105%. The standard (LRA2) was re-analyzed later (01/06/92) and found acceptable. The significance of nickel being 1% below the lower limit should be of little concern since the largest concentration involving this analyte was less than 5% of this calibration standard. It should be noted that nickel was within the acceptance limit in all quality control standards measured (eg. ICV1, CRI, ICSAB, etc.). Further, the same LRA2 standard was re-analyzed during the Post-Digestion Spike recovery test (01/06/92). All of the analytes measured, including nickel, were within the acceptance limits.

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U.S. EPA - CLP

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B015K3

Lab Name: BATTELLE_PNL Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 8,9,10

Matrix (soil/water): SOIL_ Lab Sample ID: 92-0921B1_

Level (low/med): LOW__ Date Received: 12/03/91

% Solids: _94.4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	8700			P
7440-36-0	Antimony	2.9	U	N	P
7440-39-3	Barium	69.9			P
7440-41-7	Beryllium	0.29	B		P
7440-43-9	Cadmium	1.6			P
7440-70-2	Calcium	6390			P
7440-47-3	Chromium	12.5			P
7440-48-4	Cobalt	6.9	B		P
7440-50-8	Copper	17.1			P
7439-89-6	Iron	18000			P
7439-95-4	Magnesium	4560			P
7439-96-5	Manganese	279			P
7440-02-0	Nickel	11.6			P
7440-09-7	Potassium	1170			P
7440-23-5	Sodium	815	B		P
7440-62-2	Vanadium	35.9			P
7440-66-6	Zinc	37.7			P

Color Before: _____ Clarity Before: _____ Texture: NON-HO

Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

ORIGINAL_SOIL_SAMPLE_LEACHATE

FORM I - IN

3/90

ICP/MS ANALYSIS RESULTS

The project samples and accompanying QC were prepared for ICP/MS analysis using procedure PNL-ALO-101, Acid Digestion for Metal Analysis. This methodology is consistent with CLP Inorganics acid digestion for metals. The resulting digestates were diluted an additional 10X for samples 92-00306-B1,2,3 and 921 (total dilution ~2000X) and 5X for samples 92-00306-B5,6 and 358, and analyzed by inductively coupled plasma mass spectrometry (ICP/MS) according to procedure PNL-ALO-280 Inductively Coupled Plasma Mass Spectrometric (ICP/MS) Analysis. Technetium was determined using procedure PNL-ALO-281 (ICP/MS Determination of ^{99}Tc), while uranium was determined using procedure PNL-ALO-282 (Determination of Uranium Concentration / Isotopic Composition Using ICP/MS). Samples were prepared in the 325 building and the ^{99}Tc and U determinations were performed in building 3708 in the 300 area.

A total of two analytical runs were necessary; the first was used as a screen to determine approximate elemental concentrations so that standards could be prepared with appropriate concentrations for the second analysis. The additional dilution should have necessarily resulted in raising the detection limit of the digestate sample(s) as received (i.e., undiluted), however the detection limit of Tc and U in the solutions analyzed was significantly lower than the LLD listed in the analytical procedures (LLD for the run was 1 ppt instead of 10 ppt). The result of this is that the detection limit of U and Tc for the digestate sample(s) as received is 5-10 ppt--approximately the same as if the samples had not been further diluted for analysis. Uranium concentrations were below the level (200 ppb) at which reliable uranium isotopic data could be obtained by this technique. The concentrations for total uranium based on ^{235}U agreed well with that based on ^{238}U, therefore natural isotopic abundance was assumed, and the uranium activity was calculated from the relative activity of the ^{238}U isotope (48.1% for natural uranium). (See ICN #1 for PNL-ALO-282.) For technetium, the only samples that had spectra with observable peaks at mass 99 were the spiked samples. The other samples having values that are reported above the detection limit are deceivingly high due to an increased background (a matrix effect) observed for the soil digestate samples, which affected the spike

recovery and concentration results. Although these values are above the reported detection limit (~1 ppt for blanks), they are still quite low.

For the blank spike, the additional 5X dilution that was necessary to mitigate observed matrix affects resulted in lowering the spike concentration to 8 ppt; in that the uranium concentration in blanks is often measurable and can be quite variable at these levels, misleading recovery is therefore not surprising. For the sample spike, the spike level was insignificant in comparison to what was observed in the sample; because the added uranium was negligible, the sample spike was essentially another sample replicate. This has been a problem on previous analyses as well; to correct for this, it is suggested that spike concentrations be increased; from 40 ppt to 80 ppt for Tc-99, and from 40 ppt to 800 ppt for uranium.

Another general concern is in regards to Tc-99 analysis in soils. Given a detection limit of 10 ppt for water, this amounts 170 pCi/L. The same concentration for a soil digestion and a 200X dilution factor (digestion as received) gives 34 pCi/gram; if additional dilution is necessary, this could be much higher. While this technique is believed to be effective in analyzing untreated water samples, the high dilution factors resulting from digestions makes ICP/MS not nearly as efficient for soils. Significant improvements could be made if the samples were first preconcentrated.

Quality control measures included the analysis of blind standards, duplicate analyses, and analysis of spiked samples. Results for check standards are in good agreement with standard values. Precision estimates based on duplicate analyses are difficult to estimate due to the detection limit values obtained in most cases for these samples.

TABLE 9: ICP-MS ANALYSIS DATA FOR TASKS 2 & 4
SDG #9

Spike recovery values corrected for contributions from blank or sample

PNL sample I.D. Number (a)	DRY WEIGHT	DILUTION FACTOR (b)	ICP/MS Analysis No.	Tc-99, ng/ml solution analyzed	Tc-99, ng/g soil (c,d)	Tc-99, ng/g spiked (d)	Tc-99, spike recovery, % (e,f)	Tc-99, pCi/g, dry soil (f)	U, ng/ml solution analyzed	U, ng/g soil (c,d)	U, ng/g spiked (d)	U, spike recovery, % (e,g)	U, pCi/g (total), dry soil (h)
92-00306-B1	1.0165	2007.6	6	0.001	2.0			34	1.1860	2380			1.7
92-00306-B2	1.0223	1996.3	8	0.005±.001	10.0			170±35	1.0640	2120			1.5
92-00306-B3	1.0205	1999.8	10	0.0114	22.8	7.8	165	386	0.9810	1960	7.79	87	1.4
92-00306-B5	N/A	1000.0	4	0.0012	1.2			20	0.0040	4.0			0.0
92-00306-B6	N/A	1000.0	3	0.0084	8.4	8.0	91	142	0.0078	7.8	7.95	65	N/A
92-00358-B1	1.1623	894.8	12	0.010±.004	9.2			160±70	1.973	1770			1.2
92-00921-B1*	1.1159	1899.0	14	0.0041	7.8			132	16.984	32300			22.6

(a) Sample types:
B1 = sample
B2 = sample, duplicate
B3 = sample + Tc/U spike
B5 = procedural blank
B6 = procedural blank + Tc/U spike
* Not samples in the SDG but reported for QC purposes

(b) units of mL/g dry soil except for -B5 and -B6 samples (blank/blank spike) units of mL; includes 5X or 10X addition dil.
(c) leachate concentration corrected for preparation dilution factor and additional dilution for analysis (5X or 10X).
(d) -B3 reported in units of ng/g; -B6 reported in ng
(e) Recovery = [Spiked Sample]/([Sample]+[Spike])
(f) Despite positive values obtained for Tc, only spike samples had an observable Tc peak. Values >LLD are due to an increased background observed for soil digestate samples.
(g) For blank spike, [U] in diluted sample approached LLD.
(h) total uranium activity calculated using natural isotopic abundance for soil leachate [U] < 200 ppb: pCi = [U]*0.000336/0.481
DL= Detection Limit is dependent on sample weight and dilution volume (see footnote C).

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GAMMA ENERGY ANALYSIS RESULTS

Five soil samples were received between October 4 and November 14, 1991 as part of three Sample Delivery Groups and were analyzed by Gamma Energy Analysis (GEA) as one batch. A duplicate sample and a matrix blank were analyzed per the Test Instructions received. A total of 7 samples were analyzed by GEA. The sample preparation and counting were performed in the 329 building in the 300 Area.

The samples were prepared for counting following PNL-ALO-105. This procedure covers the preparation of solid samples for GEA. Because of the activity associated with these samples, they were not prepared in the large tuna can geometry which holds approximately 220 g of soil. Instead, the samples were initially prepared in a glass scintillation vial which contained about 15 g of soil and was counted on shelf 2 of the sample holder for diode L (Samples 92-00358* and 92-00921). Samples 92-00306*, 92-001246*, and 92-01827* had too much activity to be counted in this position and the holder was raised to shelf 5. Even in this position, the detector dead time was too high for samples 92-01246* and 92-01827*. A smaller aliquot was then taken (about 1.5 g) and contained in a 2/5 dram polyvial and counted on shelf 4 to obtain a reasonable dead time for the analyzer.

The aliquots taken used the "as received" soil, ie., the soil was not dried. A percent solids determination has been performed as part of Task 2 and 4 and the results for the six samples are as follows:

ALO No.	WHC No.	% Solids
92-00306*	B015G9	96.89
92-00358*	B015H1	96.65
92-00921	B015K3	94.38
92-01246*	B015L5	95.84
92-01827*	B015M9	97.86

Therefore, one can convert the reported values to a dry weight basis if desired.

* Samples not a part of this SDG.

The calibration standard used for calibrating the glass scintillation vial on shelf 2 was also used to calibrate the vial on shelf 5. In addition, another calibration standard was prepared for a 2/5th dram polyvial container containing about 1.5 g sample.

The samples were then analyzed by gamma-ray spectroscopy to determine the quantities of ^{60}Co, ^{106}Ru, and ^{137}Cs present. This portion of the work was performed following PNL-ALO-464 and PNL-ALO-470. The samples were counted on diode L which is a lithium-drifted germanium [Ge(Li)] detector. Table 10 presents the measured quantities for ^{60}Co, ^{106}Ru, and ^{137}Cs in the soils. The detection limits quoted are calculated as if the isotope was present at a level that is 2.5 times the square root of twice the average background. In most cases, two counts were taken of the sample. A short count of 10 minutes was taken to obtain a peak for ^{137}Cs that did not overflow the analyzer and a longer count to obtain better numbers for ^{106}Ru and ^{60}Co where the peak for ^{137}Cs may have overflowed the analyzer. Therefore, both counts were used to obtain the recommended values for each isotope in each sample.

Two aliquots of sample 92-00358 were measured. For ^{137}Cs, the counting errors are 1.1% and 0.9% and the mean and standard deviation for the two analyses are 2045 ± 219 (11%). This is below the required precision for soils of ± 35%.

The detection limits were determined from sample 92-00358-L-5 which is an empty glass scintillation vial counted on shelf 2 of the sample holder for diode L. The average weight of the preceding 9 samples prepared in the glass scintillation vials was determined to be 14.212 g. This weight was assumed to allow the calculation of detection limits in pCi/g for ^{60}Co, ^{106}Ru, and ^{137}Cs. The detection limits at one sigma are <0.06, <0.6, and <0.04 pCi/g, respectively.

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Table 10: Gamma Energy Analysis of Soils

Recommended Values

Batch 5

Diode L

(Radionuclide activity in pCi/g[a])

Client ID	Sample ID	Collection Date	Weight (g)	^{60}Co	^{106}Ru	^{137}Cs
B015G9	92-00306-L-1*	10/4/91 14:20	14.200	<8	<500	$(5.72 \pm 0.06) \times 10^5$
B015H1	92-00358-L-1*	10/9/91 10:45	14.205	<0.4	<18	1890 ± 20
B015H1	92-00358-L-2*	10/9/91 10:45	14.201	<0.3	<15	2200 ± 20
B015H1	92-00358-L-5*	11/8/91 11:06	14.212	<0.15	<1.6	<0.11
B015K3	92-00921-L-1	10/22/91 11:31	13.975	28.6 ± 1.6	<280	$(5.62 \pm 0.06) \times 10^5$
B015L5	92-01246-L-1*	11/6/91 11:44	1.6300	<30	<2300	$(2.00 \pm 0.02) \times 10^6$
B015M9	92-01827-L-1*	11/14/91 14:06	1.5020	<20	<1200	$(1.23 \pm 0.01) \times 10^6$

[a] The one sigma uncertainties are based on counting statistics. All "<" values are detection limits associated with each "not detected" analysis.

The detection limits are determined from Sample 92-00358-L-5. The detection limits in pCi/g for ^{60}Co, ^{106}, and ^{137}Cs at one sigma are < 0.06, <0.6, and <0.04. Note that the detection limits quoted above were calculated as if the isotope were present at a level that is 2.5 times the square root of twice the average background.

* Samples not in the SDG but reported for QC purposes.

TOTAL ALPHA ANALYSIS RESULTS

Three soil samples were prepared and analyzed with their corresponding QC samples. Analyses were performed according to procedures PNL-ALO-106, Acid Digestion for Preparation of Samples for Radiochemical Analysis, PNL-ALO-460, Source Preparation for Gross Alpha Analyses, and PNL-ALO-461, Alpha Counting Procedure. All analytical work and calculation were performed in Building 329 and 329T5 in the 300 Area.

An appropriate aliquot (ranging from a nominal 1g to 2.5g) was sub-sampled from each received sample. The blank spike consisted of 10ml 8M HNO_3 with a known amount of Pu-239 spike. The matrix spike consisted of the sample spiked with a known amount of Pu-239 spike. The blank consisted of 10ml 8M HNO_3.

The blank spike recovery is 104% and the matrix spike recovery is 92%. These recoveries average 98% ± 8% and indicate an average bias of -2%. The precision reflected in the relative percent difference (RPD) of sample number 92-00921, is 7.3%. These meet the target values in the QAPP of ± 50% accuracy and ± 35% precision. The blank was good; a minimum detectable activity was reported. The results are reported per received sample weight (not corrected for weight percent solids).

No hold times are defined for total alpha analysis.

TABLE 11: TOTAL ALPHA ANALYSIS DATA FOR TASKS 2 & 4
SDG #9

SOIL SAMPLES

Client #	Sample #	Sample Type	Total Alpha (pCi/g)	+/- 1 sigma	RPD	Spike Conc. (pCi/g)	+/- 1 sigma	Spike % Rec.
B015K3	92-00921-A-1a	Soil	25.7	5.8				
B015K3	92-00921-A-2a	Duplicate	23.9	5.7	7			
	92-00306-A-5a*	Blank	<4.7					
	92-00921-A-4a	Blank Spike	57.1	8.4		54.8	0.6	104.0
	92-00921-A-3a	Matrix Spike	66.7	4.6		45.4	0.5	92.3

Average % recovery 98 +/- 8

* Not samples in the SDG but reported for QC purposes
The detection limit for soil samples of this size is approximatedly 5 pCi/g.
Contract detection limits can be achieved by use of a larger sample size and longer counting time. Due to the high activity of the samples in this batch, a smaller sample size and shorter counting time were used.

Error is based on the propagated error of volume and counting uncertainties.

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TOTAL BETA ANALYSIS RESULTS

Three soil samples were prepared and analyzed with their corresponding QC samples Analyses were performed in the 329 Building, 300 Area, as directed by the test instructions according to procedures PNL-ALO-106, Acid Digestion for Preparation of Samples for Radiochemical Analysis, PNL-ALO-462, Source preparation for Gross Beta Analyses, and PNL-ALO-463, Beta Counting Procedure.

An appropriate aliquot (nominally 1 g) was sub-sampled from each received sample. The blank spike consisted of 10 ml 8M HNO3 with a known amount of Sr/Y-90 spike. The matrix spike consisted of a previously analyzed sample (92-00358, not a sample in this SDG) containing a relatively low level beta activity, with a known amount of Sr/Y-90 spike added. The blank consisted of 10 ml 8M HNO3.

Sample number 92-00921 was analyzed in duplicate and the values were 64,500 ± 1990 pCi/g and 60,600 ± 1880 pCi/g total beta activity. Results are reported as "per received" sample weight.

The blank spike recovery is 83% and the matrix spike recovery is 108%. These recoveries average 95% ± 8%. The precision, reflected in the relative percent deviation (RPD) of sample number 92-00921, is 6%. These meet the target values in the QAPP of ±50% accuracy and ±35% precision. The blank was negligible compared to the sample value but higher than normal due to contamination from the very high activity level of the samples in this set. With samples of this activity level greater sample separation will be needed. A detection limit of 36 pCi/g would not be met with this data set. The results are reported per received sample weight (not corrected for weight percent solids).

No hold times are defined for total beta analysis.

TABLE 12: TOTAL BETA ANAYSIS RESULTS FOR TASKS 2 & 4
SDG #9

SOIL SAMPLES

WHC #	Sample #	Sample Type	Total Beta (pCi/g)	+/- 1 sigma	RPD	Spike Conc. (pCi/g)	+/- 1 sigma	Spike % Rec.
B015K3	92-00921-A-1a	Soil	64500	1990				
B015K3	92-00921-A-2a	Soil	60600	1880	6			
	92-00358-A-3a*	Matrix Spike	4790	145		1536	78	108
	92-00921-A-5a	Blank	97	21				
	92-00921-A-4 a	Blank Spike	491	29		477	29	83

* Not samples in the SDG but reported for QC purposes
The detection limit for soil samples of this size is approximatedly 36 pCi/g. Contract detection limits can be achieved by use of a larger sample size and longer counting time. Due to the high activity of the samples in this batch, a smaller sample size and shorter counting time were used.

Error is based on the propagated error of volume and counting uncertainties.

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PLUTONIUM ANALYSIS RESULTS

Three soil samples, 92-00306*, 92-00358* and 92-00921, were prepared and analyzed with their corresponding QC samples. Analyses were performed according to Procedures PNL-ALO-106, Acid Digestion for Preparation of Samples for Radiochemical Analysis, PNL-ALO-466, Plutonium Separation, PNL-ALO-468, Electroplating, and PNL-ALO-469, Alpha Energy Analysis. The digestion, separation, source preparation, and counting were performed in building 329 in the 300 area.

An appropriate aliquot (ranging from a nominal 0.5g to 10 g) was sub-sampled from each received sample. All samples were spiked with Pu-242 tracer which was used to correct each individual sample result for Pu yield. The Pu-239 recovery for the blank spike was excellent at 95% and indicates that a bias of 5% was obtained for this batch. This is well within the target accuracy of ± 25%. The duplicate samples have a relative percent difference (RPD) of 11% for Pu-239+240 and 32% for Pu-238 which are both within the project target of ± 35% precision. Also, the precision is expected to be less for the Pu-238 since the activity is two orders of magnitude less than the Pu-239+240 activity and is of the same order of magnitude as the minimum detectable activity reported for the blank and blank spike. The results for the blank were good for both Pu-239+240 and Pu-238; in each case a minimum detectable activity was reported. The results are reported per received sample weight (not corrected for weight percent solids).

No hold times are defined for plutonium analyses.

* Not samples in this sample delivery group.

TABLE 13: Pu 238 and Pu 239/240 DATA ANALYSIS
SDG #9

WHC Sample #	Program Sample ID	Sample Type	Pu-239+240 pCi/g	+/- 1 sigma	Pu-239+240 RPD	Pu-238 pCi/g	+/- 1 sigma	Pu-238 RPD	Pu-239 Spike pCi/g	+/- 1 sigma	% Recovery
B015H1	92-00358-A-1c*	Soil	2.39E-01	1.01E-02	11	2.92E-03	8.37E-04	32			
	92-00358-A-2c*	Duplicate	2.68E-01	1.04E-02		4.03E-03	8.48E-04				
B015K3	92-00921-A-1c	Soil	2.96E+00	1.06E-01		4.42E-02	7.65E-03				
	92-00306-A-4c*	Blank Spike	2.23E+00	7.61E-02		< 1E-03			2.35E+00	1.46E-02	95
	92-00306-A-5c*	Blank	< 5E-04			< 1E-03					

Pu-239+240 detection limit is approximately 5 E-04 pCi/g.
Pu-238 detection limit is approximately 1 E-03 pCi/g.

Errors quoted are the propagated error of individual measurements.

* Samples not in the SDG but reported for QC purposes

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STRONTIUM ANALYSIS RESULTS

An aliquot of sample leachate was taken from each sample. The leach procedure used was PNL-ALO-106, Acid Digestion for Preparation of Samples for Radiochemical Analysis. This was followed by Procedure PNL-ALO-465, Strontium-90 Analysis (Oxalate-Nitric Acid Method), and PNL-ALO-463, Beta Counting Procedure. All work was performed in building 329 and 329T5 of the 300 area.

The strontium-90 results for the sample is 7750 ± 570 pCi/g. The results are reported per received sample weight (not corrected for weight percent solids).

The analysis for strontium-90 proceeded smoothly; all QC criteria were met. The blank spike was used to determine the batch yield. Because it was essentially 100%, virtually no correction for radioisotope recovery needed to be made. The matrix spike shows 93.5% recovery with a method bias of -6.5%. The precision, estimated by the relative percent difference of the duplicates, is 1.8%. The blanks were just above the detection limit but, due to the magnitude of Sr in the samples, this had minimal impact on the sample results.

The strontium-90 analysis results does not correct for the presence of strontium-89; all activity is assumed to be from ^{90}Sr.

No hold times are defined for strontium analysis.

TABLE 14: STRONTIUM-90 ANALYSIS DATA FOR TASK 2 & 4
SDG #9

Parameters of Interest

WHC Sample #	Sample #	Sample Type	Strontium (pCi/g)	+/- 1 sigma*	RPD	Spike Conc. (pCi/g)	+/- 1 sigma*	Spike % Rec.	Normalize % Yield**
B015H1	92-00358-A-1b+	Soil	452	33					
	92-00358-A-2b+	Soil Duplicate	461	34	1.8				
B015K3	92-00921-A-1b	Soil	7750	570					
	92-00306-A-3b+	Matrix Spike	46.3	3.6		49.5	2.5	93.5	
	BL-00306-A-5b+	Blank	0.1	0.02					
	BL-00306-A-5b+	Blank duplicate	0.3	0.04					
	BS-00306-A-4b+	Blank Spike	Used to determine batch yield						103.5

Minimum detectable activity for a sample is approximately 0.06 pCi/g.
+ Sample not in the SDG but reported for QC purposes
* One sigma uncertainties are based on propagation of mass, volume, and counting uncertainties.

** All Sr-90 analyses are calculated on the basis of their ratio to the blank spike recovery which has been normalized to 100% chemical recovery.

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TRITIUM ANALYSIS RESULTS

Five soil samples and their corresponding QC samples were prepared and analyzed according to procedures PNL-ALO-441, Radionuclide Separation and Analysis Procedure for Tritium, and PNL-ALO-443, Liquid Scintillation Counting Procedure for Tritium. The leach, distillation and counting were performed in building 329 in the 300 Area.

A nominal 5g aliquot was initially subsampled. After leaching and distillation, the aliquot counted is equivalent to approximately 0.3 g of soil. The blank (or method) spike was used to determine batch yield which in turn is used as a correction factor for the other analyses in that batch. (This factor is F_s, the recovery correction factor, as defined in PNL-ALO-441). The batch yield was determined to be 75%. The duplicate samples had a relative percent difference of 41%. This is somewhat outside the project target of ± 35% precision. The mean gross counting rates of the sample and duplicate were 21 and 17 cpm, respectively. This may be compared with about 13 cpm (gross) for the blank and 12 cpm for the distilled deep well water blanks. At such low counting rates RPD values are not very meaningful.

Note that sample results are reported per received sample weight (not corrected for weight percent solids). No hold times are defined for tritium analysis.

TABLE 15: TRITIUM ANALYSIS FOR TASK 2 & 4
SDG #9

WHC Sample #	Project Sample ID	Sample Type	Tritium (pCi/g)	+/- 1 sigma	RPD	Spike Conc. (pCi/g)	+/- 1 sigma	Recov. Corr. Factor, % Fs
B015K3	92-00921-K-1	Soil	56	4				
	92-00921-K-2	Duplicate	37	3	41			
	92-00921-K-5	Blank	<4 **					
	92-00921-K-4	Method Spike Used to Determine Batch Yield						75

Approximate Detection Limit = 10 pCi/g (variations occur due to actual sample size)
* Not samples in the SDG but reported for QC purposes
** Based on 0.3 g sample size

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TOTAL ORGANIC CARBON ANALYSIS RESULTS

Sample 92-00921 (B015K3) was prepared by procedure PNL-7-40.37, rev. 0, "Determination of Carbon in Solids Using the Coulometrics Carbon Dioxide Coulometer". The methodology is consistent with SW 846 method 9060. Procedure PNL-7-40.37 defines the operation of the instrument used as well as the analysis of the sample. SW 846 Method 9060 leaves the option for the analyst to follow the manufacturer's instrument instructions for calibration, analysis procedure, and calculations. Analysis was performed in the 325 building in the 300 area.

With the Coulometrics TOC analyzer, an average (daily) blank must be determined prior to calibration check of the instrument and analysis of samples. The major carbon source in the blank is CO_2 adsorbed on the sample boat and ladle. The blank is obtained by removing the quartz ladle and platinum boat from the furnace tube and exposing them to air. These parts are then placed in the furnace and carbon analysis is performed on this blank. This procedure is repeated until consecutive blank values differ by no more than 0.5 ug of total organic carbon. As there is no sample preparation prior to analysis, this instrument blank is also considered to be the methods blank when determining TOC by this method.

The blank thus obtained has a direct effect on the quantification limit for each sample as this value must be subtracted from each sample value determined. However, this blank value is not an indicator of instrument sensitivity, and should not be considered as an indication of the true instrument detection limit. If the instrument were operated in a carbon-free atmosphere, a lower blank value could be observed. It is not possible to determine absolute instrument detection limit (i.e., a measurement of instrument sensitivity) under current laboratory operating conditions. For purposes of this report, the daily blank value is used as the lower quantification limit for the analyses. Reported results indicate that the results are above this method quantification limit (instrument background carbon levels).

An average "method detection limit" for this analytical method may be estimated from the standard deviation around the blank values reported in this data package. This "method detection limit", defined as three times the

standard deviation of the blank values, is ~2 μg of total organic carbon in the analytical sample. The method detection limit expressed in concentration terms would be dependent on the sample size analyzed. This value is useful in evaluating future applicability of this analytical method.

The sample was analyzed in duplicate as specified in TI-200BP-1-105. The relative percent difference, an estimation of relative standard deviation, was 3%. This variability is mostly attributed to the inherent heterogeneity of the soil sample received. It should be noted, however, that the remote possibility of analytical error cannot be completely eliminated based on existing data.

At least one standard is analyzed each day as a one point calibration of the instrument. The manufacturer's manual states to use a single point calibration of the instrument as the instrument exhibits a linear response. Upon review of the standard result (of the same Kodak Glucose standard) for this set of data, the recoveries were 95.3% and 95.9%. The average recovery was 95.6% with a relative percent difference of less than 1%. The conclusion is that precision from this set of data is ± 1% relative and a bias (accuracy) of -4% on the average. The reported values <u>are</u> corrected for instrument bias.

The nature of the sample required a 30 minute run time, versus a standard run time of 10 minutes, to fully oxidize all organic carbon present. While consecutive blank determinations met the 0.5 ug organic carbon blank determination criteria at 10 minutes, this criteria was not met when these same runs were extended to 30 minutes (0.71 ug C difference). Previous blank determinations under similar circumstances have confirmed the trend described above. The overall affect on reported TOC results is negligible considering the size of the difference and the results are still valid for the scope of the analysis.

The Environmental Protection Agency (EPA) hold time for Total Organic Carbon Analysis in soils is defined at 14 days from the date of sampling. The hold time was met for this sample.

TABLE 16: TOTAL ORGANIC CARBON ANALYSIS DATA FOR TASK 2 & 4
SDG #9

Soil Samples

WHC Sample #	PNL ALO #	Sample Type	Sample wt. g	ug C Results	ug C in Sample	mg/Kg Sample	RSD (%) Dups	% rec. spike	Date Received	Date Analyzed
B015K3	92-0921-1	Sample	0.06108	45.5	35.4	579.0	3		10-23-91	11-4-91
B015K3	92-0921-2	Duplicate	0.06316	45.1	34.9	553			10-23-91	11-4-91
B015K3	92-0921-3	Standard						95.6		11-4-91
B015K3	92-0921-4	Blank		10.2						11-4-91

Total Organic Carbon by PNL Procedure 7-40.37 on Instrument WA92040,
325 Bldg., rm 701. Data reported from LRB 52996, pp 151-152.

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VOLATILE ORGANIC COMPOUND ANALYSIS REPORT

SAMPLE ANALYSIS REPORTED

Analysis of one soil sample and two spiked soil samples for volatile organic compounds by gas chromatography/mass spectrometry (GC/MS) is the subject of this report.

SAMPLE DESCRIPTION

Sample ID	ACL Lab Number
B015K3	92-00921
B015K3 MS	92-00921 MS
B015K3 MSD	92-00921 MSD

The sample, B015K3, was received in the 325 Building on 10/23/91.

SAMPLE PREPARATION

One gram aliquots of the samples were transferred to twenty mL pre-cleaned VOA vials, and accurately weighed. The samples were serially dissolved in five mL of lab water, then added to a purge vessel attached to a Tekmar Liquid Sample Concentrator equipped with a heated purge.

The analysis followed EPA-CLP SOW 2/88 procedures for the analysis of volatile compounds.

ANALYSIS METHOD

- GC/MS procedure: PNL-ALO-335.
- GC/MS instrumentation: HP-5890/5970 GC/MS (WB46864).
- GC/MS location: Lab 327-A, 325 building

QUALITY CONTROL

Quality control procedures specified for this method were followed. While these forms are all included in this report, the quality assurance performance requirements are summarized below:

Form	Information	Comments
2A	Surrogate Recovery	Meets all requirements.
3A	MS/MSD Recovery	One RPD exceeded QC limits; otherwise, meets all requirements.
4A	Method Blank Summary	Meets all requirements.
5A	Tune/Mass Calibration	Meets all requirements.
6A	Initial Calibration	5 point calibration. Meets all requirements.
7A	Daily Calibration	Meets all requirements.
8A	Internal Standards	Meets all requirements.

DEVIATIONS FROM PROTOCOLS

- Holding time. Holding time for sample B015K3 was exceeded by 3 days.

DATA

A hard copy is kept on file in the ALO data management office.

The data and calibration are archived on magnetic tape in the 325 building, 327-A laboratory. The following is the list of pertinent files:

File Name	Sample Number	Sample Analyzed
>WA501		Mass Calibration/Tune Check
>WA502		Daily Calibration
>WA504		Method Blank
>WA507	92-00921	B015K3
>WA508	92-00921 DUP	B015K3 DUP
>WA509	92-00921 MS	B015K3 MS
>WA510	92-00921 MSD	B015K3 MSD

Lab data are also maintained as follows:

Activity	LRB Number	Page Number
GC/MS injection log	BNW-52907	90-91

RESULTS

CLP Target Compounds: The attached 1A Forms show that volatile target compounds, **Acetone and 2-Butanone**, were observed in the BLANK, but they were below the Contract Required Quanti-tation Limits, (CRQL's). Hence, these compounds are "B-flagged". **2-Butanone** was observed below the CRQL in sample 92-00921. **Acetone** was observed below the CRQL in sample 92-00921 DUP.

In summary, no target compounds were observed in the sample above the quantitation limits.

The following defines the qualifiers, Q-flags, in the Form 1's:

"Q" Flag	Definition
U	Indicates the compound was analyzed for but not detected, the U-flagged concentration number is the CRQL.
J	Indicates an estimated value for the target or tentatively identified compounds, spectra meet criteria but response is below the CRQL for the target compounds.
B	Compound was found in the blank.
X	Indicates compound was manually deleted because all requirements were not met.
D	Analysis was performed on a diluted sample.
E	Indicates that Quantitation was outside the calibration range.

Tentatively Identified Compounds: As shown in the attached 1E Forms, no non-EPA target compounds were observed in the blank or the samples.

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015K3

Lab Name: BATTELLE-PNL Contract: ------

Lab Code: ------ Case No.: ----- SAS No.: ----- SDG No.: ------

Matrix: (soil/water) SOIL Lab Sample ID: 92-00921

Sample wt/vol: 1.5311 (g/mL) G Lab File ID: >WA507

Level: (low/med) LOW Date Received: 10/23/91

% Moisture: not dec. 4.0 Date Analyzed: 11/05/91

Column: (pack/cap) CAP Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
74-87-3	Chloromethane	34.	U
74-83-9	Bromomethane	34.	U
75-01-4	Vinyl Chloride	34.	U
75-00-3	Chloroethane	34.	U
75-09-2	Methylene Chloride	17.	U
67-64-1	Acetone	34.	U
75-15-0	Carbon Disulfide	17.	U
75-35-4	1,1-Dichloroethene	17.	U
75-34-3	1,1-Dichloroethane	17.	U
540-59-0	1,2-Dichloroethene (total)	17.	U
67-66-3	Chloroform	17.	U
107-02-2	1,2-Dichloroethane	17.	U
78-93-3	2-Butanone	17.	JB
71-55-6	1,1,1-Trichloroethane	17.	U
56-23-5	Carbon Tetrachloride	17.	U
108-05-4	Vinyl Acetate	34.	U
75-27-4	Bromodichloromethane	17.	U
78-87-5	1,2-Dichloropropane	17.	U
10061-01-5	cis-1,3-Dichloropropene	17.	U
79-01-6	Trichloroethene	17.	U
124-48-1	Dibromochloromethane	17.	U
79-00-5	1,1,2-Trichloroethane	17.	U
71-43-2	Benzene	17.	U
10061-02-6	trans-1,3-Dichloropropene	17.	U
75-25-2	Bromoform	17.	U
108-10-1	4-Methyl-2-pentanone	34.	U
591-78-6	2-Hexanone	34.	U
127-18-4	Tetrachloroethene	17.	U
79-34-5	1,1,2,2-Tetrachloroethane	17.	U
108-88-3	Toluene	17.	U
108-90-7	Chlorobenzene	17.	U
100-41-4	Ethylbenzene	17.	U
100-42-5	Styrene	17.	U
133-02-7	Xylene (total)	17.	U

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1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B015K3

Lab Name: BATTELLE-PNL Contract: ------

Lab Code: ------ Case No.: ----- SAS No.: ----- SDG No.: ------

Matrix: (soil/water) SOIL Lab Sample ID: 92-00921

Sample wt/vol: 1.5311 (g/mL) G Lab File ID: >WA507

Level: (low/med) LOW Date Received: 10/23/91

% Moisture: not dec. 4.0 Date Analyzed: 11/05/91

Column: CAP Dilution Factor: 1.00000

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) ug/Kg

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
3.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
3				

SEMI-VOLATILE ORGANIC ANALYSIS

SAMPLE ANALYSIS REPORTED

Analysis of 200-BP-1 sample B015K3 for semivolatile organic compounds by gas chromatography/mass spectrometry (GC/MS) is the subject of this report.

SAMPLE DESCRIPTION AND PREPARATION

Sample ID	ACL Lab Number
Method Blank	92-00921-E-4
B015K3	92-00921-E-1
B015K3 D	92-00921-E-1D
B015K3 MS	92-00921-E-2
B015K3 MSD	92-00921-E-#

The sample was received in good condition on 10/23/91. Extraction of sample and spiked samples were performed on 10/30/91.

- Extraction procedure: PNL-ALO-344
- Extraction location: Lab 302, 325 building
- Extraction type: Sonication, low level, soil
- Sample/Extract storage temperature: 4°C(±2°)

ANALYSIS METHOD

- GC/MS procedure: PNL-ALO-345
- GC/MS instrumentation: HP-5890/5970 GC/MS (WB46867)
- GC/MS location: Lab 325, 325 building

A GC screen analysis was not deemed necessary, and was not performed.

QUALITY CONTROL

The QC features in the analytical procedure were followed as described below. The following lists the attached CLP forms that relate to QC and summarizes the QC results.

Form	Information	Comments
2D	Surrogate Recovery	All requirements were met
3D	MS/MSD Recovery	All requirements were met

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4B	Method Blank Summary	All requirements were met
5B	Tune/Mass Calibration	All requirements were met
6B,C	Initial Calibration	All requirements were met
7B,C	Daily Calibration	All requirements were met
8B,C	Internal Standards	All requirements were met

The following comments provide additional comments on QC and related features for analysis of these samples.

- Holding time. The holding times for extractions and analysis were met.

DATA

The data and calibration are archived on magnetic tape in the 325 building 325 laboratory. The following is the list of the pertinent files.

File Name	Sample Number	Sample Analyzed
>XC501		Mass calibration and tune check
>XC502		Daily (continuing) calibration
>XC508	92-00921-E-4	Method blank
>XC509	92-00921-E-1	B015K3
>XC510	92-00921-E-1D	B015K3 duplicate
>XC511	92-00921-E-2	B015K3 matrix spike (MS)
>XC512	92-00921-E-3	B015K3 matrix spike duplicate (MSD)

Laboratory data is maintained as follows:

Activity	LRB Number	Page Number
• GC/MS injection log	BNW-53728	16-18

- Extraction bench sheet: filed with data in the ACL/ALO records center
- GC/MS data, sample report: filed with data in the ACL/ALO records center

RESULTS

CLP Target Compounds: As seen in the attached 1B,C Forms, the only target compound found was di-n-butyl phthalate (580 and 500 ug/Kg) which was also in the blank (410 ug/Kg) at an acceptable level.

Tentatively Identified Compounds (TIC): The attached 1F Forms show results for the TIC's. Concentration estimates for the TIC's are made assuming that the response factor for each TIC is one. The peak area for each TIC is then compared to the area of the nearest internal standard (for which concentrations are known) to estimate the TIC concentrations. Identification of the TIC is made by a computer search of the NIST mass spectral library to attempt a match with the spectrum of each of the TIC's. The TIC's reported as "Unknown" did not have satisfactory matches with library spectra. The TIC concentration estimate and identification are reported only if the TIC peak area is 10% or greater than the nearest internal standard peak area.

The two TIC's in the blanks that correspond to the first two peaks in the sample and sample duplicate are probably aldol condensation products formed in preparation of soil samples.

The third peak in the samples appears to be an alkane ester of phosphoric acid (430 ug/Kg in both the sample and duplicate). The mass spectrum is not a good match with that of tributyl phosphate.

The following defines the Q-flags in the Form 1's

"Q" Flag	Definition
U	Indicates the compound was analyzed for but not detected, the U-flagged concentration is the Contract Required Quantitation Limit.
J	Indicates an estimated value for target and tentatively identified compounds, spectra meet criteria but response is below Contract Required Quantitation Limit for the target compounds.

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B	Indicates compound was found in the blank.
X	Indicates compound was manually deleted because all requirements were not met.
D	Indicates analysis was performed on a diluted sample.
E	Indicates that quantitation was outside of the calibration range.
A	Aldol condensation product.

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1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015K3

Lab Name: BATTELLE-PNL Contract: -------

Lab Code: ------- Case No.: ------ SAS No.: ------ SDG No.: #9

Matrix: (soil/water) SOIL Lab Sample ID: 92-921-E-1

Sample wt/vol: 30.1 (g/mL) G Lab File ID: >XC509

Level: (low/med) LOW Date Received: 10/23/91

% Moisture: not dec.4.7 dec. -- Date Extracted: 10/30/91

Extraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/25/91

GPC Cleanup: (Y/N) N pH:7.5 Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
108-95-2	Phenol	350.	U
111-44-4	bis(2-Chloroethyl)Ether	350.	U
95-57-8	2-Chlorophenol	350.	U
541-73-1	1,3-Dichlorobenzene	350.	U
106-46-7	1,4-Dichlorobenzene	350.	U
100-51-6	Benzyl alcohol	350.	U
95-50-1	1,2-Dichlorobenzene	350.	U
95-48-7	2-Methylphenol	350.	U
39638-32-9	bis(2-chloroisopropyl)ether	350.	U
106-44-5	4-Methylphenol	350.	U
621-64-7	N-Nitroso-Di-n-propylamine	350.	U
67-72-1	Hexachloroethane	350.	U
98-95-3	Nitrobenzene	350.	U
78-59-1	Isophorone	350.	U
88-75-5	2-Nitrophenol	350.	U
105-67-9	2,4-Dimethylphenol	350.	U
65-85-0	Benzoic acid	1700.	U
111-91-1	bis(2-Chloroethoxy)methane	350.	U
120-83-2	2,4-Dichlorophenol	350.	U
120-82-1	1,2,4-Trichlorobenzene	350.	U
91-20-3	Naphthalene	350.	U
106-47-8	4-Chloroaniline	350.	U
87-68-3	Hexachlorobutadiene	350.	U
59-50-7	4-Chloro-3-methylphenol	350.	U
91-57-6	2-Methylnaphthalene	350.	U
77-47-4	Hexachlorocyclopentadiene	350.	U
88-06-2	2,4,6-Trichlorophenol	350.	U
95-95-4	2,4,5-Trichlorophenol	1700.	U
91-58-7	2-Chloronaphthalene	350.	U
88-74-4	2-Nitroaniline	1700.	U
131-11-3	Dimethylphthalate	350.	U
208-96-8	Acenaphthylene	350.	U
606-20-2	2,6-Dinitrotoluene	350.	U

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1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015K3

Lab Name: BATTELLE-PNL Contract: -------

Lab Code: ------- Case No.: ------ SAS No.: ------ SDG No.: #9

Matrix: (soil/water) SOIL Lab Sample ID: 92-921-E-1

Sample wt/vol: 30.1 (g/mL) G Lab File ID: >XC509

Level: (low/med) LOW Date Received: 10/23/91

% Moisture: not dec.4.7 dec. -- Date Extracted: 10/30/91

Extraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/25/91

GPC Cleanup: (Y/N) N pH:7.5 Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
99-09-2	3-Nitroaniline	1700.	U
83-32-9	Acenaphthene	350.	U
51-28-5	2,4-Dinitrophenol	1700.	U
100-02-7	4-Nitrophenol	1700.	U
132-64-9	Dibenzofuran	350.	U
121-14-2	2,4-Dinitrotoluene	350.	U
84-66-2	Diethylphthalate	350.	U
7005-72-3	4-Chlorophenyl-phenylether	350.	U
86-73-7	Fluorene	350.	U
100-01-6	4-Nitroaniline	1700.	U
534-52-1	4,6-Dinitro-2-methylphenol	1700.	U
86-30-6	N-Nitrosodiphenylamine (1)	350.	U
101-55-3	4-Bromophenyl-phenylether	350.	U
118-74-1	Hexachlorobenzene	350.	U
87-86-5	Pentachlorophenol	1700.	U
85-01-8	Phenanthrene	350.	U
120-12-7	Anthracene	350.	U
84-74-2	Di-n-butylphthalate	580.	B
206-44-0	Fluoranthene	350.	U
129-00-0	Pyrene	350.	U
85-68-7	Butylbenzylphthalate	350.	U
91-94-1	3,3'-Dichlorobenzidine	700.	U
56-55-3	Benzo(a)anthracene	350.	U
218-01-9	Chrysene	350.	U
117-81-7	bis(2-Ethylhexyl)phthalate	350.	U
117-84-0	Di-n-octylphthalate	350.	U
205-99-2	Benzo(b)fluoranthene	350.	U
207-08-9	Benzo(k)fluoranthene	350.	U
50-32-8	Benzo(a)pyrene	350.	U
193-39-5	Indeno(1,2,3-cd)pyrene	350.	U
53-70-3	Dibenz(a,h)anthracene	350.	U
191-24-2	Benzo(g,h,i)perylene	350.	U

(1) - Cannot be separated from Diphenylamine

9613497.2668

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B015K3

Lab Name: BATTELLE-PNL Contract: -------

Lab Code: ------- Case No.: ------ SAS No.: ------ SDG No.: 9

Matrix: (soil/water) SOIL Lab Sample ID: 92-921-E-1

Sample wt/vol: 30.1 (g/mL) G Lab File ID: >XC509

Level: (low/med) LOW Date Received: 10/23/91

% Moisture: not dec. 4.7 dec. -- Date Extracted: 10/30/91

Extraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/25/91

GPC Cleanup: (Y/N) N pH: 7.5 Dilution Factor: 1.00000

Number TICs found: 4

CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	Unknown	4.37	1700.	JAB
2.	Unknown	5.09	790.	JAB
	Unknown	5.32	770.	JAB
4.	Unknown	19.46	430.	J
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
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25.				
26.				
27.				
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30.				

9613497.2669

PCB/PESTICIDE ANALYSIS RESULTS

SAMPLE ANALYSIS REPORTED

Analysis of one 200-BP-1 sample consisting of sample delivery group nine (SDG No. 9) for pesticides and PCBs (Aroclors) by gas chromatography/electron capture detection (GC/ECD) is the subject of this report.

SAMPLE DESCRIPTION AND PREPARATION

Sample ID	ACL Lab Number
B015K3	92-00921-P-1
B015K3 DUPLICATE	92-00921-P-1D
B015K3 MS	92-00921-P-2
B015K3 MSD	92-00921-P-3
Method Blank	92-00921-P-4

The sample was received in good condition on 10/23/91 Extraction of the sample and spiked samples were performed on 10/30/91.

- Extraction procedure PNL-ALO-347.
- Extraction location Lab 302, 325 building
- Extraction type Sonication, low level, soil
- Sample/Extract storage temperature 4°C(±2°)

ANALYSIS METHOD

- GC/ECD procedure: PNL-ALO-346.
- GC/ECD instrumentation: HP-5890 (WB60701)
- GC/ECD location: Lab 325, 325 building.

Screening analysis was not performed on this sample because a screening instrument was not available, and the screen was not anticipated to be necessary.

The GC/ECD used for analysis employed 0.53 megabore capillary columns for both primary and confirmation analysis.

QUALITY CONTROL

In addition to the result forms (1D) the QC features in the analytical procedure were followed as described. The following lists the attached CLP forms that relate to QC and summarizes the results. These forms can be found in appendix E1.

Form	Information	Comments
2F	Surrogate Recovery	Meets all requirements.
3F	MS/MSD Recovery	2 of 12 recoveries were outside control limits. 4 of 6 RPD's were outside control limits.
4C	Method Blank Summary	Meets all method blank requirements.
8D	Evaluation Standards	Meets all requirements.
8E	Retention Time Summary	Meets all requirements.
9	Standards Summary	Meets all requirements.
10	Identification Summary	No compounds to report.

Note:(1) All holding times were met.

(2) No action is required for recoveries or RPD's outside control limits reported on form 3F.

(3) Due to current automation constraints, forms 8 and 9 are provided for the primary column only. The user of this data is instructed to refer to spreadsheets entitled "Retention Time Determination Form" in place of the forms 8 and 9 for the confirmatory analysis. The spreadsheet is included in this package to assist in the confirmation of the reported results.

DATA

Laboratory data is maintained as follows:

Activity	LRB Number	Page Number
• GC/ECD injection log	BNW-53202	66
• Extraction bench sheet: filed with data in the ACL/ALO records center		
• GC/ECD hard copy data, sample report: filed with data in the ACL/ALO records center		

Within the raw data, true "hits" are labeled manually or circled on the area summary report associated with each sample chromatogram. Unless noted as such, all data system generated hits shall be considered false.

RESULTS

No target listed compounds were identified as indicated on the attached 1D Forms at levels above the contract required quantitation limit (CRQL).

Peak height, rather than peak area, was used to determine breakdown on the Eval B standard analyzed 12/05/91. This was done due to improper integration of the peak area by the HP3396A integrator.

The following defines the Q-flags in the Form 1's

"Q" Flag	Definition
U	Indicates the compound was analyzed for but not detected, the U-flagged concentration is the Contract Required Quantitation Limit.
B	Indicates compound was found in the blank.
D	Indicates analysis was performed on a diluted sample.
E	Indicates that quantitation was outside of the calibration range.
C	Indicates results were confirmed by GC/MS Analysis.

9613497.2672

CLP FORMS: PCB/Pesticide Analysis

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015K3

Lab Name: Battelle-PNL Contract: - - -

Lab Code: - - - Case No.: - - - SAS No.: - - - SDG No.: 9

Matrix: (soil/water) soil Lab Sample ID: 92-00921-P-1

Sample wt/vol: 30.1 (g/mL) g Lab File ID: - - -

Level: (low/med) low Date Received: 10/23/91

% Moisture: not dec. 4.7 dec. - - - Date Extracted: 10/30/91

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 12/06/91

GPC Cleanup: (Y/N) N pH: 7.5 Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
319-84-6	alpha-BHC	8.0	U
319-85-7	beta-BHC	8.0	U
319-86-8	delta-BHC	8.0	U
58-89-9	gamma-BHC (Lindane)	8.0	U
76-44-8	Heptachlor	8.0	U
309-00-2	Aldrin	8.0	U
1024-57-3	Heptachlor epoxide	8.0	U
959-98-8	Endosulfan I	8.0	U
60-57-1	Dieldrin	16.0	U
72-55-9	4,4'-DDE	16.0	U
72-20-8	Endrin	16.0	U
33213-65-9	Endosulfan II	16.0	U
72-54-8	4,4'-DDD	16.0	U
1031-07-8	Endosulfan sulfate	16.0	U
50-29-3	4,4'-DDT	16.0	U
72-43-5	Methoxychlor	80.0	U
53494-70-5	Endrin ketone	16.0	U
5103-71-9	alpha-Chlordane	80.0	U
5103-74-2	gamma-Chlordane	80.0	U
8001-35-2	Toxaphene	160.0	U
12674-11-2	Aroclor-1016	80.0	U
11104-28-2	Aroclor-1221	80.0	U
11141-16-5	Aroclor-1232	80.0	U
53469-21-9	Aroclor-1242	80.0	U
12672-29-6	Aroclor-1248	80.0	U
11097-69-1	Aroclor-1254	160.0	U
11096-82-5	Aroclor-1260	160.0	U

9613497.2674

Westinghouse Hanford Company	CHAIN OF CUSTODY

Custody Form Initiator W.S. Thompson

Project #: 91-019 WST 10/17/91

Company Contact W S Thompson

Telephone (509) ~~5X~~ 376-2153

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

Collection Date 10/17/91

Boring: ~~216-B-49A~~ WST 10/17/91 216-B-50C

Time 1100; 1100; 1357

Ice Chest No. PACE/KS #22

Field Logbook No. WHC-N-287-3

Bill of Lading/Airbill No. N/A

Offsite Property No. N/A

Method of Shipment Hand Carry

Shipped to 325 PNL Laboratory

Possible Sample Hazards/Remarks Keep samples chilled. #1 & #2 & #3 nonradioactive with field instruments & no chemical hazards detected.

Sample Identification

#1 B015H8; 1, 120ml; glass; Soil; CLP- total CN, free CN; ferro-CN

#2 B015J8; 1, 120ml, glass; Soil; CLP- total CN; free CN; ferro-CN

#3 B015K0; 1, 120ml, glass; Soil; CLP- total CN; Free CN; Ferro CN

N/A

N/A

☒ Field Transfer of Custody

CHAIN OF POSSESSION		(Sign and Print Names)
Relinquished by: W. S. Thompson Wendy S Thompson	Received by: J. KOBBINS J. Kobbins	Date/Time: 10-18-91 1150
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:

9613497.2675

Westinghouse Hanford Company

SAMPLE ANALYSIS REQUEST

PART I: FIELD SECTION

Collector W.S. Thompson; M.C. Douglas; J.G. Hogan Date Sampled 10/17/91 Time 1100 hours 1100 hours 1357 hours

Company Contact W.S. Thompson Telephone (509) 376-7153

	Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
#1	B015H8	1,120 ml; glass; soil	CLP - Total	CN; free CN; ferro CN
#2	B015J8	1,120 ml; glass; soil	CLP - Total	CN; free CN; ferro CN
#3	B015K0	1,120 ml; glass; soil	CLP - Total	Cn; Free Cn, Ferro Cn.
		N/A		N/A

Field Information** Samples #1 & #2 & #3 support 216-B-50C boring of 200-BP-1 RI/FS

Special Handling and/or Storage Keep samples chilled.

Possible Sample Hazards No hazards indicated

PART II: LABORATORY SECTION

Received by V. Robbins V. ROBBINS Title Sr. RES. SCIENTIST Date 10-18-91

Analysis Required

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

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

A-6000-406 (05/90)

9613497.2676

SAMPLE RECEIPT FORM

Delivered by: MATT DOUGLAS Date/Time: 10-18-91 11:45

Received by: J. ROBBINS

Customer Sample Number(s): B015H8, B015J8, B015K0

ALO Sample Number(s): 92-00570 TO 92-00572

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

2. Additional Shipping Forms (list):

   SAR

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

   Present ✓ Absent

   If Present, Condition: INTACT

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

   Notes: N/A

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

   OK (WATER WITH ICE CONFIRMED TO BE AT 0°C !!!)

6. Condition of Sample Vials.

   OK

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

   OK

8. Resolution of Problems or Discrepancies.

   OK

RETURN COMPLETED FORM TO PROJECT MANAGER

9613497.2677

B015H8

SAMPLE STATUS REPORT FOR E 7484. E-BLANK B015H7 TIME: 10/18/91 8:26
DISPATCHED: 9/17/91 14:58 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 10/18/91 8:17

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 PICI/G	N	Y	~~[illegible]~~ MKO 10/18/91

END OF REPORT

PE3BP

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B01-005

9613497.2678

B015J8

SAMPLE STATUS REPORT FOR E 8125. E-BLANK B015J7 TIME: 10/18/91 8:26
DISPATCHED: 10/17/91 9:59 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 10/18/91 8:17

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 PICI/G	N	Y	PE3BP

END OF REPORT

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B01-006

BOISKO

SAMPLE STATUS REPORT FOR E 8126. E-BLANK 201539 TIME: 10/19/91 8:26
DISPATCHED: 10/17/91 10: 0 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 10/19/91 8:17

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4371	TOT-ACT	< 5.000000E 01 PICI/G	N	/	PE3BP

END OF REPORT

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9613497.2680

Westinghouse Hanford Company	CHAIN OF CUSTODY

Custody Form Initiator W.S. Thompson — Project #: 91-019

Company Contact W.S. Thompson — Telephone (509) 376-2153

Project Designation/Sampling Locations 200-BP-1 Operable Unit — Collection Date 10/22/91

Boring: ~~216-B-57A~~ 216-B-49A ; 216-B-50C — Time 0846, 1131

Ice Chest No. "Sneezy" — Field Logbook No. WHC-N-287-3

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

Method of Shipment Hand Carry

Shipped to ~~325~~ 329 PNL Laboratory (300 Area) Jim Robbins

Possible Sample Hazards/Remarks B015K3 is Radioactive 44.2 nCi/gm of Cs137
B015K2 is nonradioactive (81.73 pCi/gm) keep samples chilled.

Sample Identification

(1) B015K2
1, 120ml, glass, soil; CLP- Total CN, free CN, ferro CN

(2) B015K3
1, 120ml, glass; soil; CLP - Total CN · free CN · ferro CN; NO_3, SO_4, PO_4, Br; ICP metals; AA metals, ICP/MS (Tc99 + Total Uranium)

☐ Field Transfer of Custody	CHAIN OF POSSESSION	(Sign and Print Names)
Relinquished by: W.S. Thompson Wendy S Thompson	Received by: J. ROBBINS J. Robbins	Date/Time: 10-23-91 2:25
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:

A-6000-407 (12/90)

B01-008

Westinghouse Hanford Company

SAMPLE ANALYSIS REQUEST

PART I: FIELD SECTION

Collector: W.S. Thompson; J.G. Hogan — Date Sampled: 10/22/91 — Time: 0846 hours

Company Contact: W.S Thompson — Telephone: (509) ~~1347~~ WSOC 1131 376-2153

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
(1) B015K2	1, 120ml; glass; soil;	CLP-	Total CN; ferro CN; free CN
(2) B015K3	1, 120ml; glass; soil;	CLP-	Total CN; ferro CN; free CN; Bi; NO_3; SO_4; PO_4; ICP/AA metals; ICP/MS; (Tc99 + total Uranium)

Field Information**: All analysis CLP - See lab statement of work
Boring # 216-B-50C → B015K3
216-B-49A → B015K2

Special Handling and/or Storage: Keep Chilled.

Possible Sample Hazards: Sample # 1 is 81.73 pCi/gm total activity
Sample # 2 is 44.5 nCi/gm Cs137

PART II: LABORATORY SECTION

Received by: J. Robbins — J. ROBBINS — Title: Sr. RES SCIENTIST — Date: 10-23-91

Analysis Required: TOTAL CN

*Indicate whether sample is soil, sludge, water, etc.
**Use back of page for additional information relative to sample location.

A-6000-406 (05/90)

9613497.2682

Westinghouse Hanford Company

SAMPLE ANALYSIS REQUEST

PART I: FIELD SECTION

Collector Wendy S. Thompson Date Sampled 10/22/91 Time 1131 hours

Company Contact W. S. Thompson Telephone (509) 376-2153

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
(1) B015K3	1x950ml; amber glass; soil;		CLP-Semi-VOA; Pest/PCB; TOC
	1x125 ml; amber glass; soil;		CLP-VOA

Field Information** All analysis is CLP. See lab statement of work. Support to the 216-B-50C boring.

Special Handling and/or Storage Keep chilled - open under hood with precaution.

Possible Sample Hazards Sample is radioactive ~~44.2nCi~~ wst 10/22/91 44.2nC/gm Cs 137

PART II: LABORATORY SECTION

Received by _____ Title _____ Date _____

Analysis Required _____

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

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

A-6000-406 (05/90)

B01-010

9613497.2683

Westinghouse Hanford Company	CHAIN OF CUSTODY

Custody Form Initiator W.S. Thompson

Project #: 91-019

Company Contact W.S. Thompson

Telephone 376-2153

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

Collection Date 10/22/91

Boring: ~~216-B-49A~~ 216-B-50C wt 10/22/91

Time 1131

Ice Chest No. "Sneezy"

Field Logbook No. WHC-N-287-3

Bill of Lading/Airbill No. N/A

Offsite Property No. N/A

Method of Shipment Hand Carry

Shipped to ~~329~~ 375 PNL Laboratory wt 10/22/91 Diane Bellafatto

Possible Sample Hazards/Remarks Sample is Radioactive - 44.2 nCi/gm Cs137
Keep chilled

Sample Identification

(1) B015K3
1x950ml; amber glass; Soil; CLP-Semi-VOA; Pest/PCB; TOC
1x 125ml; amber glass; Soil; CLP-VOA

☐ Field Transfer of Custody

CHAIN OF POSSESSION (Sign and Print Names)		
Relinquished by: W.S. Thompson Henry S Thompson	Received by: Diane Bellafatto	Date/Time: 10/23/91 2:23pm
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:

A-6000-A (12/90)

B01-011

9613497.2684

Westinghouse Hanford Company

SAMPLE ANALYSIS REQUEST

PART I: FIELD SECTION

Collector W.S. Thompson Date Sampled 10/22/91 Time 1131 hours

Company Contact W.S. Thompson Telephone (509) 376-2153

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
B015K3	1 x 1000 ml; glass;	soil;	CLP-Total α; total beta; GEA; Sr90; Pu (by AEA) Co60; Cs137; Ru106

Field Information** All analysis is CLP-See lab statement of work. Supports the 216-B-50C boring.

Special Handling and/or Storage Keep Chilled

Possible Sample Hazards Sample is radioactive → 44.2 nCi from Cs137

PART II: LABORATORY SECTION

Received by [illegible] Title Sr Tech Spec I Date 10-23-91

Analysis Required

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

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

A-6000-406 (05/90)

B01-012

9613497.2685

Westinghouse Hanford Company	CHAIN OF CUSTODY

Custody Form Initiator W.S. Thompson

Project #: 91-019

Company Contact W.S. Thompson

Telephone (509) 376-2153

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

Collection Date 10/22/91

Boring: ~~216-B-49A~~ 216-B-50C wt 10/22/91

Time 1:31

Ice Chest No. SML-39

Field Logbook No. WHC-N-287-3

Bill of Lading/Airbill No. N/A

Offsite Property No. N/A

Method of Shipment Hand Carry

Shipped to ~~329~~ ~~325~~ wt 10/22/91 ~~329~~ PNL Laboratory

Possible Sample Hazards/Remarks Sample is Radioactive - 44.2 nCi/gm Cs 137
Keep chilled

Sample Identification

① B015K3
1 x 1000ml; glass; soil; CLP - Total alpha/beta; GEA; Sr90; Pu (by AEA) Co60, Cs137; Ru106

☐ Field Transfer of Custody	CHAIN OF POSSESSION	(Sign and Print Names)
Relinquished by: W.S. Thompson Kenny J Thompson	Received by: N.J. Wyatt	Date/Time: 10-23-91 13:50
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:		

A-6000-107 (12/90)

B01-013

9613497.2686

200BP-1
16772

SAMPLE RECEIPT FORM

Delivered by: 10-23-91 Date/Time: 10/23/91 2:23pm

Received by: D. Ballagatti [illegible]

Customer Sample Number(s): B015K3 (Full Suite) B015K2 (CN only)

ALO Sample Number(s): 92-00921 & 92-00922

1. Customer Chain-of-Custody Form: Present UPS Absent _____
2. Additional Shipping Forms (list): Standard RSR, SAR
3. Custody Seals on Shipping and/or Sample Containers and their Conditions.

   Present UPS Absent _____

   If Present, Condition: good
4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.

   Notes: good
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.)
   water in contact with ice found to be 4°C ± 2°C
6. Condition of Sample Vials. good
7. Verification of Agreement or Nonagreement of Information on Receiving Documents. OK
8. Resolution of Problems or Discrepancies. OK

RETURN COMPLETED FORM TO PROJECT MANAGER

9613497.2687

200-BP-1 QA PLAN: ALO-001
PROGRAM: 16772
FILE CAT.:

SAMPLE RECEIPT FORM

Delivered by: Wendy Thompson Date/Time: 10-23-91 13:50

Received by: N. L. Wynhoff

Customer Sample Number(s): ~~B015K3~~ B015K3

ALO Sample Number(s): 91-00921 NLW 10-23-91

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

2. Additional Shipping Forms (list):
   Sample Analysis Request
   Onsite RSR Log

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

   Present X Absent

   If Present, Condition: OK

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

   Notes: OK

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

6. Condition of Sample Vials. OK

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

8. Resolution of Problems or Discrepancies. - None

RETURN COMPLETED FORM TO PROJECT MANAGER

B01-015

9613497.2688

Westinghouse Hanford Company	CHAIN OF CUSTODY

Custody Form Initiator W.S. Thompson — Project #: 91-019

Company Contact W.S. Thompson — Telephone (509)-376-2153

Project Designation/Sampling Locations 200-BP-1 Operable Unit — Collection Date 10/23/91

Boring: ~~216-B-49A~~ 216-B-50C w/ 10/24/91 — Time 1039

Ice Chest No. PACE/KS #22 — Field Logbook No. WHC-N-287-3

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

Method of Shipment Hand Carry

Shipped to 329 PNL Laboratory (Jim Robbins)

Possible Sample Hazards/Remarks Sample is non radioactive. No hazards detected with hand-held field instruments. Keep sample chilled.

Sample Identification

(1) B015K6

1, 120ml, glass; soil, CLP-TOTAL CN; ferroCN; free CN.

☐ Field Transfer of Custody	CHAIN OF POSSESSION	(Sign and Print Names)
Relinquished by: Wendy S Thompson	Received by: J. ROBBINS J. Robbins	Date/Time: 10-24-91 1350
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:

A-6000-407 (12/90)

B01-016

9613497.2689

Westinghouse Hanford Company

SAMPLE ANALYSIS REQUEST

PART I: FIELD SECTION

Collector W.S. Thompson; M.C. Douglas Date Sampled 10/23/91 Time 1039 hours

Company Contact W.S. Thompson Telephone (509) 376-2153

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
① B015K6	1x120ml., glass;	soil;	CLP-TOTAL CN; free CN; ferro CN.

Field Information** All analysis is CLP. See lab statement of work. Sample supports 200-BP-1 (TASK 2/4). 216-B-5de boring

Special Handling and/or Storage Keep sample chilled

Possible Sample Hazards None indicated by hand-held field instruments. Non-radioactive.

PART II: LABORATORY SECTION

Received by [signature] Title Sr. RES. SCIENTIST Date 10-24-91

Analysis Required TOTAL CN

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

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

A-6000-406 (05/90)

9015497.2690

SAMPLE RECEIPT FORM

Delivered by: WENDY THOMPSON Date/Time: 10-24-91 1350

Received by: J. ROBBINS

Customer Sample Number(s): B015K6

ALO Sample Number(s): 92-00931

1. Customer Chain-of-Custody Form: Present ✓ Absent_____
2. Additional Shipping Forms (list):
   SAR
3. Custody Seals on Shipping and/or Sample Containers and their Conditions.
   Present ✓ Absent_____
   If Present, Condition: INTACT
4. Sample Tag(s) ID Numbers if not Recorded on the Chain-of-Custody Record or on Sample Vial.
   Notes: N/A
5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).
   OK (WATER IN CONTACT WITH ICE FOUND TO BE AT 0°C)
6. Condition of Sample Vials.
   OK
7. Verification of Agreement or Nonagreement of Information on Receiving Documents.
   OK
8. Resolution of Problems or Discrepancies.
   OK

RETURN COMPLETED FORM TO PROJECT MANAGER

9613497 2691

SAMPLE STATUS REPORT FOR E 8129. E-BLANK ~~BG15K5~~ B01SK6 TIME: 10/24/91 18:13
DISPATCHED: 10/17/91 10: 1 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 10/24/91 7:59

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	5.000000E 01 PICI/G	N	Y	PE3BP

END OF REPORT

BEST COPY AVAILABLE

B01-019

9613197.2692

Westinghouse Hanford Company	CHAIN OF CUSTODY

Custody Form Initiator W.S. Thompson

Project #: 91-019

Company Contact W.S. Thompson

Telephone 6-2153

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

Collection Date 10/24/91

Boring: ~~216-B-49A~~ 216-B-50C (#1) 216-B-49A (#2) (#3)

Time 1130; 1925 PT; 0946; 0952

Ice Chest No. #64

Field Logbook No. WHC-N-287-3

Bill of Lading/Airbill No. N/A

~~Office Property No. N/A~~

~~200-BP-1 OX PLAN: ALO 001~~

PROGRAM: 16772

Method of Shipment Hand Carry

~~FILE CAT.:~~

Shipped to ~~329~~ 325 PNL Laboratory

Possible Sample Hazards/Remarks Sample is non hazardous. Keep sample chilled.

Sample Identification

(1) B00X88
3 x 1000ml; plastic; water (NaOH); CLP-total CN; free CN; ferro CN

(2) B015H0
3 x 1000 ml; plastic; water (NaOH); CLP - total CN; free CN; ferro CN

(3) B015K8
1 x 120 ml; glass; soil; CLP- total CN, free CN, ferro CN

☐ Field Transfer of Custody

CHAIN OF POSSESSION (Sign and Print Names)

Relinquished by:	Received by:	Date/Time:
Kindy S Thompson	J. Robbins	1:30 10-28-91
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=020

9613497.2693

Westinghouse Hanford Company

SAMPLE ANALYSIS REQUEST

PART I: FIELD SECTION

10/25/91 0946 ; 0952

Collector W.S Thompson; MC Douglas; Date Sampled 10/24/91 Time 1130 hours

Company Contact W.S Thompson Telephone (509) 376-2153

	Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
1	B00X88	3 x 1000 ml ; Plastic	Water (NaOH)	CLP - Total CN ; Free CN ; Ferro CN
2	B015H0	3 x 1000 ml ; Plastic	Water (NaOH)	CLP - Total CN ; Free CN ; Ferro CN
3	B015K8	1 x 120 ml ; Glass	Soil ; CLP-	Total CN , Free CN , Ferro CN

Field Information** Sample collected from 200-BP-1 ; borehole 216-B-49A in Support of Task 2 & 4 RI/FS.
All Analysis CLP (See Statement of Work)

Special Handling and/or Storage "Keep samples chilled."

Possible Sample Hazards No chemical or radiological hazards indicated with field instruments.

PART II: LABORATORY SECTION

Received by J. ROBBINS Title Sr RES SCIENTIST Date 10-28-91

Analysis Required TOTAL CN

*Indicate whether sample is soil, sludge, water, etc.
**Use back of page for additional information relative to sample location.

A-6000-406 (05/90)

B01-021

9613497.2698

SAMPLE RECEIPT FORM

Delivered by: W. THOMPSON Date/Time: 10-28-91 1:30

Received by: J. ROBBINS

Customer Sample Number(s): B0X88, B015H0, B015K8

ALO Sample Number(s): 92-00975 to 92-00977

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

2. Additional Shipping Forms (list):
   SAR

3. Custody Seals on Shipping and/or Sample Containers and their Conditions.
   Present ✓ Absent ____
   If Present, Condition: INTACT

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

5. Condition of Shipping Container (Verify that ice still exists such that samples are at refrigerated temperature).
   ICE IN CONTACT WITH WATER YEW
   WATER AT 0°C.

6. Condition of Sample Vials.
   OK

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

8. Resolution of Problems or Discrepancies.
   OK

RETURN COMPLETED FORM TO PROJECT MANAGER

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B00X880 wat 10/28/91
B015H2 and
~~B00XB9~~

SAMPLE STATUS REPORT FOR E 7872. E-BLANK
DISPATCHED: 10/ 7/91 13: 1
RECEIVED: 10/28/91 10:37

SAMPLE HAS NOT BEEN SLURPED

TIME: 10/28/91 10:40

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD CHARGE ANS?	CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 PICI/G	N	Y	PE3BP

END OF REPORT

B01-023

9613497.2696

B015K8 wsh 10/28/91

SAMPLE STATUS REPORT FOR E 8270. E-BLANK ~~B015K7~~ TIME: 10/28/91 10:40
DISPATCHED: 10/23/91 15:14 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 10/28/91 10:37

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	1.73960E 02 PICI/G	N	Y	PE3BP

END OF REPORT

B01-024

9613497.2697

Chain of Custody Number 200BP1-98

ALO CHAIN OF CUSTODY

200-BP-1 QA PLAN: ALO-00
PROGRAM: 16772
FILE CAT.: 1.2

ALO SAMPLE NUMBER	ANALYSIS REQUESTED	SAMPLE DESCRIPTION
92-00921	Tc-99/U	SOIL

SENDER [signature] DATE 11/06/91 14:15

RECEIVER [signature] DATE 11/6/91 14:45

ALO SAMPLE NUMBER	ANALYSIS REQUESTED	SAMPLE DESCRIPTION

SENDER _____ DATE _____

RECEIVER _____ DATE _____

ALO SAMPLE NUMBER	ANALYSIS REQUESTED	SAMPLE DESCRIPTION

SENDER _____ DATE _____

RECEIVER _____ DATE _____

ALO SAMPLE NUMBER	ANALYSIS REQUESTED	SAMPLE DESCRIPTION

SENDER _____ DATE _____

RECEIVER _____ DATE _____

Original - Project Management Office
Copy - Sender
Copy - Receiver

Applicable Test Instruction

TI-200BP-1-105

B02-002

9613497.2698

Report To

Westinghouse Hanford Company
Richland, Washington

Data Validation Report
200-BP-1 RI/FS
Laboratory: Pacific Northwest Laboratory
Data Packages: B00X68-PNL-050, B00X64-PNL-051, B015G4-PNL-052, B015H8-PNL-053
Sample Matrix: Soil and Water
Analysis Type: Organics/Inorganics/Wet Chemistry/Radiochemistry

Prepared By

Golder Associates Inc.
Redmond, Washington

February 8, 1993

913-1719

9613497.2699

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1. INTRODUCTION

This report presents the results of data validation conducted on organic, inorganic, wet chemistry and radiochemistry analyses performed on soil and water samples collected in support of the 200-BP-1 Operable Unit remedial investigation/feasibility study (RI/FS) at the Hanford Site. The samples were analyzed for several parameters by the Pacific Northwest Laboratory (PNL) in Richland, Washington. The following analyses were validated:

- Volatile Organics
- Semivolatile Organics
- Pesticides/PCBs
- Metals/Cyanide
- Wet Chemistry
- Gross Alpha/Beta
- Strontium-90
- Alpha spectroscopy (Isotopic Plutonium)
- Tritium
- Gamma Spectroscopy
- ICP/MS (Technetium-99 and Total Uranium)

Data verification was conducted by comparison of the reported results against the raw data and laboratory worksheets provided in the data packages, discrepancies noted were corrected on the laboratory report forms provided in Attachment 3. The radiochemistry sample results and minimum detectable activity values were verified using computer spreadsheet models. Printouts of the spreadsheet data are provided in Appendix B.

Sample identifications, locations and sample dates are provided in Table 1. Data validation was conducted in accordance with the Westinghouse Hanford Company statement of work (WHC 1991) and validation procedures (WHC 1992a and 1992b).

Data qualifiers applied as a result of the validation performed are summarized below:

B Indicates the compound or analyte was analyzed for and detected. The value reported is less than the CRQL but greater than the 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 an 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.

2. DATA QUALITY OBJECTIVES

2.1 Completeness

Data quality objectives for the project specified the use of CLP methods for the TCL volatiles, semivolatiles, pesticides/PCBs and TAL metals/cyanide analytes and the use of standard methods for the wet chemistry parameters. The data packages were complete for all requested analyses and met the data quality objectives of the work plan with the exception of the items listed below.

- The volatile initial calibration form associated with SDG B00X64 was submitted with the data package, however, the supporting raw data was not included. No qualification was necessary since the ICV calculations were confirmed in the other three data packages completing this data set.

- The mercury analysis for SDG B015G4 was provided for two of three analysis dates in which all holding times were exceeded. The sample run performed on October 16, 1991 is the only set that does not exceed the holding time for mercury analysis, however, the data was not provided for this run.

- The graphite furnace (GFAA) raw data was not provided in the data package for SDG B015H8. The data was provided in another data package (SDG B015G4), therefore the data could be validated.

- The strontium-90 blank and blank spike results in SDG B00X68 have been rejected (R) since the reported blank spike is not associated with the reported blank sample.

- The technetium-99 results in SDG B00X68 have been rejected (R) since the associated raw data was not submitted with the data package, hence, the results could not be verified.

- The strontium-90 counter control and background data associated with detectors 1, 2, and 3 which are associated with the laboratory blank and laboratory blank duplicate samples in SDGs B015H8 and B015G4 were not included in the data package. The continuing calibration information data for strontium in other SDGs of this data set do not include the associated date of analysis. Therefore, the strontium-90 results for BL-00306 and BL-00306 Dup have been qualified as rejected (R).

- The initial calibration raw data associated with the parameters gross alpha, gross beta, strontium-90, and tritium was not provided. However, since general calibration information was submitted, but was not detector specific, the associated sample results have been qualified as estimated (J for detects, UJ for non-detects).

- The gamma spectroscopy raw data sheet for sample B00X77 (SDG B00X64) listing the MDA values of ruthenium-106 and cobalt-60 was missing from the data package. No qualification was required since the positive results could be verified.

A total of 28 samples were validated as part of this data set with a total of 858 determinations (analyses) reported. Out of the 858 determinations reported, 678 were deemed valid which results in a completeness of 79 percent ([2501/2671] x 100). This completeness percentage does not meet the work plan objective of 80% or the QAPjP objective of 90%.

2.2 Detection Limit and Sample Result Verification

The following detection limits, minimum detectable activity (MDA), and sample results could not be verified based on the raw data provided.

Volatiles

- The sample results associated with SDG B015G4 reported methylene chloride, toluene, carbon tetrachloride, and 1,1,1-trichloroethane as undetected. However, the sample results for these compounds were recalculated and detected during the validation process. Therefore, the results have been corrected on the associated laboratory report forms.

Semivolatiles

- Compounds identified during the validation process but were not reported by the laboratory for SDG B00X68, sample B00X75 were bis-(2-ethylhexyl)phthalate and di-n-octylphthalate which were also detected in the blank and subsequently qualified as undetected (U).

- Compound di-n-butylphthalate was reported at 44 ug/kg and has been corrected to 22 ug/kg due to a laboratory error.

Pesticides

- Aldrin for SDG B00X68, sample B00X75, was not reported by the laboratory and has been corrected on the report form.

- Heptachlor was not reported in the blank associated with SDG B00X68. This compound was corrected on the laboratory report form and corresponding

results for sample B00X75 have been qualified as undetected (U) due to blank contamination.

Metals

- All cyanide results were corrected to the CRQL of 10 mg/kg from the reported 0.6 mg/kg value, which could not be verified.
- The reporting limits for the analytes performed by the GFAA were adjusted to the CRDL value for non-detects instead of the reported "<IDL" values for all associated samples.

Wet Chemistry

- The detected result for nitrate was calculated incorrectly for sample B00X75 in SDG B00X68. The associated result has been recalculated and corrected on the laboratory report form.
- The detected results for nitrite, nitrate, and phosphate were calculated incorrectly for samples B015G9 and B015H1. The associated results have been recalculated and corrected on the laboratory report forms.

Radiochemistry

- The detected result for plutonium-239 was calculated incorrectly for the laboratory blank in SDG B00X68. The associated result has been recalculated and corrected on the laboratory report form.
- The detected results for plutonium-238 were calculated incorrectly for samples B015H1 and B015K3. The associated results have been recalculated and corrected on the laboratory report forms.
- Reported MDA values for plutonium-238 in the laboratory blank for SDG B00X68 could not be verified therefore, the associated result has been qualified as estimated (UJ).
- The total uranium results for samples B015G9, B015G9 duplicate, and B015G9 matrix spike could not be verified. Therefore, the associated results have been rejected (R).

2.3 Sample Quantitation Limits

Sample quantitation limits were met with the exception of differences due to moisture content sample size and dilution factors.

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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.

Volatiles

- The holding times for B00X75 and B00X77 (both the samples and laboratory duplicates) were exceeded by a factor greater than two (28 days). Therefore, the associated sample results have been qualified as rejected (R).

Semivolatiles

- Samples B00X75 and B00X77 contain the tentatively identified compounds (TIC) identified as aldol condensation products which are known to be laboratory contaminants. Therefore, the associated results been qualified as rejected (R).

- The surrogate recovery for 2-fluorophenol was zero percent for sample B015G9 in SDG B015G4. The sample was then re-analyzed, however, the data for the re-analysis was not submitted with the data package. Therefore, the compounds associated with the surrogate 2-fluorophenol in sample B015G9 and B015G9 (laboratory duplicate) have been qualified as rejected (R).

Pesticides/PCBs

- Sample B00X77 in SDG B00X64 required re-extraction which was performed out of the holding time by a factor greater than two (14 days). Unfortunately, the data from the first analysis was not provided in the data package. Therefore, the sample results associated with the re-extraction have been qualified as rejected (R).

Metals

- The sample results for mercury in B00X75 and B015K3 were rejected (R) since the holding times were exceeded by a factor greater than two (46 days).

- The cyanide result for sample B00X77 was rejected (R) since the holding time was exceeded by a factor greater than two (28 days).

- The matrix spike percent recovery for sample B00X77 was less than 30%, and the sample result was less than the instrument detection limit (IDL). Therefore, the associated sample result has been qualified as rejected (R).

- The laboratory control sample (LCS) for potassium in SDGs B015G4 and B015H8 was less than 50% recovery, therefore, the associated sample results have been rejected (R).

Radiochemistry

- The plutonium-238 and 239 sample runs associated with SDGs B00X68, B015H8, and B015G4 are not bracketed by acceptable counter control checks. Therefore, the associated results have been qualified as rejected (R).

- Tritium calibration check results for the samples associated with SDGs B015H8 and B015G4 were outside the laboratory control limits causing rejection (R) of the sample results.

- The gross beta result for sample B015H1 duplicate in SDG B015G4 has been rejected (R) since the calibration check was outside of the control limits.

3.2 Minor Deficiencies

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

3.2.1 Volatile Organics

Blanks

The following compounds were detected in the laboratory blanks.

- SDG B015G4: Acetone and 2-butanone

- SDG B015H8: Acetone and 2-butanone

The associated positive sample results with concentrations less than ten times the blank concentrations have been qualified as undetected (U).

3.2.2 Semivolatile Organics

Holding Times

The following samples exceeded holding times:

- SDG B00X68: Samples B00X75 and B00X75 duplicate

- SDG B015H8: Samples B015K3, B015K3 (duplicate), B015K3MS, and B015K3MSD were extracted out of holding time

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Quantitation limits and results for the above samples have been qualified as estimated (J for detects, UJ for non-detects)

Initial Calibration

The following compounds and their associated SDGs exceeded the initial calibration relative standard deviation (RSD) limit of 30%:

- SDG B00X68: Bis-2-chloroethylether, 4-chloroaniline and 3-nitroaniline

The associated sample results have been qualified as estimated (J for detects, UJ for non-detects).

Continuing Calibration

The following compounds and their associated SDGs exceeded the continuing calibration percent difference (%D) limit of 25%:

- SDG B00X68: bis-2-chloroethylether, 4-chloroaniline, and 3-nitroaniline
- SDG B00X64: 4-chloroaniline, 3-nitroaniline, 2,4-dinitrophenol, 4-nitrophenol, and 4-nitroaniline
- SDG B015G4: 4-chloroaniline, hexachlorocyclopentadiene, and 3-nitroaniline
- SDG B015H8: Bis(2-chloroisopropyl)ether, 4-chloroaniline, hexachlorocyclopentadiene, and 3-nitroaniline

The associated sample results have been qualified as estimated (J for detects, UJ for non-detects).

Blanks

The following compounds were detected in the laboratory blanks:

- SDG B00X68: Di-n-butylphthalate, di-n-octylphthalate, and the TIC identified as unknowns at the retention times of 4.76, 5.80, and 33.84 minutes.
- SDG B00X64: Di-n-octylphthalate and the TIC identified as an unknown at a retention time of 5.04 minutes.
- SDG B015G4: Di-n-butylphthalate, the TIC identified as triphenyl phosphic oxide, and the TICs identified as unknowns at retention times of 4.44, 5.18, and 5.42 minutes.
- SDG B015H8: Di-n-butylphthalate and the TICs identified as unknowns at the retention times of 4.37, 5.09, and 5.32 minutes.

All associated positive samples results less than five or ten times the blank concentration for the above compounds in the respective SDG have been qualified as undetected (U).

3.2.3 Pesticides/PCBs

Holding Times

The following samples exceeded holding times:

- SDG B00X68: Sample B00X75 and the laboratory blank
- SDG B015H8: Sample B015K3
- SDG B015G4: Samples B015G9 and B015H1

The associated results for the above samples have been qualified as estimated (J for detects, UJ for non-detects).

Continuing Calibration

- The continuing calibration percent difference limit of 15% was exceeded for several compounds associated with sample B00X75 in SDG B00X68. However, the associated sample results have already been qualified due to exceeded holding times therefore, no further qualification is required.

Blanks

The following compounds were detected in the laboratory blanks:

- SDG B00X68: Heptachlor

All associated positive sample results less than five times the blank concentration for the above compounds in the respective SDG have been qualified as undetected (U).

Matrix Spikes

- The matrix spike percent recoveries associated with SDG B00X68 were out of the control limits. The associated sample results have already been qualified due to exceeded holding times therefore, no further qualification was necessary.

3.2.4 Metals

Holding Times

The following samples exceeded holding times:

- For cyanide, samples B00X72, B015G4, B015G6, B015G8, B015G9, B00X88, and B015H0

- For mercury, sample B00X77

The associated sample results have been qualified as estimated (J for detects, UJ for non-detects).

Calibration

- An initial calibration verification (ICV) sample was performed for cyanide analysis in place of a mid-range standard. Therefore, no qualification of the data was required.

- The cyanide ICV percent recovery exceeded control limits for the associated samples in SDGs B015G4 and B015H8. The associated sample results (B015H1, B015H4, and B015K8) have been qualified as estimated (J for detects, UJ for non-detects).

Blanks

The following compounds were detected in the laboratory blanks:

- SDG B00X68: Copper

- SDG B00X64: Antimony, copper, cobalt, and potassium

- SDG B015G4: Cadmium and potassium

- SDG B015H8: Cadmium and potassium

All associated positive sample results less than five times the blank concentration for the above compounds in the respective SDG have been qualified as undetected (U).

Matrix Spike

The following spike results exceeded the QC limits of 75% to 125%:

- SDG B00X68: Antimony and manganese

- SDG B00X64: Antimony

- SDG B015G4: Antimony

- SDG B015H8: Antimony

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The associated sample results have been qualified as estimated (J for detects, UJ for non-detects).

Laboratory Control Sample

The following laboratory control sample percent recoveries were out of the specified control limits:

- SDG B00X68: Arsenic
- SDG B00X64: Thallium
- SDG B015G4: Aluminum and sodium
- SDG B015H8: Aluminum and sodium

The associated sample results in the respective SDG have been qualified as estimated (J for detects, UJ for non-detects).

Duplicates

- A laboratory duplicate for cyanide was performed on the water sample, B00X82 in SDG B00X64, the RPD value was 61.83%. Therefore, the associated cyanide result has been qualified as estimated (J).

Serial Dilutions

The following serial dilution results exceeded the QC limits of 10% for analyte concentrations greater than 50 times the IDL:

- SDG B00X64: Zinc, iron, and manganese

The associated sample results have been qualified as estimated (J for detects, UJ for non-detects).

3.2.5 Wet Chemistry

Holding Times

The following samples exceeded holding times for the anion parameters, phosphate, nitrate, nitrite, and sulfate:

- SDG B00X68: Sample B00X75 (nitrite, nitrate, and phosphate only)
- SDG B00X64: Sample B00X77
- SDG B015G4: Samples B015G9 and B015H1

- SDG B015H8: Sample B015K3

The associated sample results have been qualified as estimated (J for detects, UJ for non-detects).

Calibration

- The phosphate ICV was outside the control limits for B00X75, therefore, the result has been qualified as estimated (UJ).

Duplicates

- The RPD values for nitrate were out of specification for the duplicate analysis for SDG B015G4. Since associated samples had been previously qualified as estimated (J) no further qualification was required.

- The laboratory duplicate for nitrate associated with the samples in SDG B015G4 was out of the control limits, however, the associated samples had been previously qualified due to holding time exceedance.

3.2.6 Radiochemistry

Holding Times

- All radiochemistry parameters were analyzed within holding time, therefore, no qualification was required.

Method Blanks

Positive results are reported in the method blanks for the following parameters:

- SDG B00X64: Gross beta, strontium, and uranium

- SDG B00X68: Gross beta, plutonium-239 and strontium

- SDG B015H8: Gross beta and strontium-90

- SDG B015G4: Strontium-90

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

Matrix Spike Recovery

Sample spike recoveries were between 105% and 115% in the following samples:

- SDG B015H8: Gross beta

The associated sample results have been qualified as estimated (J for detects, UJ for non-detects).

Blank Spike Recovery

Blank spike recoveries were between 105% and 115% in the following SDGs causing associated sample results to be qualified as estimated (J for detects, UJ for non-detects):

- SDG B00X68: Gross alpha
- SDG B00X64: Gross alpha
- SDG B015G4: Gross alpha and gross beta

Laboratory Control Samples

- No laboratory control samples were analyzed as part of this data set therefore, unless otherwise specified all detected results have been qualified as estimated (J).

Duplicate

The duplicate RPD for the following parameters in the associated SDGs were out of the control limits of 35%:

- SDG B00X64 Plutonium and strontium-90
- SDG B015H8 Tritium
- SDG B015G4 Tritium

The associated sample results have been qualified as estimated (J for detects, UJ for non-detects).

3.2.7 ICP/MS (Technetium-99 and Total Uranium)

Holding Times

- All technetium-99 and total uranium analyses were performed within holding time, therefore, no qualification is required.

Method Blanks

- Technetium-99 was present in the method blank associated with SDG B015G4. Therefore, the TC-99 result for B015G9 has been qualified as undetected (U).

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Matrix Spike

The following spike results exceeded the QC limits of 75% to 125%:

- SDG B015G4: Technetium-99 and total uranium
- SDG B015H8: Technetium-99 and total uranium

The associated sample results have been qualified as estimated (J for detects, UJ for non-detects).

Duplicates

- The duplicate RPD for technetium-99 was out of the control limits for SDG B015G4 and B015H8.

Laboratory Control Samples

- Laboratory control samples (LCS) were analyzed for technetium-99 and total uranium, however, the LCS concentrations are unknown. Therefore, all detected results have been qualified as estimated (J).

4. CONCLUSION

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 with the exception of those major deficiencies described in Section 3.1. The original, as received data package will be transmitted at a later date under separate cover for inclusion in the project QA record.

The appendices provide supporting documentation and a tabular summary of the qualified data.

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

WHC, 1992b, Westinghouse Hanford Company, Data validation Procedures for Chemical Analyses, WHC-SD-EN-SPP-001, Rev. 0, 1992. Westinghouse Hanford Company, Richland, Washington.

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TABLES

TABLE 1

LIST OF SAMPLES VALIDATED, SDG B00X68-PNL-050, B00X64-PNL-051, B015G4-PNL-052 AND B015H8-PNL-053

DATA PACKAGE ID	HEIS NO.	PNL ID	SAMPLE DATE	LOCATION	COMMENTS
B00X68-PNL-050	B00X68	91-7426	07/25/91	216-B-49A 3.0-5.5	
B00X68-PNL-050	B00X70	91-7427	07/25/91	216-B-49A 8.5-11.0	
B00X68-PNL-050	B00X72	91-7504	07/29/91	216-B-57A 82.0-84.5	
B00X68-PNL-050	B00X74	91-7623	08/01/91	216-B-57A 109.5-112.0	
B00X68-PNL-050	B00X90	91-7807	08/06/91	216-B-57A 139.0-141.5	
B00X68-PNL-050	B00X75	91-7815	08/06/91	216-B-49A 17.0-20.0	
B00X68-PNL-050	B00X92	91-7875	08/08/91	216-B-57A 166.5-169.0	
B00X68-PNL-050	B00XC0	91-7505	07/30/91	216-B-57A	TRIP BLANK
B00X68-PNL-050	B00X84	91-7624	08/01/91	216-B-57A	EQUIPMENT BLANK
B00X64-PNL-051	B00X64	91-6420	07/09/91	216-B-57A 30.0-33.0	
B00X64-PNL-051	B00X77	91-6421	07/09/91	216-B-57A 30.0-33.0	
B00X64-PNL-051	B00X82	91-6693	07/16/91	216-B-57A	EQUIPMENT BLANK
B00X64-PNL-051	B00X66	91-6906	07/17/91	216-B-57A 55.5-58.0	
B00X64-PNL-051	B00X78	91-6907	07/17/91	216-B-57A 55.5-58.0	
B015G4-PNL-052	B015G4	92-00019	09/30/91	216-B-49A 104.5-107.0	
B015G4-PNL-052	B015G6	92-00116	10/02/91	216-B-50B 3.5-6.0	

TABLE 1 (Cont.)

LIST OF SAMPLES VALIDATED, SDG B00X68-PNL-050, B00X64-PNL-051, B015G4-PNL-052 AND B00XH8-PNL-053

DATA PACKAGE ID	HEIS NO.	PNL ID	SAMPLE DATE	LOCATION	COMMENTS
B015G4-PNL-052	B015G8	92-00117	10/02/91	216-B-50B 12.0-16.0	
B015G4-PNL-052	B015G9	92-00306	10/04/91	216-B-50B 15.5-17.5	
B015G4-PNL-052	B015H4	92-00356	10/09/91	216-B-50B 28.0-30.5	
B015G4-PNL-052	B015H6	92-00357	10/09/91	216-B-49A 135.0-137.5	
B015G4-PNL-052	B015H1	92-00358	10/09/91	216-B-50B 28.0-30.5	
B015H8-PNL-053	B015H8	92-00570	10/17/91	216-B-50C 3.5-6.0	
B015H8-PNL-053	B015J8	92-00571	10/17/91	216-B-50C 3.5-6.0	
B015H8-PNL-053	B015K0	92-00572	10/17/91	216-B-50C 11.0-15.0	
B015H8-PNL-053	B015K3	92-00921	10/22/91	216-B-50C 19.0-20.5	
B015H8-PNL-053	B015K2	92-00922	10/22/91	216-B-49A 162.0-164.5	
B015H8-PNL-053	B015K6	92-00931	10/23/91	216-B-50C 28.0-30.5	
B015H8-PNL-053	B00X88	92-00975	10/24/91	216-B-50C	EQUIPMENT BLANK
B015H8-PNL-053	B015H0	92-00976	10/24/91	216-B-49A	FIELD BLANK
B015H8-PNL-053	B015K8	92-00977	10/24/91	216-B-49A 190.5-193.0	

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APPENDIX A

AS QUALIFIED DATA SUMMARY AND LABORATORY RESULTS

BATTELLE - PACIFIC NORTHWEST LABORA		TORY									
DATA PACKAGE		B00X68		B00X64		B015G4		B015G4		B015H8	
SAMPLE NUMBER		B00X75		B00X77		B015G9		B015H1		B015K3	
VOLATILE ORGANIC COMPOUND	CRQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
CHLOROMETHANE	10	47	R	48	R	46	U	55	U	34	U
BROMOMETHANE	10	47	R	48	R	46	U	55	U	34	U
VINYL CHLORIDE	10	47	R	48	R	46	U	55	U	34	U
CHLOROETHANE	10	47	R	48	R	46	U	55	U	34	U
METHYLENE CHLORIDE	5	24	R	24	R	23	U	3	J	17	U
ACETONE	10	47	R	50	R	83	B	28	U	34	U
CARBON DISULFIDE	5	24	R	24	R	23	U	27	U	17	U
1,1-DICHLOROETHENE	5	24	R	24	R	23	U	27	U	17	U
1,1-DICHLOROETHANE	5	24	R	24	R	23	U	27	U	17	U
1,2-DICHLOROETHENE (TOTAL)	5	24	R	24	R	23	U	27	U	17	U
CHLOROFORM	5	24	R	24	R	23	U	27	U	17	U
1,2-DICHLOROETHANE	5	24	R	24	R	23	U	27	U	17	U
2-BUTANONE	10	47	R	51	R	53	U	35	U	17	U
1,1,1-TRICHLOROETHANE	5	24	R	24	R	7	J	8	J	17	U
CARBON TETRACHLORIDE	5	24	R	24	R	23	U	27	U	17	U
VINYL ACETATE	10	47	R	48	R	46	U	55	U	34	U
BROMODICHLOROMETHANE	5	24	R	24	R	23	U	27	U	17	U
1,2-DICHLOROPROPANE	5	24	R	24	R	23	U	27	U	17	U
CIS-1,3-DICHLOROPROPENE	5	24	R	24	R	23	U	27	U	17	U
TRICHLOROETHENE	5	24	R	24	R	23	U	27	U	17	U
DIBROMOCHLOROMETHANE	5	24	R	24	R	23	U	27	U	17	U
1,1,2-TRICHLOROETHANE	5	24	R	24	R	23	U	27	U	17	U
BENZENE	5	24	R	24	R	23	U	27	U	17	U
TRANS-1,3-DICHLOROPROPENE	5	24	R	24	R	23	U	27	U	17	U
BROMOFORM	5	24	R	24	R	23	U	27	U	17	U
4-METHYL-2-PENTANONE	10	47	R	48	R	46	U	55	U	34	U
2-HEXANONE	10	47	R	48	R	46	U	55	U	34	U
TETRACHLOROETHENE	5	24	R	24	R	23	U	27	U	17	U
1,1,2,2-TETRACHLOROETHANE	5	24	R	24	R	23	U	27	U	17	U
TOLUENE	5	24	R	9	R	2	J	2	J	17	U
CHLOROBENZENE	5	24	R	24	R	23	U	27	U	17	U
ETHYLBENZENE	5	24	R	24	R	23	U	27	U	17	U
STYRENE	5	24	R	24	R	23	U	27	U	17	U
XYLENES (TOTAL)	5	24	R	24	R	23	U	27	U	17	U

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BATTELLE - PACIFIC NORTHWEST LABORATORY											
DATA PACKAGE		B00X68		B00X64		B015G4		B015G4		B015H8	
SAMPLE NUMBER		B00X75		B00X77		B015G9		B015H1		B015K3	
SEMIVOLATILE COMPOUND	CRQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
4-NITROPHENOL	1600	1700	UJ	1700	UJ	3400	R	1700	U	1700	UJ
DIBENZOFURAN	330	330	UJ	330	U	670	R	350	U	350	UJ
2,4-DINITROTOLUENE	330	330	UJ	330	U	670	R	350	U	350	UJ
DIETHYLPHTHALATE	330	620	J	330	U	670	R	350	U	350	UJ
4-CHLOROPHENYL-PHENYLETHER	330	330	UJ	330	U	670	R	350	U	350	UJ
FLUORENE	330	330	UJ	330	U	670	R	350	U	350	UJ
4-NITROANILINE	1600	1700	UJ	1700	UJ	3400	R	1700	U	1700	UJ
4,6-DINITRO-2-METHYLPHENOL	1600	1700	UJ	1700	U	3400	R	1700	U	1700	UJ
N-NITROSODIPHENYLAMINE	330	330	UJ	330	U	670	R	350	U	350	UJ
4-BROMOPHENYL-PHENYLETHER	330	330	UJ	330	U	670	R	350	U	350	UJ
HEXACHLOROBENZENE	330	330	UJ	330	U	670	R	350	U	350	UJ
PHENANTHRENE	330	330	UJ	330	U	670	R	350	U	350	UJ
ANTHRACENE	330	330	UJ	330	U	670	R	350	U	350	UJ
DI-N-BUTYLPHTHALATE	330	350	UJ	22	J	740	R	410	U	580	UJ
FLUORANTHENE	330	330	UJ	330	U	670	R	350	U	350	UJ
PYRENE	330	330	UJ	330	U	670	R	350	U	350	UJ
BUTYLBENZYLPHTHALATE	330	330	UJ	330	U	670	R	350	U	350	UJ
3,3'-DICHLOROBENZIDINE	660	670	UJ	670	U	1300	R	700	U	700	UJ
BENZO(A)ANTHRACENE	330	330	UJ	333	U	670	R	350	U	350	UJ
CHRYSENE	330	330	UJ	333	U	670	R	350	U	350	UJ
BIS(2-ETHYLHEXYL)PHTHALATE	330	23	J	333	U	670	R	350	U	350	UJ
PENTACHLOROPHENOL	1600	1700	UJ	1700	U	3400	R	1700	U	1700	UJ
DI-N-OCTYLPHTHALATE	330	330	UJ	330	U	47	R	350	U	350	UJ
BENZO(B)FLUORANTHENE	330	330	UJ	330	U	670	R	350	U	350	UJ
BENZO(K)FLUORANTHENE	330	330	UJ	330	U	670	R	350	U	350	UJ
BENZO(A)PYRENE	330	330	UJ	330	U	670	R	350	U	350	UJ
INDENO(1,2,3-CD)PYRENE	330	330	UJ	330	U	670	R	350	U	350	UJ
DIBENZ(A,H)ANTHRACENE	330	330	UJ	330	U	670	R	350	U	350	UJ
BENZO(G,H,I)PERYLENE	330	330	UJ	330	U	670	R	350	U	350	UJ

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BATTELLE - PACIFIC NORTHWEST L ABORATORY											
DATA PACKAGE		B00X68		B00X64		B015G4		B015G4		B015H8	
SAMPLE NUMBER		B00X75		B00X77		B015G9		B015H1		B015K3	
INORGANIC ANALYTES	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
ALUMINUM	40	7420		7610		8030	J	6010	J	8700	J
ANTIMONY	12	4.6	UJ	4.3	UJ	2.6	UJ	2.8	UJ	2.9	UJ
ARSENIC	2	2.3	J	2.4	B	6.47	B	5.44	B	8.22	B
BARIUM	40	59.1		63.7		78.6		68.6		69.9	
BERYLLIUM	1	0.45	B	0.3	B	0.26	B	0.26	B	0.29	B
CADMIUM	1	0.58	U	0.54	U	2	U	2	U	1.6	U
CALCIUM	1000	7290		6500		7350		5670		6390	
CHROMIUM	2	8.8		7.6		10.2		10.3		12.5	
COBALT	10	8.3	B	7.1	U	7.3	B	6.2	B	6.9	B
COPPER	5	18.3	U	11.9	U	21.5		18.6		17.1	
IRON	20	14500		14700	J	22200		18600		18000	
LEAD	1	5.9		5.5		3.11		2.93	B	3.21	
MAGNESIUM	1000	4730		4710		4160		4240		4560	
MANGANESE	3	288	J	289	J	269		269		279	
MERCURY	0.04	0.14	R	0.1	R	0.25	J	0.07	J	0.09	R
NICKEL	8	14.2		11		11.6		12.9		11.6	
POTASSIUM	1000	1270		1080	U	793	R	838	R	1170	R
SELENIUM	1	0.14	U	0.14	U	5	U	5	U	5	U
SILVER	2	0.09	U	10	U	10	U	10	U	10	U
SODIUM	1000	780	B	113	B	596	J	1070	J	815	J
THALLIUM	2	0.22	U	1	UJ	10	U	0.7	B	10	U
VANADIUM	10	24.8		23.6		52.1		33.8		35.9	
ZINC	4	36.6		36.8	J	44.1		34.2		37.7	
BISMUTH	12	0.27	U	60	U	0.17	U	0.17	U	0.17	U
NITRATE-N	500	887		23.6	J	686	J	16.2	J	121	J
NITRITE-N	NA	1	U	1	UJ	1	UJ	1	UJ	1	UJ
PHOSPHATE-P	1	5	UJ	5	UJ	7.9	J	12.2	J	12.7	J
SULFATE	100	162		23.6	J	32	J	13	J	20	J
TOTAL ORGANIC CARBON	NA	529		194		1100		547		579	

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BATTELLE - PACIFIC NORTHWEST LABORATORY

DATA PACKAGE		B00X68		B00X64		B015G4		B015G4		B015H8	
SAMPLE NUMBER		B00X75		B00X77		B015G9		B015H1		B015K3	
SEMIVOLATILE COMPOUND	CRQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
PHENOL	330	330	UJ	330	U	670	R	350	U	350	UJ
BIS(2-CHLOROETHYL)ETHER	330	330	UJ	330	U	670	R	350	U	350	UJ
2-CHLOROPHENOL	330	330	UJ	330	U	670	R	350	U	350	UJ
1,3-DICHLOROBENZENE	330	330	UJ	330	U	670	R	350	U	350	UJ
1,4-DICHLOROBENZENE	330	330	UJ	330	U	670	R	350	U	350	UJ
BENZYL ALCOHOL	330	330	UJ	330	U	670	R	350	U	350	UJ
1,2-DICHLOROBENZENE	330	330	UJ	330	U	670	R	350	U	350	UJ
2-METHYLPHENOL	330	330	UJ	330	U	670	R	350	U	350	UJ
BIS(2-CHLOROISOPROPYL)ETHER	330	330	UJ	330	U	670	R	350	U	350	UJ
4-METHYLPHENOL	330	330	UJ	330	U	670	R	350	U	350	UJ
N-NITROSO-DI-N-PROPYLAMINE	330	330	UJ	330	U	670	R	350	U	350	UJ
HEXACHLOROETHANE	330	330	UJ	330	U	670	R	350	U	350	UJ
NITROBENZENE	330	330	UJ	330	U	670	R	350	U	350	UJ
ISOPHORONE	330	330	UJ	330	U	670	R	350	U	350	UJ
2-NITROPHENOL	330	330	UJ	330	U	670	R	350	U	350	UJ
2,4-DIMETHYLPHENOL	330	330	UJ	330	U	670	R	350	U	350	UJ
BENZOIC ACID	1600	1700	UJ	1700	U	3400	R	1700	U	1700	UJ
BIS(2-CHLOROETHOXY)METHANE	330	330	UJ	330	U	670	R	350	U	350	UJ
2,4-DICHLOROPHENOL	330	330	UJ	330	U	670	R	350	U	350	UJ
1,2,4-TRICHLOROBENZENE	330	330	UJ	330	U	670	R	350	U	350	UJ
NAPHTHALENE	330	330	UJ	330	U	670	R	350	U	350	UJ
4-CHLOROANILINE	330	330	UJ	330	UJ	670	R	350	UJ	350	UJ
HEXACHLOROBUTADIENE	330	330	UJ	330	U	670	R	350	U	350	UJ
4-CHLORO-3-METHYLPHENOL	330	330	UJ	330	U	670	R	350	U	350	UJ
2-METHYLNAPHTHALENE	330	330	UJ	330	U	670	R	350	U	350	UJ
HEXACHLOROCYCLOPENTADIENE	330	330	UJ	330	U	670	R	350	UJ	350	UJ
2,4,6-TRICHLOROPHENOL	330	330	UJ	330	U	670	R	350	U	350	UJ
2,4,5-TRICHLOROPHENOL	1600	1700	UJ	1700	U	3400	R	1700	U	1700	UJ
2-CHLORONAPHTHALENE	330	330	UJ	330	U	670	R	350	U	350	UJ
2-NITROANILINE	1600	1700	UJ	1700	U	3400	R	1700	U	1700	UJ
DIMETHYLPHTHALATE	330	330	UJ	330	U	670	R	350	U	350	UJ
ACENAPHTHYLENE	330	330	UJ	330	U	670	R	.350	U	350	UJ
2,6-DINITROTOLUENE	330	330	UJ	330	U	670	R	350	U	350	UJ
3-NITROANILINE	1600	1700	UJ	1700	UJ	3400	R	1700	UJ	1700	UJ
ACENAPHTHENE	330	330	UJ	330	U	670	R	350	U	350	UJ
2,4-DINITROPHENOL	1600	1700	UJ	1700	UJ	3400	R	1700	U	1700	UJ

FILENAME: B00X64SV.WK1

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BATTELLE - PACIFIC NORTHWEST LABORATORY

DATA PACKAGE		B00X68		B00X64		B015G4		B015G4		B015H8	
SAMPLE NUMBER		B00X75		B00X77		B015G9		B015H1		B015K3	
PESTICIDE/PCB COMPOUND	CRQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
ALPHA-BHC	8	8	UJ	8	R	8	UJ	8	UJ	8	UJ
BETA-BHC	8	8	UJ	8	R	8	UJ	8	UJ	8	UJ
DELTA-BHC	8	8	UJ	8	R	8	UJ	8	UJ	8	UJ
GAMMA-BHC (LINDANE)	8	8	UJ	8	R	8	UJ	8	UJ	8	UJ
HEPTACHLOR	8	9.8	UJ	8	R	8	UJ	8	UJ	8	UJ
ALDRIN	8	6.6	J	8	R	8	UJ	8	UJ	8	UJ
HEPTACHLOR EPOXIDE	8	8	UJ	8	R	8	UJ	8	UJ	8	UJ
ENDOSULFAN I	8	8	UJ	8	R	8	UJ	8	UJ	8	UJ
DIELDRIN	16	16	UJ	16	R	16	UJ	16	UJ	16	UJ
4,4'-DDE	16	16	UJ	16	R	16	UJ	16	UJ	16	UJ
ENDRIN	16	16	UJ	16	R	16	UJ	16	UJ	16	UJ
ENDOSULFAN II	16	16	UJ	16	R	17.1	J	16	UJ	16	UJ
4,4'-DDD	16	16	UJ	16	R	16	UJ	16	UJ	16	UJ
ENDOSULFAN SULFATE	16	16	UJ	16	R	16	UJ	16	UJ	16	UJ
4,4'-DDT	16	16	UJ	16	R	16	UJ	16	UJ	16	UJ
METHOXYCHLOR	80	80	UJ	80	R	80	UJ	80	UJ	80	UJ
ENDRIN KETONE	16	16	UJ	16	R	16	UJ	16	UJ	16	UJ
ALPHA-CHLORDANE	80	80	UJ	80	R	80	UJ	80	UJ	80	UJ
GAMMA-CHLORDANE	80	80	UJ	80	R	80	UJ	80	UJ	80	UJ
TOXAPHENE	160	160	UJ	160	R	160	UJ	160	UJ	160	UJ
AROCLOR-1016	80	80	UJ	80	R	80	UJ	80	UJ	80	UJ
AROCLOR-1221	80	80	UJ	80	R	80	UJ	80	UJ	80	UJ
AROCLOR-1232	80	90	J	80	R	80	UJ	80	UJ	80	UJ
AROCLOR-1242	80	80	UJ	80	R	80	UJ	80	UJ	80	UJ
AROCLOR-1248	80	80	UJ	80	R	80	UJ	80	UJ	80	UJ
AROCLOR-1254	160	160	UJ	160	R	313	J	160	UJ	160	UJ
AROCLOR-1260	160	160	UJ	160	R	160	UJ	160	UJ	160	UJ

FILENAME:B00X64-P.WK1

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BATTELLE - PACIFIC NORTHWEST LABORATORY											
DATA PACKAGE		B00X68		B00X64		B015G4		B015G4		B015H8	
SAMPLE NUMBER		B00X75		B00X77		B015G9		B015H1		B015K3	
RADIOCHEMICAL ANALYTE	CRQL	RESULT	Q	RESULT	Q	RESULT	Q	RESULT	Q	RESULT	Q
GROSS ALPHA	6	48.9	J	6.3	J	107.5	J	2.9	J	25.7	J
GROSS BETA	3	159330	J	47771	J	622300	J	2590	J	64500	J
CESIUM-137	0.6	21270	J	67000	J	572000	J	1890	J	562000	J
COBALT-60	0.02	1.23	J	0.46	U	8	U	0.4	U	28.6	J
PLUTONIUM-238	0.0001	0.428	R	0.00623	J	1.87	R	0.00283	R	0.0446	R
PLUTONIUM-239+240	0.0001	32.3	R	0.00325	J	121	R	0.239	R	2.96	R
RUTHENIUM-106	0.2	32	U	33	U	500	U	18	U	280	U
STRONTIUM-90	0.15	62600	J	1.2	J	67700	J	452	J	7750	J
TECHNETIUM-99	0.5	48	R	60	J	34	UJ	160	J	132	J
TRITIUM	1	39	J	16	J	16	R	23	R	56	R
TOTAL URANIUM	0.3	41	J	0.4	J	1.7	R	1.2	J	22.6	J

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FILENAME: B00X64-R.WK1

BATTELLE - PACIFIC NORTHWEST LABORATORY

SAMPLE NO.	PARAMETER	RESULT	Q	UNITS
B00X64	CN (TOTAL)	1	U	MG/KG
B00X66	CN (TOTAL)	1	U	MG/KG
B00X68	CN (TOTAL)	0.6	U	MG/KG
B00X70	CN (TOTAL)	0.6	U	MG/KG
B00X72	CN (TOTAL)	0.6	UJ	MG/KG
B00X74	CN (TOTAL)	0.6	U	MG/KG
B00X75	CN (TOTAL)	1.6		MG/KG
B00X77	CN (TOTAL)	1	R	MG/KG
B00X78	CN (TOTAL)	1	U	MG/KG
B00X82	CN (TOTAL)	19.4	J	UG/L
B00X84	CN (TOTAL)	5.9	U	UG/L
B00X88	CN (TOTAL)	5.9	UJ	UG/L
B00X90	CN (TOTAL)	0.6	U	MG/KG
B00X92	CN (TOTAL)	0.6	U	MG/KG
B00XC0	CN (TOTAL)	5.9	U	UG/L
B015G4	CN (TOTAL)	0.8	J	MG/KG
B015G6	CN (TOTAL)	0.6	UJ	MG/KG
B015G8	CN (TOTAL)	0.6	UJ	MG/KG
B015G9	CN (TOTAL)	0.6	UJ	MG/KG
B015H0	CN (TOTAL)	5.9	UJ	UG/L
B015H1	CN (TOTAL)	0.6	UJ	MG/KG
B015H4	CN (TOTAL)	0.6	UJ	MG/KG
B015H6	CN (TOTAL)	1.5		MG/KG
B015H8	CN (TOTAL)	1	U	MG/KG
B015J8	CN (TOTAL)	1	U	MG/KG
B015K0	CN (TOTAL)	1	U	MG/KG
B015K2	CN (TOTAL)	0.8	B	MG/KG
B015K3	CN (TOTAL)	1	U	MG/KG
B015K6	CN (TOTAL)	1	U	MG/KG
B015K8	CN (TOTAL)	1.2	J	MG/KG

FILENAME: B00X64CN.WK1

9013197.2723

9613497.2724

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B00X77
216-B-57A 30 - 33

ame: BATTELLE-PNL Contract: ------

Lab Code: ------ Case No.: ----- SAS No.: ----- SDG No.: ------

Matrix: (soil/water) SOIL Lab Sample ID: 91-06421

Sample wt/vol: 1.109 (g/mL) G Lab File ID: >VB410

Level: (low/med) LOW Date Received: 07/10/91

% Moisture: not dec. 5.3 Date Analyzed: 10/14/91

Column: (pack/cap) CAP Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
74-87-3	Chloromethane	48.	U
74-83-9	Bromomethane	48.	U
75-01-4	Vinyl Chloride	48.	U
75-00-3	Chloroethane	48.	U
75-09-2	Methylene Chloride	24.	U
67-64-1	Acetone	50.	B
75-15-0	Carbon Disulfide	24.	U
75-35-4	1,1-Dichloroethene	24.	U
75-34-3	1,1-Dichloroethane	24.	U
540-59-0	1,2-Dichloroethene (total)	24.	U
67-66-3	Chloroform	24.	U
107-02-2	1,2-Dichloroethane	24.	U
78-93-3	2-Butanone	51.	B
71-55-6	1,1,1-Trichloroethane	24.	U
56-23-5	Carbon Tetrachloride	24.	U
108-05-4	Vinyl Acetate	48.	U
75-27-4	Bromodichloromethane	24.	U
78-87-5	1,2-Dichloropropane	24.	U
10061-01-5	cis-1,3-Dichloropropene	24.	U
79-01-6	Trichloroethene	24.	U
124-48-1	Dibromochloromethane	24.	U
79-00-5	1,1,2-Trichloroethane	24.	U
71-43-2	Benzene	24.	U
10061-02-6	trans-1,3-Dichloropropene	24.	U
75-25-2	Bromoform	24.	U
108-10-1	4-Methyl-2-pentanone	48.	U
591-78-6	2-Hexanone	48.	U
127-18-4	Tetrachloroethene	24.	U
79-34-5	1,1,2,2-Tetrachloroethane	24.	U
108-88-3	Toluene	9.	J
108-90-7	Chlorobenzene	24.	U
100-41-4	Ethylbenzene	24.	U
100-42-5	Styrene	24.	U
133-02-7	Xylene (total)	24.	U

R

gj 11/2/92

FORM I VOA 1/89 Rev.

9613497.2725

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B00X75
216-6-49A 17-20

Lab Name: BATTELLE-PNL Contract: ------

Lab Code: ------ Case No.: ----- SAS No.: ----- SDG No.: ------

Matrix: (soil/water) SOIL Lab Sample ID: 91-7815

Sample wt/vol: 1.1047 (g/mL) G Lab File ID: >WA505

Level: (low/med) LOW Date Received: 08/08/91

% Moisture: not dec. 4.0 Date Analyzed: 11/05/91

Column: (pack/cap) CAP Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
74-87-3	Chloromethane	47.	UJ
74-83-9	Bromomethane	47.	UJ
75-01-4	Vinyl Chloride	47.	UJ
75-00-3	Chloroethane	47.	UJ
75-09-2	Methylene Chloride	24.	UJ
67-64-1	Acetone	47.	UJ
75-15-0	Carbon Disulfide	24.	UJ
75-35-4	1,1-Dichloroethene	24.	UJ
75-34-3	1,1-Dichloroethane	24.	UJ
540-59-0	1,2-Dichloroethene (total)	24.	UJ
67-66-3	Chloroform	24.	UJ
107-02-2	1,2-Dichloroethane	24.	UJ
78-93-3	2-Butanone	47.	UJ
71-55-6	1,1,1-Trichloroethane	24.	UJ
56-23-5	Carbon Tetrachloride	24.	UJ
108-05-4	Vinyl Acetate	47.	UJ
75-27-4	Bromodichloromethane	24.	UJ
78-87-5	1,2-Dichloropropane	24.	UJ
10061-01-5	cis-1,3-Dichloropropene	24.	UJ
79-01-6	Trichloroethene	24.	UJ
124-48-1	Dibromochloromethane	24.	UJ
79-00-5	1,1,2-Trichloroethane	24.	UJ
71-43-2	Benzene	24.	UJ
10061-02-6	trans-1,3-Dichloropropene	24.	UJ
75-25-2	Bromoform	24.	UJ
108-10-1	4-Methyl-2-pentanone	47.	UJ
591-78-6	2-Hexanone	47.	UJ
127-18-4	Tetrachloroethene	24.	UJ
79-34-5	1,1,2,2-Tetrachloroethane	24.	UJ
108-88-3	Toluene	24.	UJ
108-90-7	Chlorobenzene	24.	UJ
100-41-4	Ethylbenzene	24.	UJ
100-42-5	Styrene	24.	UJ
133-02-7	Xylene (total)	24.	UJ

R

FORM I VOA 1/89 Rev.

1/21/93

9613497.2726

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015G9
216-A-506 15.5-17.5

Lab Name: BATTELLE-PNL Contract: ------

Lab Code: ------ Case No.: ----- SAS No.: ----- SDG No.: ------

Matrix: (soil/water) SOIL Lab Sample ID: 92-00306

Sample wt/vol: 1.121 (g/mL) G Lab File ID: >VB408

Level: (low/med) LOW Date Received: 10/08/91

% Moisture: not dec. 3.0 Date Analyzed: 10/14/91

Column: (pack/cap) CAP Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q	
74-87-3	Chloromethane	46.	U	
74-83-9	Bromomethane	46.	U	
75-01-4	Vinyl Chloride	46.	U	
75-00-3	Chloroethane	46.	U	
75-09-2	Methylene Chloride	23.	U	
67-64-1	Acetone	83.	~~B~~	tt B
75-15-0	Carbon Disulfide	23.	U	
75-35-4	1,1-Dichloroethene	23.	U	
75-34-3	1,1-Dichloroethane	23.	U	
540-59-0	1,2-Dichloroethene (total)	23.	U	
67-66-3	Chloroform	23.	U	
107-02-2	1,2-Dichloroethane	23.	U	
78-93-3	2-Butanone	53.	~~B~~	u
71-55-6	1,1,1-Trichloroethane	7.	J	
56-23-5	Carbon Tetrachloride	23.	U	
108-05-4	Vinyl Acetate	46.	U	
75-27-4	Bromodichloromethane	23.	U	
78-87-5	1,2-Dichloropropane	23.	U	
10061-01-5	cis-1,3-Dichloropropene	23.	U	
79-01-6	Trichloroethene	23.	U	
124-48-1	Dibromochloromethane	23.	U	
79-00-5	1,1,2-Trichloroethane	23.	U	
71-43-2	Benzene	23.	U	
10061-02-6	trans-1,3-Dichloropropene	23.	U	
75-25-2	Bromoform	23.	U	
108-10-1	4-Methyl-2-pentanone	46.	U	
591-78-6	2-Hexanone	46.	U	
127-18-4	Tetrachloroethene	23.	U	
79-34-5	1,1,2,2-Tetrachloroethane	23.	U	
108-88-3	Toluene	2~~23~~.	~~U~~	J
108-90-7	Chlorobenzene	23.	U	
100-41-4	Ethylbenzene	23.	U	
100-42-5	Styrene	23.	U	
133-02-7	Xylene (total)	23.	U	

FORM I VOA 1/89 Rev.

5/11/92

9613497.2727

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015H1
216-B-SOB 28-30.5
split

Lab Name: BATTELLE-PNL Contract: ------

Lab Code: ------ Case No.: ----- SAS No.: ----- SDG No.: ------

Matrix: (soil/water) SOIL Lab Sample ID: 92-00358

Sample wt/vol: 0.9431 (g/mL) G Lab File ID: >VB404

Level: (low/med) LOW Date Received: 10/11/91

% Moisture: not dec. 3.3 Date Analyzed: 10/14/91

Column: (pack/cap) CAP Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q	
74-87-3	Chloromethane	55.	U	
74-83-9	Bromomethane	55.	U	
75-01-4	Vinyl Chloride	55.	U	
75-00-3	Chloroethane	55.	U	
75-09-2	Methylene Chloride	3 ~~28.~~	~~U~~	J
67-64-1	Acetone	28.	~~JB~~	U
75-15-0	Carbon Disulfide	27.	U	
75-35-4	1,1-Dichloroethene	27.	U	
75-34-3	1,1-Dichloroethane	27.	U	
540-59-0	1,2-Dichloroethene (total)	27.	U	
67-66-3	Chloroform	27.	U	
107-02-2	1,2-Dichloroethane	27.	U	
78-93-3	2-Butanone	35.	~~JB~~	U
71-55-6	1,1,1-Trichloroethane	8.	J	
56-23-5	Carbon Tetrachloride	27.	U	
108-05-4	Vinyl Acetate	55.	U	
75-27-4	Bromodichloromethane	27.	U	
78-87-5	1,2-Dichloropropane	27.	U	
10061-01-5	cis-1,3-Dichloropropene	27.	U	
79-01-6	Trichloroethene	27.	U	
124-48-1	Dibromochloromethane	27.	U	
79-00-5	1,1,2-Trichloroethane	27.	U	
71-43-2	Benzene	27.	U	
10061-02-6	trans-1,3-Dichloropropene	27.	U	
75-25-2	Bromoform	27.	U	
108-10-1	4-Methyl-2-pentanone	55.	U	
591-78-6	2-Hexanone	55.	U	
127-18-4	Tetrachloroethene	27.	U	
79-34-5	1,1,2,2-Tetrachloroethane	27.	U	
108-88-3	Toluene	2 ~~27.~~	~~U~~	J
108-90-7	Chlorobenzene	27.	U	
100-41-4	Ethylbenzene	27.	U	
100-42-5	Styrene	27.	U	
133-02-7	Xylene (total)	27.	U	

FORM I VOA 1/89 Rev.

CJ 11/9/92

9613497.2728

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015K3
216-B-SDC 19-20.5

ab Name: BATTELLE-PNL Contract: ------

ab Code: ------ Case No.: ----- SAS No.: ----- SDG No.: ------

atrix: (soil/water) SOIL Lab Sample ID: 92-00921

ample wt/vol: 1.5311 (g/mL) G Lab File ID: >WA507

evel: (low/med) LOW Date Received: 10/23/91

Moisture: not dec. 4.0 Date Analyzed: 11/05/91

olumn: (pack/cap) CAP Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
74-87-3	Chloromethane	34.	U
74-83-9	Bromomethane	34.	U
75-01-4	Vinyl Chloride	34.	U
75-00-3	Chloroethane	34.	U
75-09-2	Methylene Chloride	17.	U
67-64-1	Acetone	34.	U
75-15-0	Carbon Disulfide	17.	U
75-35-4	1,1-Dichloroethene	17.	U
75-34-3	1,1-Dichloroethane	17.	U
540-59-0	1,2-Dichloroethene (total)	17.	U
67-66-3	Chloroform	17.	U
107-02-2	1,2-Dichloroethane	17.	U
78-93-3	2-Butanone	17.	~~JB~~ U
71-55-6	1,1,1-Trichloroethane	17.	U
56-23-5	Carbon Tetrachloride	17.	U
108-05-4	Vinyl Acetate	34.	U
75-27-4	Bromodichloromethane	17.	U
78-87-5	1,2-Dichloropropane	17.	U
10061-01-5	cis-1,3-Dichloropropene	17.	U
79-01-6	Trichloroethene	17.	U
124-48-1	Dibromochloromethane	17.	U
79-00-5	1,1,2-Trichloroethane	17.	U
71-43-2	Benzene	17.	U
10061-02-6	trans-1,3-Dichloropropene	17.	U
75-25-2	Bromoform	17.	U
108-10-1	4-Methyl-2-pentanone	34.	U
591-78-6	2-Hexanone	34.	U
127-18-4	Tetrachloroethene	17.	U
79-34-5	1,1,2,2-Tetrachloroethane	17.	U
108-88-3	Toluene	17.	U
108-90-7	Chlorobenzene	17.	U
100-41-4	Ethylbenzene	17.	U
100-42-5	Styrene	17.	U
133-02-7	Xylene (total)	17.	U

FORM I VOA 11/12/89 Rev.

9613497.2729

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B00X75

Z16-6-49A (7-2)

Lab Name: BATTELLE-PNL Contract: -------

Lab Code: ------- Case No.: ------ SAS No.: ------ SDG No.: ------

Matrix: (soil/water) SOIL Lab Sample ID: 91-7815-E-1

Sample wt/vol: 30 (g/mL) G Lab File ID: >VA905

Level: (low/med) LOW Date Received: 08/08/91

% Moisture: not dec. 0.1 dec. 0.1 Date Extracted: 08/20/91

Extraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 9/09/91

GPC Cleanup: (Y/N) N pH: 6.4 Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
108-95-2	Phenol	330.	U J
111-44-4	bis(2-Chloroethyl)Ether	330.	U
95-57-8	2-Chlorophenol	330.	U
541-73-1	1,3-Dichlorobenzene	330.	U
106-46-7	1,4-Dichlorobenzene	330.	U
100-51-6	Benzyl alcohol	330.	U
95-50-1	1,2-Dichlorobenzene	330.	U
95-48-7	2-Methylphenol	330.	U
39638-32-9	bis(2-chloroisopropyl)ether	330.	U
106-44-5	4-Methylphenol	330.	U
621-64-7	N-Nitroso-Di-n-propylamine	330.	U
67-72-1	Hexachloroethane	330.	U
98-95-3	Nitrobenzene	330.	U
78-59-1	Isophorone	330.	U
88-75-5	2-Nitrophenol	330.	U
105-67-9	2,4-Dimethylphenol	330.	U
65-85-0	Benzoic acid	1700.	U
111-91-1	bis(2-Chloroethoxy)methane	330.	U
120-83-2	2,4-Dichlorophenol	330.	U
120-82-1	1,2,4-Trichlorobenzene	330.	U
91-20-3	Naphthalene	330.	U
106-47-8	4-Chloroaniline	330.	U
87-68-3	Hexachlorobutadiene	330.	U
59-50-7	4-Chloro-3-methylphenol	330.	U
91-57-6	2-Methylnaphthalene	330.	U
77-47-4	Hexachlorocyclopentadiene	330.	U
88-06-2	2,4,6-Trichlorophenol	330.	U
95-95-4	2,4,5-Trichlorophenol	1700.	U
91-58-7	2-Chloronaphthalene	330.	U
88-74-4	2-Nitroaniline	1700.	U
131-11-3	Dimethylphthalate	330.	U
208-96-8	Acenaphthylene	330.	U
606-20-2	2,6-Dinitrotoluene	330.	U

5-11-5/92

9613497.2730

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B00X75
216-B-49A 17

Lab Name: BATTELLE-PNL Contract: -------

Lab Code: ------- Case No.: ------ SAS No.: ------ SDG No.: ------

Matrix: (soil/water) SOIL Lab Sample ID: 91-7815-E-1

Sample wt/vol: 30 (g/mL) G Lab File ID: >VA905

Level: (low/med) LOW Date Received: 08/08/91

% Moisture: not dec.0.1 dec. 0.1 Date Extracted: 08/20/91

Extraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 9/09/91

GPC Cleanup: (Y/N) N pH: 6.4 Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
99-09-2	3-Nitroaniline	1700.	U J
83-32-9	Acenaphthene	330.	U
51-28-5	2,4-Dinitrophenol	1700.	U
100-02-7	4-Nitrophenol	1700.	U
132-64-9	Dibenzofuran	330.	U
121-14-2	2,4-Dinitrotoluene	330.	U
84-66-2	Diethylphthalate	620.	J
7005-72-3	4-Chlorophenyl-phenylether	330.	U J
86-73-7	Fluorene	330.	U
100-01-6	4-Nitroaniline	1700.	U
534-52-1	4,6-Dinitro-2-methylphenol	1700.	U
86-30-6	N-Nitrosodiphenylamine (1)	330.	U
101-55-3	4-Bromophenyl-phenylether	330.	U
118-74-1	Hexachlorobenzene	330.	U
87-86-5	Pentachlorophenol	1700.	U
85-01-8	Phenanthrene	330.	U
120-12-7	Anthracene	330.	U
84-74-2	Di-n-butylphthalate	350.	~~B J~~ UJ
206-44-0	Fluoranthene	330.	U J
129-00-0	Pyrene	330.	U
85-68-7	Butylbenzylphthalate	330.	U
91-94-1	3,3'-Dichlorobenzidine	670.	U
56-55-3	Benzo(a)anthracene	330.	U
218-01-9	Chrysene	330.	U
117-81-7	bis(2-Ethylhexyl)phthalate	23 ~~330.~~	~~U~~ J
117-84-0	Di-n-octylphthalate	~~3304~~ ~~330.~~	U ~~B~~ UJ
205-99-2	Benzo(b)fluoranthene	330.	U
207-08-9	Benzo(k)fluoranthene	330.	U
50-32-8	Benzo(a)pyrene	330.	U
193-39-5	Indeno(1,2,3-cd)pyrene	330.	U
53-70-3	Dibenz(a,h)anthracene	330.	U
191-24-2	Benzo(g,h,i)perylene	330.	U

(1) - Cannot be separated from Diphenylamine

gj 11/5/92

FORM I SV-2 1/87 R

9613497.2731

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B00X75
216-B-49A. 17-20

Name: BATTELLE-PNL Contract: -------

Lab Code: ------- Case No.: ------ SAS No.: ------ SDG No.: ------

Matrix: (soil/water) SOIL Lab Sample ID: 91-7815-E-1

Sample wt/vol: 30 (g/mL) G Lab File ID: >VA905

Level: (low/med) LOW Date Received: 08/08/91

% Moisture: not dec.0.1 dec. 0.1 Date Extracted: 08/20/91

Extraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 9/09/91

GPC Cleanup: (Y/N) N pH: 6.4 Dilution Factor: 1.00000

Number TICs found: 4

CONCENTRATION UNITS:
(ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	123422	2-Pentanone, 4-hydroxy-4-met	4.20	110000.	~~AJB~~ R
2.		Unknown	4.76	3000.	~~JB~~ u
3.		Unknown	5.80	820.	~~JB~~ u
4.		Hexanedioic acid ester	33.83	8200.	~~JB~~ u
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
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23.					
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25.					
26.					
27.					
28.					
29.					
30.					

S 11/5/91

9613497.2732

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B00X77
216-B-57A 34

( ) Name: BATTELLE-PNL Contract: -------

Lab Code: ------- Case No.: ------ SAS No.: ------ SDG No.: ------

Matrix: (soil/water) SOIL Lab Sample ID: 91-6421-E-1

Sample wt/vol: 30 (g/mL) G Lab File ID: >TD105

Level: (low/med) LOW Date Received: 07/12/91

% Moisture: not dec.0.1 dec. 0.1 Date Extracted: 07/16/91

Extraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 7/31/91

GPC Cleanup: (Y/N) N pH: 6.6 Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
108-95-2	Phenol	330.	U
111-44-4	bis(2-Chloroethyl)Ether	330.	U
95-57-8	2-Chlorophenol	330.	U
541-73-1	1,3-Dichlorobenzene	330.	U
106-46-7	1,4-Dichlorobenzene	330.	U
100-51-6	Benzyl alcohol	330.	U
95-50-1	1,2-Dichlorobenzene	330.	U
95-48-7	2-Methylphenol	330.	U
39638-32-9	bis(2-chloroisopropyl)ether	330.	U
106-44-5	4-Methylphenol	330.	U
621-64-7	N-Nitroso-Di-n-propylamine	330.	U
67-72-1	Hexachloroethane	330.	U
98-95-3	Nitrobenzene	330.	U
78-59-1	Isophorone	330.	U
88-75-5	2-Nitrophenol	330.	U
105-67-9	2,4-Dimethylphenol	330.	U
65-85-0	Benzoic acid	1700.	U
111-91-1	bis(2-Chloroethoxy)methane	330.	U
120-83-2	2,4-Dichlorophenol	330.	U
120-82-1	1,2,4-Trichlorobenzene	330.	U
91-20-3	Naphthalene	330.	U
106-47-8	4-Chloroaniline	330.	~~U~~ UJ
87-68-3	Hexachlorobutadiene	330.	U
59-50-7	4-Chloro-3-methylphenol	330.	U
91-57-6	2-Methylnaphthalene	330.	U
77-47-4	Hexachlorocyclopentadiene	330.	U
88-06-2	2,4,6-Trichlorophenol	330.	U
95-95-4	2,4,5-Trichlorophenol	1700.	U
91-58-7	2-Chloronaphthalene	330.	U
88-74-4	2-Nitroaniline	1700.	U
131-11-3	Dimethylphthalate	330.	U
208-96-8	Acenaphthylene	330.	U
606-20-2	2,6-Dinitrotoluene	330.	U

FORM I SV-1 cj 11/13/92 1/87 Rev.

9613497.2733

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

800X77

2116-B-57A 30-33

Name: BATTELLE-PNL Contract: -------

Lab Code: ------- Case No.: ------ SAS No.: ------ SDG No.: ------

Matrix: (soil/water) SOIL Lab Sample ID: 91-6421-E-1

Sample wt/vol: 30 (g/mL) G Lab File ID: >TD105

Level: (low/med) LOW Date Received: 07/12/91

% Moisture: not dec. 0.1 dec. 0.1 Date Extracted: 07/16/91

Extraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 7/31/91

GPC Cleanup: (Y/N) N pH: 6.6 Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q	
99-09-2	3-Nitroaniline	1700.	~~U~~	UJ
83-32-9	Acenaphthene	330.	U	
51-28-5	2,4-Dinitrophenol	1700.	~~U~~	UJ
100-02-7	4-Nitrophenol	1700.	~~U~~	UJ
132-64-9	Dibenzofuran	330.	U	
121-14-2	2,4-Dinitrotoluene	330.	U	
84-66-2	Diethylphthalate	330.	U	
7005-72-3	4-Chlorophenyl-phenylether	330.	U	
86-73-7	Fluorene	330.	U	
100-01-6	4-Nitroaniline	1700.	~~U~~	UJ
534-52-1	4,6-Dinitro-2-methylphenol	1700.	U	
86-30-6	N-Nitrosodiphenylamine (1)	330.	U	
101-55-3	4-Bromophenyl-phenylether	330.	U	
118-74-1	Hexachlorobenzene	330.	U	
87-86-5	Pentachlorophenol	1700.	U	
85-01-8	Phenanthrene	330.	U	
120-12-7	Anthracene	330.	U	
84-74-2	Di-n-butylphthalate	22 ~~44.~~	J	
206-44-0	Fluoranthene	330.	U	
129-00-0	Pyrene	330.	U	
85-68-7	Butylbenzylphthalate	330.	U	
91-94-1	3,3'-Dichlorobenzidine	670.	U	
56-55-3	Benzo(a)anthracene	330.	U	
218-01-9	Chrysene	330.	U	
117-81-7	bis(2-Ethylhexyl)phthalate	330.	U	
117-84-0	Di-n-octylphthalate	330 ~~198.~~	~~38~~	U
205-99-2	Benzo(b)fluoranthene	330.	U	
207-08-9	Benzo(k)fluoranthene	330.	U	
50-32-8	Benzo(a)pyrene	330.	U	
193-39-5	Indeno(1,2,3-cd)pyrene	330.	U	
53-70-3	Dibenz(a,h)anthracene	330.	U	
191-24-2	Benzo(g,h,i)perylene	330.	U	

(1) - Cannot be separated from Diphenylamine.

9 11/3/92

FORM I SV-2 1/87 Rev.

9613497.2734

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B00X72
216-B-57A 30-33

Lab Name: BATTELLE-PNL Contract: -------

Lab Code: ------- Case No.: ------ SAS No.: ------ SDG No.: ------

Matrix: (soil/water) SOIL Lab Sample ID: 91-6421-E-1

Sample wt/vol: 30 (g/mL) G Lab File ID: >TD105

Level: (low/med) LOW Date Received: 07/12/91

% Moisture: not dec.0.1 dec. 0.1 Date Extracted: 07/16/91

Extraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 7/31/91

GPC Cleanup: (Y/N) N pH:6.6 Dilution Factor: 1.00000

Number TICs found: 2

CONCENTRATION UNITS:
(ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		Unknown	4.15	2800	J
2.	123422	2-Pentanone, 4-hydroxy-4-met	4.38	49000.	JBA
3.		Unknown	5.04	1900.	~~JB~~
4.		Unknown	5.34	390.	J
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FORM I SV-TIC 1/87 Rev.

9613497.2735

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015H1
216-B-50B 28-30.5 split

Lab Name: BATTELLE-PNL Contract: -------

Lab Code: ------- Case No.: ------ SAS No.: ------ SDG No.: B 12-24-91

Matrix: (soil/water) SOIL Lab Sample ID: 92-358-E-1

Sample wt/vol: 29.7 (g/mL) G Lab File ID: >XC405

Level: (low/med) LOW Date Received: 10/11/91

% Moisture: not dec. 3.4 dec. -- Date Extracted: 10/17/91

Extraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/24/91

GPC Cleanup: (Y/N) N pH: 8.5 Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q	
108-95-2	Phenol	350.	U	
111-44-4	bis(2-Chloroethyl)Ether	350.	U	
95-57-8	2-Chlorophenol	350.	U	
541-73-1	1,3-Dichlorobenzene	350.	U	
106-46-7	1,4-Dichlorobenzene	350.	U	
100-51-6	Benzyl alcohol	350.	U	
95-50-1	1,2-Dichlorobenzene	350.	U	
95-48-7	2-Methylphenol	350.	U	
39638-32-9	bis(2-chloroisopropyl)ether	350.	U	
106-44-5	4-Methylphenol	350.	U	
621-64-7	N-Nitroso-Di-n-propylamine	350.	U	
67-72-1	Hexachloroethane	350.	U	
98-95-3	Nitrobenzene	350.	U	
78-59-1	Isophorone	350.	U	
88-75-5	2-Nitrophenol	350.	U	
105-67-9	2,4-Dimethylphenol	350.	U	
65-85-0	Benzoic acid	1700.	U	
111-91-1	bis(2-Chloroethoxy)methane	350.	U	
120-83-2	2,4-Dichlorophenol	350.	U	
120-82-1	1,2,4-Trichlorobenzene	350.	U	
91-20-3	Naphthalene	350.	U	
106-47-8	4-Chloroaniline	350.	~~U~~	UJ
87-68-3	Hexachlorobutadiene	350.	U	
59-50-7	4-Chloro-3-methylphenol	350.	U	
91-57-6	2-Methylnaphthalene	350.	U	
77-47-4	Hexachlorocyclopentadiene	350.	~~U~~	UJ
88-06-2	2,4,6-Trichlorophenol	350.	U	
95-95-4	2,4,5-Trichlorophenol	1700.	U	
91-58-7	2-Chloronaphthalene	350.	U	
88-74-4	2-Nitroaniline	1700.	U	
131-11-3	Dimethylphthalate	350.	U	
208-96-8	Acenaphthylene	350.	U	
606-20-2	2,6-Dinitrotoluene	350.	U	

FORM I SV-1 1/87 Rev.

5/11/01/92

9613497.2736

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015H1

Lab Name: BATTELLE-PNL Contract: -------

Lab Code: ------- Case No.: ------ SAS No.: ------ SDG No.: 8 12-2-91

Matrix: (soil/water) SOIL Lab Sample ID: 92-358-E-1

Sample wt/vol: 29.7 (g/mL) G Lab File ID: >XC405

Level: (low/med) LOW Date Received: 10/11/91

% Moisture: not dec. 3.4 dec. -- Date Extracted: 10/17/91

Extraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/24/91

GPC Cleanup: (Y/N) N pH: 8.5 Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
99-09-2	3-Nitroaniline	1700.	U
83-32-9	Acenaphthene	350.	U
51-28-5	2,4-Dinitrophenol	1700.	U
100-02-7	4-Nitrophenol	1700.	U
132-64-9	Dibenzofuran	350.	U
121-14-2	2,4-Dinitrotoluene	350.	U
84-66-2	Diethylphthalate	350.	U
7005-72-3	4-Chlorophenyl-phenylether	350.	U
86-73-7	Fluorene	350.	U
100-01-6	4-Nitroaniline	1700.	U
534-52-1	4,6-Dinitro-2-methylphenol	1700.	U
86-30-6	N-Nitrosodiphenylamine (1)	350.	U
101-55-3	4-Bromophenyl-phenylether	350.	U
118-74-1	Hexachlorobenzene	350.	U
87-86-5	Pentachlorophenol	1700.	U
85-01-8	Phenanthrene	350.	U
120-12-7	Anthracene	350.	U
84-74-2	Di-n-butylphthalate	410.	B
206-44-0	Fluoranthene	350.	U
129-00-0	Pyrene	350.	U
85-68-7	Butylbenzylphthalate	350.	U
91-94-1	3,3'-Dichlorobenzidine	700.	U
56-55-3	Benzo(a)anthracene	350.	U
218-01-9	Chrysene	350.	U
117-81-7	bis(2-Ethylhexyl)phthalate	350.	U
117-84-0	Di-n-octylphthalate	350.	U
205-99-2	Benzo(b)fluoranthene	350.	U
207-08-9	Benzo(k)fluoranthene	350.	U
50-32-8	Benzo(a)pyrene	350.	U
193-39-5	Indeno(1,2,3-cd)pyrene	350.	U
53-70-3	Dibenz(a,h)anthracene	350.	U
191-24-2	Benzo(g,h,i)perylene	350.	U

UJ

U

(1) - Cannot be separated from Diphenylamine

FORM I SV-2 1/87 Rev.

11/10/92

9613497.2737

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B015H1
216B-506 28-30.5

Lab Name: BATTELLE-PNL Contract: -------

Lab Code: ------- Case No.: ------ SAS No.: ------ SDG No.: B 12-2-91 ow

Matrix: (soil/water) SOIL Lab Sample ID: 92-358-E-1

Sample wt/vol: 29.7 (g/mL) G Lab File ID: >XC405

Level: (low/med) LOW Date Received: 10/11/91

% Moisture: not dec.3.4 dec. -- Date Extracted: 10/17/91

Extraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/24/91

GPC Cleanup: (Y/N) N pH: 8.5 Dilution Factor: 1.00000

Number TICs found: 4

CONCENTRATION UNITS:
(ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q	
1.		Unknown	4.39	1300.	~~JB~~	U
2.		Unknown	5.36	390.	~~JB~~	U
3.	791286	Phosphine oxide, triphenyl-	34.65	340.	~~JB~~	U
4.		Unknown	5.11	710.	~~JB~~	U
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FORM I SV-TIC 1/87 Rev.

9613497.2738

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015G9

216B-50B 15.5-17.5

Lab Name: BATTELLE-PNL Contract: -------

Lab Code: ------- Case No.: ------ SAS No.: ------ SDG No.: 8

Matrix: (soil/water) SOIL Lab Sample ID: 92-306-E-1

Sample wt/vol: 30.6 (g/mL) G Lab File ID: >XC409

Level: (low/med) LOW Date Received: 10/08/91

% Moisture: not dec.3 dec. -- Date Extracted: 10/17/91

Extraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/24/91

GPC Cleanup: (Y/N) N pH: 6.5 Dilution Factor: 2.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q	
108-95-2	Phenol	670.	U D	R
111-44-4	bis(2-Chloroethyl)Ether	670.	U D	
95-57-8	2-Chlorophenol	670.	U D	
541-73-1	1,3-Dichlorobenzene	670.	U D	
106-46-7	1,4-Dichlorobenzene	670.	U D	
100-51-6	Benzyl_alcohol	670.	U D	
95-50-1	1,2-Dichlorobenzene	670.	U D	
95-48-7	2-Methylphenol	670.	U D	
39638-32-9	bis(2-chloroisopropyl)ether	670.	U D	
106-44-5	4-Methylphenol	670.	U D	
621-64-7	N-Nitroso-Di-n-propylamine	670.	U D	
67-72-1	Hexachloroethane	670.	U D	
98-95-3	Nitrobenzene	670.	U D	
78-59-1	Isophorone	670.	U D	
88-75-5	2-Nitrophenol	670.	U D	
105-67-9	2,4-Dimethylphenol	670.	U D	
65-85-0	Benzoic_acid	2400.	U D	
111-91-1	bis(2-Chloroethoxy)methane	670.	U D	
120-83-2	2,4-Dichlorophenol	670.	U D	
120-82-1	1,2,4-Trichlorobenzene	670.	U D	
91-20-3	Naphthalene	670.	U D	
106-47-8	4-Chloroaniline	670.	U D	UJ
87-68-3	Hexachlorobutadiene	670.	U D	
59-50-7	4-Chloro-3-methylphenol	670.	U D	
91-57-6	2-Methylnaphthalene	670.	U D	
77-47-4	Hexachlorocyclopentadiene	670.	U D	UJ
88-06-2	2,4,6-Trichlorophenol	670.	U D	
95-95-4	2,4,5-Trichlorophenol	3400.	U D	
91-58-7	2-Chloronaphthalene	670.	U D	
88-74-4	2-Nitroaniline	3400.	U D	
131-11-3	Dimethylphthalate	670.	U D	
208-96-8	Acenaphthylene	670.	U D	
606-20-2	2,6-Dinitrotoluene	670.	U D	

FORM I SV-1 1/87 Rev.

8/11/10/92

9613497.2739

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015G9
216-B-50B 15.5-17.5

Lab Name: BATTELLE-PNL Contract: -------

Lab Code: ------- Case No.: ------ SAS No.: ------ SDG No.: 8-11-24 cay

Matrix: (soil/water) SOIL Lab Sample ID: 92-306-E-1

Sample wt/vol: 30.6 (g/mL) G Lab File ID: >XC409

Level: (low/med) LOW Date Received: 10/08/91

% Moisture: not dec.3 dec. -- Date Extracted: 10/17/91

Extraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/24/91

GPC Cleanup: (Y/N) N pH: 6.5 Dilution Factor: 2.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q	
99-09-2	3-Nitroaniline	3400.	~~U~~ D	R UJ
83-32-9	Acenaphthene	670.	U D	
51-28-5	2,4-Dinitrophenol	3400.	U D	
100-02-7	4-Nitrophenol	3400.	U D	
132-64-9	Dibenzofuran	670.	U D	
121-14-2	2,4-Dinitrotoluene	670.	U D	
84-66-2	Diethylphthalate	670.	U D	
7005-72-3	4-Chlorophenyl-phenylether	670.	U D	
86-73-7	Fluorene	670.	U D	
100-01-6	4-Nitroaniline	3400.	U D	
534-52-1	4,6-Dinitro-2-methylphenol	3400.	U D	
86-30-6	N-Nitrosodiphenylamine (1)	670.	U D	
101-55-3	4-Bromophenyl-phenylether	670.	U D	
118-74-1	Hexachlorobenzene	670.	U D	
87-86-5	Pentachlorophenol	3400.	U D	
85-01-8	Phenanthrene	670.	U D	
120-12-7	Anthracene	670.	U D	
84-74-2	Di-n-butylphthalate	740.	~~U~~ BD	UJ
206-44-0	Fluoranthene	670.	U D	
129-00-0	Pyrene	670.	U D	
85-68-7	Butylbenzylphthalate	670.	U D	
91-94-1	3,3'-Dichlorobenzidine	1300.	U D	
56-55-3	Benzo(a)anthracene	670.	U D	
218-01-9	Chrysene	670.	U D	
117-81-7	bis(2-Ethylhexyl)phthalate	670.	U D	
117-84-0	Di-n-octylphthalate	47.	~~U~~ ~~D~~	J
205-99-2	Benzo(b)fluoranthene	670.	U D	R
207-08-9	Benzo(k)fluoranthene	670.	U D	
50-32-8	Benzo(a)pyrene	670.	U D	
193-39-5	Indeno(1,2,3-cd)pyrene	670.	U D	
53-70-3	Dibenz(a,h)anthracene	670.	U D	
191-24-2	Benzo(g,h,i)perylene	670.	U D	

(1) - Cannot be separated from Diphenylamine

FORM I SV-2 1/87 Rev.

8/11/0492

9613497.2740

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B015G9
216-B-50B 15.5-17.5

Lab Name: BATTELLE-PNL Contract: -------

Lab Code: ------- Case No.: ------ SAS No.: ------ SDG No.: 8 12-2-91 Rev

Matrix: (soil/water) SOIL Lab Sample ID: 92-306-E-1

Sample wt/vol: 30.6 (g/mL) G Lab File ID: >XC409

Level: (low/med) LOW Date Received: 10/08/91

% Moisture: not dec.3 dec. -- Date Extracted: 10/17/91

Extraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/24/91

GPC Cleanup: (Y/N) N pH: 6.5 Dilution Factor: 2.00000

Number TICs found: 10 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q	
1.	Unknown	4.37	1600.	~~JB~~	U
2.	Unknown	5.34	400.	~~JB~~	U
3.	Unknown	5.62	310.	J	
4.	Unknown Alkane	12.58	330.	J	
5.	Unknown Alkane	13.17	410.	J	
6.	Unknown Alkane	14.76	460.	J	
7.	Unknown Alkane	15.73	420.	J	
8.	Unknown	19.56	1600.	J	
9. 791286	Phosphine oxide, triphenyl-	34.64	430.	~~JB~~	U
10.	Unknown	5.10	860.	~~JB~~	U
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FORM I SV-TIC 1/87 Rev.

9613497.2741

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015K3
216-B-500 19-20.5

ame: BATTELLE-PNL Contract: -------

ab Code: ------- Case No.: ------ SAS No.: ------ SDG No.: #9

atrix: (soil/water) SOIL Lab Sample ID: 92-921-E-1

ample wt/vol: 30.1 (g/mL) G Lab File ID: >XC509

evel: (low/med) LOW Date Received: 10/23/91

Moisture: not dec. 4.7 dec. -- Date Extracted: 10/30/91

xtraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/25/91

PC Cleanup: (Y/N) N pH: 7.5 Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
108-95-2	Phenol	350.	U
111-44-4	bis(2-Chloroethyl)Ether	350.	U
95-57-8	2-Chlorophenol	350.	U
541-73-1	1,3-Dichlorobenzene	350.	U
106-46-7	1,4-Dichlorobenzene	350.	U
100-51-6	Benzyl alcohol	350.	U
95-50-1	1,2-Dichlorobenzene	350.	U
95-48-7	2-Methylphenol	350.	U
39638-32-9	bis(2-chloroisopropyl)ether	350.	U
106-44-5	4-Methylphenol	350.	U
621-64-7	N-Nitroso-Di-n-propylamine	350.	U
67-72-1	Hexachloroethane	350.	U
98-95-3	Nitrobenzene	350.	U
78-59-1	Isophorone	350.	U
88-75-5	2-Nitrophenol	350.	U
105-67-9	2,4-Dimethylphenol	350.	U
65-85-0	Benzoic acid	1700.	U
111-91-1	bis(2-Chloroethoxy)methane	350.	U
120-83-2	2,4-Dichlorophenol	350.	U
120-82-1	1,2,4-Trichlorobenzene	350.	U
91-20-3	Naphthalene	350.	U
106-47-8	4-Chloroaniline	350.	U
87-68-3	Hexachlorobutadiene	350.	U
59-50-7	4-Chloro-3-methylphenol	350.	U
91-57-6	2-Methylnaphthalene	350.	U
77-47-4	Hexachlorocyclopentadiene	350.	U
88-06-2	2,4,6-Trichlorophenol	350.	U
95-95-4	2,4,5-Trichlorophenol	1700.	U
91-58-7	2-Chloronaphthalene	350.	U
88-74-4	2-Nitroaniline	1700.	U
131-11-3	Dimethylphthalate	350.	U
208-96-8	Acenaphthylene	350.	U
606-20-2	2,6-Dinitrotoluene	350.	U

UJ

FORM I SV-1 1/87 Rev.

9613497.2742

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015K3
216-B-50C 19-20.5

ab ame: BATTELLE-PNL Contract: -------

ab Code: ------- Case No.: ------ SAS No.: ------ SDG No.: #9

atrix: (soil/water) SOIL Lab Sample ID: 92-921-E-1

ample wt/vol: 30.1 (g/mL) G Lab File ID: >XC509

evel: (low/med) LOW Date Received: 10/23/91

Moisture: not dec. 4.7 dec. -- Date Extracted: 10/30/91

xtraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/25/91

PC Cleanup: (Y/N) N pH: 7.5 Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
99-09-2	3-Nitroaniline	1700.	U
83-32-9	Acenaphthene	350.	U
51-28-5	2,4-Dinitrophenol	1700.	U
100-02-7	4-Nitrophenol	1700.	U
132-64-9	Dibenzofuran	350.	U
121-14-2	2,4-Dinitrotoluene	350.	U
84-66-2	Diethylphthalate	350.	U
7005-72-3	4-Chlorophenyl-phenylether	350.	U
86-73-7	Fluorene	350.	U
100-01-6	4-Nitroaniline	1700.	U
534-52-1	4,6-Dinitro-2-methylphenol	1700.	U
86-30-6	N-Nitrosodiphenylamine (1)	350.	U
101-55-3	4-Bromophenyl-phenylether	350.	U
118-74-1	Hexachlorobenzene	350.	U
87-86-5	Pentachlorophenol	1700.	U
85-01-8	Phenanthrene	350.	U
120-12-7	Anthracene	350.	U
84-74-2	Di-n-butylphthalate	580.	~~B~~ ~~U~~ UJ
206-44-0	Fluoranthene	350.	U
129-00-0	Pyrene	350.	U
85-68-7	Butylbenzylphthalate	350.	U
91-94-1	3,3'-Dichlorobenzidine	700.	U
56-55-3	Benzo(a)anthracene	350.	U
218-01-9	Chrysene	350.	U
117-81-7	bis(2-Ethylhexyl)phthalate	350.	U
117-84-0	Di-n-octylphthalate	350.	U
205-99-2	Benzo(b)fluoranthene	350.	U
207-08-9	Benzo(k)fluoranthene	350.	U
50-32-8	Benzo(a)pyrene	350.	U
193-39-5	Indeno(1,2,3-cd)pyrene	350.	U
53-70-3	Dibenz(a,h)anthracene	350.	U
191-24-2	Benzo(g,h,i)perylene	350.	U

UJ

(1) - Cannot be separated from Diphenylamine

FORM I SV-2

4/11/2/92 1/87 Rev.

9613495.2743

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B015K3
216-B-50C 19.20.5

ıme: BATTELLE-PNL Contract: -------

ıb Code: ------- Case No.: ------ SAS No.: ------ SDG No.: 9

ıtrix: (soil/water) SOIL Lab Sample ID: 92-921-E-1

ımple wt/vol: 30.1 (g/mL) G Lab File ID: >XC509

ıvel: (low/med) LOW Date Received: 10/23/91

Moisture: not dec. 4.7 dec. -- Date Extracted: 10/30/91

traction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/25/91

C Cleanup: (Y/N) N pH: 7.5 Dilution Factor: 1.00000

ımber TICs found: 4 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	Unknown	4.37	1700.	~~JAB~~ U
2.	Unknown	5.09	790.	~~JAB~~ U
	Unknown	5.32	770.	~~JAB~~ U
	Unknown	19.46	430.	J
6.				
7.				
8.				
9.				
10.				
11.				
12.				
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3				

FORM I SV-TIC 1/87 Rev.

4-11/2/92

9613497.2744

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B00X75
216-B-49A
17-20

Lab Name: Battelle PNL Contract:

Lab Code: PNL Case No.: SAS No.: SDG No.: 4

Matrix: (soil/water) SOIL Lab Sample ID: 91-07815-P-1

Sample wt/vol: 30.0 (g/mL) G Lab File ID: ------

Level: (low/med) LOW Date Received: 08/08/91

% Moisture: not dec. 4.0 dec. ---- Date Extracted: 08/20/91

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 10/25/91

GPC Cleanup: (Y/N) N pH: 6.4 Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
319-84-6	alpha-BHC	8.0	UJ
319-85-7	beta-BHC	8.0	U
319-86-8	delta-BHC	8.0	U
58-89-9	gamma-BHC (Lindane)	8.0	U
76-44-8	Heptachlor	~~9.8~~ ~~BJ~~	UJ
309-00-2	Aldrin	6.6 ~~8.0~~	UJ
1024-57-3	Heptachlor epoxide	8.0	U
959-98-8	Endosulfan I	8.0	U
60-57-1	Dieldrin	16.0	U
72-55-9	4,4'-DDE	16.0	U
72-20-8	Endrin	16.0	U
33213-65-9	Endosulfan II	16.0	U
72-54-8	4,4'-DDD	16.0	U
1013-07-8	Endosulfan sulfate	16.0	U
50-29-3	4,4'-DDT	16.0	U
72-43-5	Methoxychlor	80.0	U
53494-70-5	Endrin ketone	16.0	U
5103-71-9	alpha-Chlordane	80.0	U
5103-74-2	gamma-Chlordane	80.0	U
8001-35-2	Toxaphene	160.0	U
12674-11-2	Arochlor-1016	80.0	U
11104-28-2	Arochlor-1221	80.0	U
11141-16-5	Arochlor-1232	90.0	J
53469-21-9	Arochlor-1242	80.0	UJ
12672-29-6	Arochlor-1248	80.0	U
11097-69-1	Arochlor-1254	160.0	U
11096-82-5	Arochlor-1260	160.0	U

FORM I PEST 1/89 Rev.

Gill 5/92

9613497.2745

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
216-B-57A
BOOX77

Lab Name: Battelle-PNL Contract: - - -

Lab Code: - - - Case No.: - - - SAS No.: - - - SDG No.: 30-33 3

Matrix: (soil/water) soil Lab Sample ID: 91-6421-P-1R

Sample wt/vol: 30.3 (g/mL) g Lab File ID: - - -

Level: (low/med) low Date Received: 7/10/91

% Moisture: not dec. 5.3 dec. - - - Date Extracted: 10/30/91

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 12/06/91

GPC Cleanup: (Y/N) N pH: 6.6 Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
319-84-6	alpha-BHC	8.0	U
319-85-7	beta-BHC	8.0	U
319-86-8	delta-BHC	8.0	U
58-89-9	gamma-BHC (Lindane)	8.0	U
76-44-8	Heptachlor	8.0	U
309-00-2	Aldrin	8.0	U
1024-57-3	Heptachlor epoxide	8.0	U
959-98-8	Endosulfan I	8.0	U
60-57-1	Dieldrin	16.0	U
72-55-9	4,4'-DDE	16.0	U
72-20-8	Endrin	16.0	U
33213-65-9	Endosulfan II	16.0	U
72-54-8	4,4'-DDD	16.0	U
1031-07-8	Endosulfan sulfate	16.0	U
50-29-3	4,4'-DDT	16.0	U
72-43-5	Methoxychlor	80.0	U
53494-70-5	Endrin ketone	16.0	U
5103-71-9	alpha-Chlordane	80.0	U
5103-74-2	gamma-Chlordane	80.0	U
8001-35-2	Toxaphene	160.0	U
12674-11-2	Aroclor-1016	80.0	U
11104-28-2	Aroclor-1221	80.0	U
11141-16-5	Aroclor-1232	80.0	U
53469-21-9	Aroclor-1242	80.0	U
12672-29-6	Aroclor-1248	80.0	U
11097-69-1	Aroclor-1254	160.0	U
11096-82-5	Aroclor-1260	160.0	U

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9613497.2746

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015G9
216-B-5DB 15.5-17.5

Lab Name: Battelle PNL Contract:

Lab Code: PNL Case No.: SAS No.: SDG No.: 8

Matrix: (soil/water) Soil Lab Sample ID: 92-00306-P-1

Sample wt/vol: 30.6 (g/mL) g Lab File ID: ------

Level: (low/med) LOW Date Received: 10/08/91

% Moisture: not dec. 3.01 dec. ---- Date Extracted: 10/17/91

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 11/28/91

GPC Cleanup: (Y/N) N pH: 6.5 Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
319-84-6	alpha-BHC	8.0	U
319-85-7	beta-BHC	8.0	U
319-86-8	delta-BHC	8.0	U
58-89-9	gamma-BHC (Lindane)	8.0	U
76-44-8	Heptachlor	8.0	U
309-00-2	Aldrin	8.0	U
1024-57-3	Heptachlor epoxide	8.0	U
959-98-8	Endosulfan I	8.0	U
60-57-1	Dieldrin	16.0	U
72-55-9	4,4'-DDE	16.0	U
72-20-8	Endrin	16.0	U
33213-65-9	Endosulfan II	17.1	
72-54-8	4,4'-DDD	16.0	U
1031-07-8	Endosulfan sulfate	16.0	U
50-29-3	4,4'-DDT	16.0	U
72-43-5	Methoxychlor	80.0	U
53494-70-5	Endrin ketone	16.0	U
5103-71-9	alpha-Chlordane	80.0	U
5103-74-2	gamma-Chlordane	80.0	U
8001-35-2	Toxaphene	160.0	U
12674-11-2	Arochlor-1016	80.0	U
11104-28-2	Arochlor-1221	80.0	U
11141-16-5	Arochlor-1232	80.0	U
53469-21-9	Arochlor-1242	80.0	U
12672-29-6	Arochlor-1248	80.0	U
11097-69-1	Arochlor-1254	ok 313.2 ~~254~~ ~~313.2~~	
11096-82-5	Arochlor-1260	160.0	U

EJ 11/20/92

EJ 11/20/92

EJ 11/20/92

02/15/93

FORM I PEST 1/89 Rev.

9613497.2747

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015H1
216-B-50B 28-30.5 split

Lab Name: Battelle PNL Contract:

Lab Code: PNL Case No.: SAS No.: SDG No.: 8

Matrix: (soil/water) Soil Lab Sample ID: 92-00358-P-1

Sample wt/vol: 29.7 (g/mL) g Lab File ID: ------

Level: (low/med) LOW Date Received: 10/11/91

% Moisture: not dec. 3.4 dec. ---- Date Extracted: 10/17/91

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 11/28/91

GPC Cleanup: (Y/N) N pH: 8.5 Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
319-84-6	alpha-BHC	8.0	U
319-85-7	beta-BHC	8.0	U
319-86-8	delta-BHC	8.0	U
58-89-9	gamma-BHC (Lindane)	8.0	U
76-44-8	Heptachlor	8.0	U
309-00-2	Aldrin	8.0	U
1024-57-3	Heptachlor epoxide	8.0	U
959-98-8	Endosulfan I	8.0	U
60-57-1	Dieldrin	16.0	U
72-55-9	4,4'-DDE	16.0	U
72-20-8	Endrin	16.0	U
33213-65-9	Endosulfan II	16.0	U
72-54-8	4,4'-DDD	16.0	U
1013-07-8	Endosulfan sulfate	16.0	U
50-29-3	4,4'-DDT	16.0	U
72-43-5	Methoxychlor	80.0	~~U~~ U
53494-70-5	Endrin ketone	16.0	U
5103-71-9	alpha-Chlordane	80.0	U
5103-74-2	gamma-Chlordane	80.0	U
8001-35-2	Toxaphene	160.0	U
12674-11-2	Arochlor-1016	80.0	U
11104-28-2	Arochlor-1221	80.0	U
11141-16-5	Arochlor-1232	80.0	U
53469-21-9	Arochlor-1242	80.0	U
12672-29-6	Arochlor-1248	80.0	U
11097-69-1	Arochlor-1254	160.0	U
11096-82-5	Arochlor-1260	160.0	U

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02/5/93

FORM I PEST 1/89 Rev.

SJ 11/10/92

9613497.2748

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015K3
216-B-50C
19-20.5

Lab Name: Battelle-PNL Contract: - - -

Lab Code: - - - Case No.: - - - SAS No.: - - - SDG No.: 9

Matrix: (soil/water) soil Lab Sample ID: 92-00921-P-1

Sample wt/vol: 30.1 (g/mL) g Lab File ID: - - -

Level: (low/med) low Date Received: 10/23/91

% Moisture: not dec. 4.7 dec. - - - Date Extracted: 10/30/91

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 12/06/91

GPC Cleanup: (Y/N) N pH: 7.5 Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
319-84-6	alpha-BHC	8.0	U
319-85-7	beta-BHC	8.0	U
319-86-8	delta-BHC	8.0	U
58-89-9	gamma-BHC (Lindane)	8.0	U
76-44-8	Heptachlor	8.0	U
309-00-2	Aldrin	8.0	U
1024-57-3	Heptachlor epoxide	8.0	U
959-98-8	Endosulfan I	8.0	U
60-57-1	Dieldrin	16.0	U
72-55-9	4,4'-DDE	16.0	U
72-20-8	Endrin	16.0	U
33213-65-9	Endosulfan II	16.0	U
72-54-8	4,4'-DDD	16.0	U
1031-07-8	Endosulfan sulfate	16.0	U
50-29-3	4,4'-DDT	16.0	U
72-43-5	Methoxychlor	80.0	U
53494-70-5	Endrin ketone	16.0	U
5103-71-9	alpha-Chlordane	80.0	U
5103-74-2	gamma-Chlordane	80.0	U
8001-35-2	Toxaphene	160.0	U
12674-11-2	Aroclor-1016	80.0	U
11104-28-2	Aroclor-1221	80.0	U
11141-16-5	Aroclor-1232	80.0	U
53469-21-9	Aroclor-1242	80.0	U
12672-29-6	Aroclor-1248	80.0	U
11097-69-1	Aroclor-1254	160.0	U
11096-82-5	Aroclor-1260	160.0	U

UJ

9/11/1992

FORM I PEST 1/87 Rev.

9613497.2719

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

91-7815B1
BOOK75
216-B-44A 17-20

Lab Name: BATTELLE_PNL Contract: _____

Lab Code: ACL Case No.: 1 SAS No.: _____ SDG No.: 1

Matrix (soil/water): SOIL Lab Sample ID: 91-7815B1

Level (low/med): MED Date Received: 08/30/91

% Solids: 96.1

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	7420			P	
7440-36-0	Antimony	4.6	~~U~~	N	P	UJ
7440-39-3	Barium	59.1			P	
7440-41-7	Beryllium	0.45	B		P	
7440-43-9	Cadmium	0.58	U		P	
7440-70-2	Calcium	7290			P	
7440-47-3	Chromium	8.8			P	
7440-48-4	Cobalt	8.3	~~B~~		P	KB 1/21/93
7440-50-8	Copper	18.3			P	U KL 3/27/92*
7439-89-6	Iron	14500		~~E~~	P	
7439-95-4	Magnesium	4730			P	
7439-96-5	Manganese	288		EN	P	J KL 3/27/92*
7440-02-0	Nickel	14.2			P	
7440-09-7	Potassium	1270			P	
7440-23-5	Sodium	780	B		P	
7440-[illegible]-2	Vanadium	24.8			P	
7440-[illegible]-6	Zinc	36.6		~~E~~	P	~~KL~~ 1/21/93 KL 3/27/92

*This qualifier does not apply to this sample.

Jackson 3-27-92

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

ORIGINAL_ANALYTICAL_SAMPLE_RUN_(09/20/91) G 11/3/92

FORM I - IN

3/90

9613497.2750

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

BOOK 77
91-6421B1
216-6-574 30-33

Lab Name: BATTELLE_PNL Contract: _____

Lab Code: ACL Case No.: 1 SAS No.: _____ SDG No.: 1

Matrix (soil/water): SOIL Lab Sample ID: 91-6421B1

Level (low/med): MED Date Received: 08/07/91

% Solids: 94.7

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	7610			P	
7440-36-0	Antimony	4.3	U	N	P	UJ
7440-39-3	Barium	63.7			P	
7440-41-7	Beryllium	0.30	B		P	
7440-43-9	Cadmium	0.54	U		P	
7440-70-2	Calcium	6500			P	
7440-47-3	Chromium	7.6			P	
7440-48-4	Cobalt	7.1	B		P	U
7440-50-8	Copper	11.9			P	UJ
7439-89-6	Iron	14700		E	P	J
7439-95-4	Magnesium	4710			P	
7439-96-5	Manganese	289		EN	P	J
7440-02-0	Nickel	11.0			P	
7440-09-7	Potassium	1080			P	U
7440-23-5	Sodium	113	B		P	
7440-62-2	Vanadium	23.6			P	
7440-66-6	Zinc	36.8		E	P	J

SJ 10/30/92

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments:
ORIGINAL_ANALYTICAL_SAMPLE_RUN_(09/20/91)

FORM I - IN

3/90

9613497.2751

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B015G9

216 B-50B 15.5-17.5

Lab Name: BATTELLE_PNL Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 8,9,10

Matrix (soil/water): SOIL_ Lab Sample ID: 92-0306B1_

Level (low/med): LOW_ Date Received: 12/03/91

% Solids: 97.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	8030			P	J
7440-36-0	Antimony	2.6	U	N	P	UJ
7440-39-3	Barium	78.6			P	
7440-41-7	Beryllium	0.26	B		P	
7440-43-9	Cadmium	2.0			P	U
7440-70-2	Calcium	7350			P	
7440-47-3	Chromium	10.2			P	
7440-48-4	Cobalt	7.3	B		P	
7440-50-8	Copper	21.5			P	
7439-89-6	Iron	22200			P	
7439-95-4	Magnesium	4160			P	
7439-96-5	Manganese	269			P	
7440-02-0	Nickel	11.6			P	
7440-09-7	Potassium	793	B		P	UR
7440-23-5	Sodium	596	B		P	J
7440-62-2	Vanadium	52.1			P	
7440-66-6	Zinc	44.1			P	

Color Before: _____ Clarity Before: _____ Texture: NON-HO

Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

ORIGINAL_SOIL_SAMPLE_LEACHATE g 11/19/92

FORM I - IN

3/90

9613497.2752

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B015H1
216-B-50B 28-30.5

Lab Name: BATTELLE_PNL_____ Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 8,9,10

Matrix (soil/water): SOIL_ Lab Sample ID: 92-0358B1_

Level (low/med): LOW__ Date Received: 12/03/91

% Solids: _96.1

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum_	6010			P_	J
7440-36-0	Antimony_	2.8	U	N	P_	UJ
7440-39-3	Barium___	68.6			P_	
7440-41-7	Beryllium	0.26	B		P_	
7440-43-9	Cadmium__	2.0			P_	U
7440-70-2	Calcium__	5670			P_	
7440-47-3	Chromium_	10.3			P_	
7440-48-4	Cobalt___	6.2	B		P_	
7440-50-8	Copper___	18.6			P_	
7439-89-6	Iron____	18600			P_	
7439-95-4	Magnesium	4240			P_	
7439-96-5	Manganese	269			P_	
7440-02-0	Nickel___	12.9			P_	
7440-09-7	Potassium	838	B		P_	UR
7440-23-5	Sodium___	1070			P_	J
7440-62-2	Vanadium_	33.8			P_	
7440-66-6	Zinc____	34.2			P_	

Color Before: _____ Clarity Before: _____ Texture: NON-HO

Color After: _____ Clarity After: _____ Artifacts: _____

Comments:
ORIGINAL_SOIL_SAMPLE_LEACHATE_____ 11/9/92

FORM I - IN

3/90

9613497.2795

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B015K3
216-B-5DC 19-20.5

Name: BATTELLE_PNL' Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 8,9,10

Matrix (soil/water): SOIL_ Lab Sample ID: 92-0921B1_

Level (low/med): LOW__ Date Received: 12/03/91

% Solids: _94.4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum_	8700			P_	J
7440-36-0	Antimony_	2.9	U	N	P_	UJ
7440-39-3	Barium___	69.9			P_	
7440-41-7	Beryllium	0.29	B		P_	
7440-43-9	Cadmium__	1.6			P_	U
7440-70-2	Calcium__	6390			P_	
7440-47-3	Chromium_	12.5			P_	
7440-48-4	Cobalt___	6.9	B		P_	
7440-50-8	Copper___	17.1			P_	
7439-89-6	Iron____	18000			P_	
7439-95-4	Magnesium	4560			P_	
7439-96-5	Manganese	279			P_	
7440-02-0	Nickel___	11.6			P_	
7440-09-7	Potassium	1170			P_	~~U~~ R
7440-23-5	Sodium___	815	B		P_	J
7440-62-2	Vanadium_	35.9			P_	
7440-66-6	Zinc____	37.7			P_	

olor Before: _____ Clarity Before: _____ Texture: NON-HO

olor After: _____ Clarity After: _____ Artifacts: _____

omments:
ORIGINAL_SOIL_SAMPLE_LEACHATE G 11/11/92

FORM I - IN

3/90

TABLE 8: Hg COLD VAPOR AA ANALYSIS DATA FOR TASKS 2 & 4
SDG #4

SOLID SAMPLES

Sample ID#	PNL Log#	B1 Sample mg/Kg	B1 Flags C	B1 Flags Q	B2 Dupl. mg/Kg	B2 C	B1&B2 %RPD	B5 Blank ug/L	B5 C	B3 (a) Sample +Spike mg/Kg	B3 (a) Digest Spike %rec	B4 (b) LCS mg/Kg	B4 (b) LCS %rec
B00X75	91-07815	0.14	R	N	0.15		5.0%	0.04	U	0.23	71.3%	10.1	79.3%
	10/16/91	(0.10)	R	N									
NIST SRM2704												1.3	88.3%

216-B-494
17-20

gj 11/3/92

(a) B3 Predigestion Spike Level = 0.05 ug Hg
(b) LCS 0287 Hg certified at 12.7 mg/Kg (Range 8.5 to 17.) mg/Kg)
(c) NIST SRM2704 certified at 1.47 ug/g Hg
(d) RPD only calculated if both sample and duplicate are >IDL
(e) IDL = 0.04 ug/L [or 0.005 mg/kg -> 0.2g sample, 25 mL analysis aliquot]
(f) CRDL = 0.2 ug/L [or 0.1 mg/kg -> 0.2g sample, 100 mL analysis aliquot]
(g) Calibration standards NIST SRM3133, ICV/CCV standard Johnson-Matthey 14395
(h) Values in ( ) were analyzed originally on the date indicated.

TABLE x: Hg COLD VAPOR AA ANALYSIS DATA

SOLID SAMPLES

Sample ID#	PNL Log#	B1 Sample mg/Kg	B1 Flags C	B1 Flags Q	B2 Dupl. mg/Kg	B2 C	B1&B2 %RPD	B5 Blank ug/L	B5 C	B3 Sample +Spike mg/Kg	B3 Digest Spike %rec	B4 LCS mg/Kg	B4 LCS %rec
B00X77	91-6421	0.1 ~~0.04~~	~~UJ~~ R	N	0.05	U	N/A	0.20	U	0.06	7.3	12.9	102

216-B-57A
30-33

cj 11/12/92

spike outside
75-125% R

(a) B3 Predigestion Spike Level = 0.1 ug Hg
(b) LCS 0287 Hg = 12.7 mg/Kg
(c) RPD only calculated if both sample and duplicate are >IDL
(d) IDL = 0.01 ug >>>>>> or 0.05 mg/kg based on a 0.2g sample
(e) CRDL = 0.2 ug/L >>>> or 0.1 mg/kg based on a 0.2g sample

TABLE 8: Hg COLD VAPOR AA ANALYSIS DATA FOR TASKS 2 & 4
SDG #8

SOLID SAMPLES

Sample ID#	PNL Log#	B1 Sample mg/Kg	B1 Flags C	B1 Flags Q	B2 Dupl. mg/Kg	B2 C	B1&B2 %RPD	B5 Blank ug/L	B5 C	B3 (a) Sample +Spike mg/Kg	B3 (a) Digest Spike %rec	B4 (b,c) LCS mg/Kg	B4 (b,c) LCS %rec
BOOX75 (h)	91-07815	0.14		N	0.15		5.0%	0.04	U	0.23	71.3%	10.1	79.3%
	10/16/91	(0.10)		N									
NIST SRM2704												1.3	88.3%
B015G9	92-00306	0.25	J	N									
	10/16/91	(0.10)	B	N									
	11/04/91	(0.07)	B	N	(0.11)	B							
B015H1	92-00358	0.07	J	N									
	10/16/91	(0.20)		N	(0.22)								
	11/04/91	(0.22)		N	(0.15)	B							

216-B-50B 15.5-17.5

24

216-B-50B 28-30.5

(a) B3 Predigestion Spike Level = 0.05 ug Hg
(b) LCS 0287 Hg certified at 12.7 mg/Kg (Range 8.5 to 17.0 mg/Kg)
(c) NIST SRM2704 certified at 1.47 ug/g Hg
(d) RPD only calculated if both sample and duplicate are >IDL
(e) IDL = 0.04 ug/L [or 0.005 mg/kg -> 0.2g sample, 25 mL analysis aliquot]
(f) CRDL = 0.2 ug/L [or 0.1 mg/kg -> 0.2g sample, 100 mL analysis aliquot]
(g) Calibration standards NIST SRM3133, ICV/CCV standard Johnson-Matthey 14395
(h) BOOX75 not part of SDG; sample used for QC during batch analysis.
(i) Values in ( ) were analyzed originally on the date indicated.

5/11/92

9614097.2756

TABLE 8: Hg COLD VAPOR AA ANALYSIS DATA FOR TASKS 2 & 4
SDG #9

SOLID SAMPLES

Sample ID#	PNL Log#	B1 Sample mg/Kg	B1 Flags C	B1 Flags Q	B2 Dupl. mg/Kg	B2 C	B1&B2 %RPD	B5 Blank ug/L	B5 C	B3 (a) Sample +Spike mg/Kg	B3 (a) Digest Spike %rec	B4 (b,c) LCS mg/Kg	B4 (b,c) LCS %rec
B00X75 (h)	91-07815 10/16/91	0.14 (0.10)		N N	0.15		5.0%	0.04	U	0.23	71.3%	10.1	79.3%
NIST SRM2704												1.3	88.3%
B015K3	92-00921 ~~11/04/91~~	0.09 ~~(0.06)~~	R ~~B~~	N ~~N~~	~~(0.06)~~	~~U~~							

216-B-50C 19-20.5

(a) B3 Predigestion Spike Level = 0.05 ug Hg
(b) LCS 0287 Hg certified at 12.7 mg/Kg (Range 8.5 to 17.0 mg/Kg)
(c) NIST SRM2704 certified at 1.47 ug/g Hg
(d) RPD only calculated if both sample and duplicate are >IDL
(e) IDL = 0.04 ug/L [or 0.005 mg/kg -> 0.2g sample, 25 mL analysis aliquot]
(f) CRDL = 0.2 ug/L [or 0.1 mg/kg -> 0.2g sample, 100 mL analysis aliquot]
(g) Calibration standards NIST SRM3133, ICV/CCV standard Johnson-Matthey 14395
(h) B00X75 not part of SDG; sample used for QC during batch analysis.
(i) Values in ( ) were analyzed originally on the date indicated.

CLP Forms

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

TABLE 7: GRAPHITE FURNACE AA ANALYSIS DATA

SOLID SAMPLES

2/6-B-49A
17-20

			B1				B2				B5			B3		B4		
Analyte	Sample ID#	PNL Log#	Sample mg/Kg	Post Spike %Rec	Flags C	Flags Q	Dupl. mg/Kg	Post Spike %rec	C	B1&B2 %RPD	Blank µg/L	Post Spike %rec	C	Sample+ Spike µg/L	Digest Spike %rec	LCS mg/Kg	LCS %rec	Post Spike %rec
Ag	B00X75	91-7815	0.09	92	U		0.09	93	U	N/A	0.50	102.	U	30.8	77	22.6	102	74
As	B00X75	91-7815	2.30	86	J		2.30	101		0.0	0.60	99	U	49.8	93	721.7	78.7	85
Pb	B00X75	91-7815	5.90	95			6.10	95		3.3	2.40	85	U	49.0	89	261.7	111	106.
Se	B00X75	91-7815	0.14	86	U		0.14	96	U	N/A	0.80	100	U	8.3	83	39.5	101	98
Tl	B00X75	91-7815	0.22	96	U		0.22	95	U	N/A	1.20	97	U	43.1	86	34.4	~~89~~	87

OK 7/11/92

			B1				B2				B5			B3		B6		
Analyte	Sample ID#	PNL Log#	Sample mg/Kg	Post Spike %Rec	Flags C	Flags Q	Dupl. mg/Kg	Post Spike %rec	C	B1&B2 %RPD	Blank µg/L	Post Spike %rec	C	Sample+ Spike µg/L	Digest Spike %rec	LCS µg/L	LCS %rec	Post Spike %rec
Bi	B00X75	91-7815	0.27	94	U		0.27	96	U	N/A	1.50	93	U	41.0	102.5	46.0	115	98

no qual. <IDL

7/11/92

(a) CRDL (µg/L): Ag=10, As=10, Bi=60, Pb=3, Se=5, Tl=10
(b) IDL (µg/L): [PE5000 7/10/91] Ag=0.5, As=0.6, Se=0.8; [PE5100 6/4/91] Bi=1.5, Pb=2.4, Tl=1.2
(c) Analytical spike (µg/L): Ag=5, As=10, Bi=20, Pb=6, Se=10, Tl=20
(d) Pre-digestion spike (µg/L): Ag=40, As=40, Bi=20, Pb=20, Se=10, Tl=50
(e) LCS standard: Ag, As, Pb, Se, Tl -- ICF 0287; Bi -- NIST 3109
(f) ICVV/CCV Used During Analysis: Ag,Pb&Tl -- ICF 0389; As&Se -- ICF 0590; Bi -- NIST 3106
(g) RPD only calculated if both sample and duplicate are greater than IDL.

9613497.2758

TABLE 6: GRAPHITE FURNACE AA ANALYSIS DATA

SOLID SAMPLES

216-B-57A
30-33

Analyte	Sample ID#	PNL Log#	B1 Sample mg/Kg	B1 Post Spike %Rec	B1 Flags C	B1 Flags Q	B2 Dupl. mg/Kg	B2 Post Spike %rec	B2 C	B1&B2 %RPD	B5 Blank µg/L	B5 Post Spike %rec	B5 C	B3 Sample+ Spike µg/L	B3 Digest Spike %rec	B4 LCS mg/Kg	B4 LCS %rec	B4 Post Spike %rec
Ag	B00X77	91-6421	10 ~~0.09~~	101	U		0.09	108	U	N/A	0.50	98	U	32.3	82	23.5	106	102
As	B00X77	91-6421	2.40	96	JB		2.30	101		4.3	0.60	102	U	49.3	89	930.1	101	95
Pb	B00X77	91-6421	5.50	93			5.90	95		7.0	1.00	110	U	47.0	81	250.1	106	88
Se	B00X77	91-6421	0.14	91	U		0.14	93	U	N/A	0.80	92	U	8.3	83	39.8	102	95
Tl	B00X77	91-6421	1.00 ~~0.18~~	94	UJ		0.18	96	U	N/A	1.00	95	U	47.4	93	40.8	105	71
Bi	B00X77	6421	60		U													

LCS outside 80-120 limits - qual. as UJ. 11/2/92

Analyte	Sample ID#	PNL Log#	B1 Sample mg/Kg	B1 Post Spike %Rec	B1 Flags C	B1 Flags Q	B2 Dupl. mg/Kg	B2 Post Spike %rec	B2 C	B1&B2 %RPD	B5 Blank µg/L	B5 Post Spike %rec	B5 C	B3 Sample+ Spike µg/L	B3 Digest Spike %rec	B4 LCS µg/L	B4 LCS %rec	B4 Post Spike %rec
Bi	B00X77	91-6421	0.29	98	U		0.29	92	U	N/A	1.5	99	U	39.0	97	38.4	96	99

(a) CRDL (µg/L): Ag=10, As=10, Bi=60, Pb=3, Se=5, Tl=10
(b) IDL (µg/L): (PES000 7/10/91) Ag=0.5, As=0.6, Bi=1.5, Pb=1.0, Se=0.8, Tl=1.0
(c) Analytical spike (µg/L): Ag=5, As=10, Bi=20, Pb=6, Se=10, Tl=20
(d) Pre-digestion spike (µg/L): Ag=40, As=40, Bi=20, Pb=20, Se=10, Tl=50
(e) LCS standard: Ag, As, Pb, Se, Tl -- ICF 0287; Bi -- NIST 3109
(f) ICVV/CCV Used During Analysis: Ag,Pb&Tl -- ICF 0389; As&Se -- ICF 0590; Bi -- NIST 3106
(g) RPD only calculated if both sample and duplicate are greater than IDL.

C07-003

96134971.2750

9613497.2760

U.S.EPA-CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015H1

Lab Name:BATTELLE/PNL_____ Contract:_____ 216-B-50B 28+30.5

Lab Code:_____ Case No.:_____ SAS No.:_____ SDG No.:_____

Matrix (soil/water):SOIL_____ Lab SAMPLE ID: 92-00358___ split

Level (low/med): LOW_____ Date Received:10/11/91 ____

% Solid: 97.0_____

Concentration Units (ug/L or mg/Kg dry weight):mg/Kg __

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum					
7440-36-0	Antimony					
7440-38-2	Arsenic	5.44			F	JB
7440-39-3	Barium					
7440-41-7	Beryllium					
7440-69-9	Bismuth	0.17	U			
7440-43-9	Cadmuim					
7440-70-2	Caltium					
7440-47-3	Chromium					
7440-48-4	Cobalt					
7440-50-8	Copper					
7439-89-6	Iron					
7439-92-1	Lead	2.93			F	JB
7439-95-4	Magnesium					
7439-96-5	Manganese					
7439-97-6	Mercury					
7440-02-0	Nickle					
7440-09-7	Potassium					
7782-49-2	Selenium	~~0.06~~ 5	U		F	
7440-22-4	Silver	~~0.04~~ 10	U		F	UJ U
7440-23-5	Sodium					
7440-28-0	Thallium	0.70	B		F	
7440-62-2	Vanadium					
7440-66-6	Zinc					
	Cyanide					

Color Before:gray-brown Clarity Before:N/A_____ Texture:hetrogeneous

Color After:gray_____ Clarity After:clear-digst Artifact:N/A_____

Comments:

These samples were undesirably heterogeneous.

9/19/92

C08-006

9613497.2761

U.S.EPA-CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015G9

216-B-5DB 15.5-17.5

Lab Name: BATTELLE/PNL Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix (soil/water): SOIL Lab SAMPLE ID: 92-00306

Level (low/med): LOW Date Received: 10/08/91

% Solid: 97.0

Concentration Units (ug/L or mg/Kg dry weight): mg/Kg

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic	6.47			F
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-69-9	Bismuth	0.17	U		F
7440-43-9	Cadmuim				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	3.11			F
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-0	Nickle				
7440-09-7	Potassium				
7782-49-2	Selenium	~~0.06~~ 5	U		F
7440-22-4	Silver	~~0.04~~ 10	~~U~~		F
7440-23-5	Sodium				
7440-28-0	Thallium	~~0.13~~ 10	U		F
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

JB

U

Color Before: gray-brown Clarity Before: N/A Texture: heterogeneous

Color After: gray Clarity After: clear-digst Artifacts: N/A

Comments:

These samples were undesirably heterogeneous.

11/9/92

C08-005

U.S.EPA-CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015K3

Lab Name: BATTELLE/PNL Contract: 216-B-50C 19-20.5
Lab Code: Case No.: SAS No.: SDG No.:
Matrix (soil/water): SOIL Lab SAMPLE ID: 92-00921
Level (low/med): LOW Date Received: 10/23/91
% Solid: 97.0

Concentration Units (ug/L or mg/Kg dry weight): mg/Kg

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum					
7440-36-0	Antimony					
7440-38-2	Arsenic	8.22			F	B
7440-39-3	Barium					
7440-41-7	Beryllium					
7440-69-9	Bismuth	0.17	~~B~~		F	~~UJ~~ U
7440-43-9	Cadmuim					
7440-70-2	Calcium					
7440-47-3	Chromium					
7440-48-4	Cobalt					
7440-50-8	Copper					
7439-89-6	Iron					
7439-92-1	Lead	3.21			F	
7439-95-4	Magnesium					
7439-96-5	Manganese					
7439-97-6	Mercury					
7440-02-0	Nickle					
7440-09-7	Potassium					
7782-49-2	Selenium	~~0.66~~ 5	U		F	
7440-22-4	Silver	~~0.04~~ 10	~~U~~		F	~~UJ~~ U
7440-23-5	Sodium					
7440-28-0	Thallium	~~0.13~~ 10	U		F	
7440-62-2	Vanadium					
7440-66-6	Zinc					
	Cyanide					

Color Before: gray-brown Clarity Before: N/A Texture: hetrogeneous
Color After: gray Clarity After: clear-digst Artifact: N/A

Comments:
These samples were undesirably heterogeneous.

cj 11/9/92

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

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#
															1,2,3
216-B-49A 3.5-5.5 B00X68	91-7426	0.6	U	0.6	U	N/A	5.9	U	41.6	8.6	10.7	100	113		ALL
216-B-49A 8.5-11 B00X70	91-7427	0.6	U												
216-B-49A 82-84.5 B00X72	91-7504	0.6	UJ	0.6	UJ	N/A	5.9	U	39.5	8.1	10.3	99	109		
216-B-57A 109.5-112 B00X74	91-7623	0.6	U	0.6	U	N/A	5.9	U	39.5	8.3	9.1	103	97		
216-B-57A 134-141.5 B00X90	91-7807	0.6	U	0.6	U	N/A	5.9	U	39.5	7.7	9.8	96	105		
216-B-57A 1065-109 B00X92	91-7875	0.6	U												
216-B-49A 17-20 B00X75	91-7815	1.6		1.7		3.53	5.9	U	39.5	9.8	10.3	99	110		
											Mean	99.4	106.8		
											Std. Dev	0.5	2.0		

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 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 B00X94 not part of this data package.

WATER SAMPLES

G 11/3/92

Sample ID#	PNL Log#	Sample G1 (µg/L)	C	Sample dup. G2 (µg/L)	C	%RPD	Blank G5 (µg/L)	C	Spike added (µg)	Sample+ spike G3 (µg/L)	sample G4 (ICV) (mg/L)	Sample+ spike G3 recovery(%)	sample G4 (ICV) recovery(%)	Flags Q	Footnote#
															1,2,4
216-B-57A Trip blank B00XC0	91-7505	5.9	U	5.9	U	N/A	5.9	U	41.6	85	11	103.0	117.0		ALL
216-B-57A Trip blank B00X84	91-7624	5.9	U	5.9	U	N/A	5.9	U	39.5	157	10.8	96.0	115.0		3
											Mean	99.5	116.0		
											Std. Dev.	3.5	1.0		

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 per distillation due to limited sample size of 1.5L of total sample.
4. Duplicate precision under the CLP protocol must be within one CRDL when either sample or duplicate are below 5X CRDL.

CLP FLAGS

U = Analyzed but not detected (less than IDL)

9615497.2763

9613497.2764

REPORT OF ANALYSIS FOR TOTAL CYANIDE IN SOLID SAMF ___

Client :	WHC, 200-BP-1
Project :	16772
Work order :	M63023
Task-work package :	Task 2&4,3
Test instruction :	200BP-1-66

Distillation analyst:	Shawn Homi	S.H.	12-3-91
Colorimetric analyst:	James Robbins	J. Robbins	12-3-91
Data reduction:	James Robbins	J. Robbins	12-3-91
Data Reviewer:	Mike Urie	MUrie	12-4-91

Cyanide analysis results

Client sample I.D.#	PNL-ACL sample #	Total CN (mg/kg)	Date received	Date distilled	Date analyzed	CLP flags
BOOX64	91-6420-G1	~~0.6~~ 1	7/10/91	7/22/91	7/22/91	U

216-B-57A
30-33

Cyanide analysis CLP quality assurance data

CLP data type	PNL-ACL sample #	Total CN (mg/kg)	Recovery (%)	Total CN (µg/l)	CLP flags	Sample QA identifiers
BOOX64	91-6420-G2	0.6			U	G1 = Sample
Sample RPD		N/A				G2 = sample duplicate
						G3 = Sample + CN spike
Method blank	91-6420-G5			5.9	U	G4 = LCS(ICV-6)
						G5 = method blank
Spiked sample	91-6420-G3	8.3				
Spike recovery	91-6420-G3		100			
ICV-6	91-6420-G4	10.39 mg/L				JMR 12-20-91
ICV-6 recovery	91-6420-G4		111			

Contract required detection limit (mg/kg):	1
Instrument detection limit (mg/kg) [1]:	0.6

Analytical method:	PNL-ALO-270
Distillation reference:	LRB54027, pg. 106
Analysis reference:	LRB54027, pg. 109
CN standardization ref:	LRB54027, pg. 64
%solids reference:	LRB54027, pg. 119

Instrumentation M&TE#:	WA54726	Spectronic 21 colorimeter	gj 11/2/92
	WB 80669	Mettler AT400 analytical balance	

[1] Instrument detection limit (IDL) based on the EPA CLP method for determining IDL. If the IDL were based on the standard deviation of laboratory control sample (ICV-6) recovery vs certified value for the period 9/90-9/91, the IDL would be 2 µg/L.

~~[2] QA data support accompanying backwash water sample distilled in the same run.~~ JMR 12-20-91

REPORT OF ANALYSIS FOR TOTAL CYANIDE IN SOLID SAMPLES

Client :	WHC, 200-BP-1
Project :	16772
Work order :	M63023
Task-work package :	Task 2&4,3
Test instruction :	200BP-1-63

Distillation analyst:	Shawn Homi	S.H.	12-3-91
Colorimetric analyst:	Shawn Homi	S.H.	12-3-91
Data reduction:	James Robbins	J. Robbins	12-3-91
Data Reviewer:	Mike Urie	M Urie	12-4-91

Cyanide analysis results

Client sample I.D.#	PNL-ACL sample #	Total CN (mg/kg)	Date received	Date distilled	Date analyzed	CLP flags
BOOX77	91-6421-G1	~~0.6~~ 1	7/10/91	8/13/91	8/15/91	~~U~~ R

216-B-57A
30-33

gj 10/3
HT out

Cyanide analysis CLP quality assurance data

CLP data type	PNL-ACL sample #	Total CN (mg/kg)	Recovery (%)	Total CN (µg/l)	CLP flags	Sample QA identifiers
BOOX77	91-6421-G2	0.6			U	G1 = Sample
Sample RPD		N/A				G2 = sample duplicate
						G3 = Sample + CN spike
Method blank	91-6421-G5			5.9	U	G4 = LCS(ICV-6)
						G5 = method blank
Spiked sample	91-6421-G3	7.8				
Spike recovery	91-6421-G3		94			
ICV-6	91-6421-G4	10.14 mg/L		JMR 12-20-91		
ICV-6 recovery	91-6421-G4		108			

Contract required detection limit (mg/kg):	1
Instrument detection limit (mg/kg) [1]:	0.6

Analytical method:	PNL-ALO-270
Distillation reference:	LRB54027, pg. 134
Analysis reference:	LRB54341, pg. 7
CN standardization ref:	LRB54174, pg. 48
%solids reference:	LRB53930, pg. 31

gj 11/3/92

Instrumentation M&TE#:	WA54726	Spectronic 21 colorimeter
	WB 80669	Mettler AT400 analytical balance

[1] Instrument detection limit (IDL) based on the EPA CLP method for determining IDL. If the IDL were based on the standard deviation of laboratory control sample (ICV-6) recovery vs certified value for the period 9/90-9/91, the IDL would be 2 µg/L.

~~[2] QA data support accompanying backwash water sample distilled in the same run.~~ JMR 12-20-91

9613497.2766

REPORT OF ANALYSIS FOR TOTAL CYANIDE IN SOLID SAMPLES

Client :	WHC, 200-BP-1
Project :	16772
Work order :	M63023
Task-work package :	Task 2&4,3
Test instruction :	200BP-1-72

Distillation analyst:	Shawn Homi	A.H.	12-3-91
Colorimetric analyst:	James Robbins	J. Robbins	12-3-91
Data reduction:	James Robbins	J. Robbins	12-3-91
Data Reviewer:	Mike Urie	MW Urie	12-9-91

Cyanide analysis results

Client sample I.D.#	PNL-ACL sample #	Total CN (mg/kg)	Date received	Date distilled	Date analyzed	CLP flags
BOOX66	91-6906-G1	~~0.6~~ \	7/19/91	7/22/91	7/22/91	U
BOOX78	91-6907-G1	~~0.6~~ \	7/19/91	7/22/91	7/22/91	U

02/5/93

Cyanide analysis CLP quality assurance data

CLP data type	PNL-ACL sample #	Total CN (mg/kg)	Recovery (%)	Total CN (µg/l)	CLP flags	Sample QA identifiers
BOOX66	91-6906-G2	0.6			U	G1 = Sample
Sample RPD		N/A				G2 = sample duplicate
						G3 = Sample + CN spike
Method blank	91-6906-G5			5.9	U	G4 = LCS(ICV-6)
						G5 = method blank
Spiked sample	91-6906-G3	8.0				
Spike recovery	91-6906-G3		91			
ICV-6	91-6906-G4	10.03 mg/L	JmR 12-20-91			
ICV-6 recovery	91-6906-G4		107			

Contract required detection limit (mg/kg):	1
Instrument detection limit (mg/kg) [1]:	0.6

Analytical method:	PNL-ALO-270
Distillation reference:	LRB54027, pg. 107
Analysis reference:	LRB54027, pg. 108
CN standardization ref:	LRB54027, pg. 64
%solids reference:	LRB54027, pg. 119

Instrumentation M&TE#:	WA54726	Spectronic 21 colorimeter
	WB 80669	Mettler AT400 analytical balance

[1] Instrument detection limit (IDL) based on the EPA CLP method for determining IDL. If the IDL were based on the standard deviation of laboratory control sample (ICV-6) recovery vs certified value for the period 9/90-9/91, the IDL would be 2 µg/L.

~~[2] QA data support accompanying backwash water sample distilled in the same run.~~ JmR 12-20-91

9613497.2767

REPORT OF ANALYSIS FOR TOTAL ( ) LIQUID SAMPLES

Client :	WHC, 200-BP-1
Project :	16772
Work order :	M63023
Task-work package :	Task 2&4,3
Test instruction :	200BP-1-71

Distillation analyst:	Shawn Homi	S.H.	12-3-91
Colorimetric analyst:	Shawn Homi	S.H.	12-3-91
Data reduction:	James Robbins	J. Robbins	12-3-91
Data Reviewer:	Mike Urie	M Urie	12-4-91

Cyanide analysis results

Client sample I.D. #	PNL ACL sample #	Total CN (µg/l)	Date received	Date distilled	Date analyzed	CLP flags
BOOX82	91-6693-G1	19.4	7/17/91	7/29/91	7/30/91	J qualifier dup. RPD out

216-B-57A equipment blank

Cyanide analysis CLP quality assurance data

CLP data type	PNL-ACL sample #	Total CN (µg/l)	Recovery (%)	CLP flags	Sample QA identifiers
0	91-6693-G2	10.2			G1 = Sample
Sample RPD		61.83 % JMR 12-20-91			G2 = sample duplicate
					G3 = Sample + CN spike
Method blank	91-6693-G5	5.9		U	G4 = LCS(ICV-6)
					G5 = method blank
Spiked sample	91-6693-G3	168.0			
Spike recovery	91-6693-G3		89		
ICV-6	91-6693-G4	10.66 ~~µg~~ mg/L JMR 12-20-91			
ICV-6 recovery	91-6693-G4		113		

Contract required detection limit(µg/l):	10
Instrument detection limit in (µg/l) [1]:	5.9

Analytical method:	PNL-ALO-270
Distillation reference:	LRB54027, pg. 114
Analysis reference:	LRB54027, pg. 117
CN standardization reference:	LRB54027, pg.64

Instrumentation M&TE#:	WA 54726	Spectronic 21 colorimeter
	WB 80669	Mettler AT400 analytical balance

ANALYSIS NOTES:

[1] Instrument detection limit (IDL) based on the EPA CLP method for determining IDL. If the IDL were based on the standard deviation of laboratory control sample (ICV-6) recovery vs certified value for the period 9/90-9/91, the IDL would be 2 µg/L.

TABLE 4: TOTAL CYANIDE ANALYSIS DATA FOR TASK 284
SDG #8

SOIL-SEDIMENT SAMPLES

Sample ID#	PNL Log#	Sample G1 (mg/kg)	C	Sample dup. G2 (mg/kg)	C	XRPD	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 1,2,3 (ALL)
216-B-49A 104.5-107	B015G4	0.8	~~UJ~~ 2/4/93	0.8	B	N/A	5.9	U	48.55	10.5	10.1	98	107		
216-B-50B 3.5-6	B015G6	0.6	UJ												
216-B-50B 12-16	B015G8	0.6	UJ	0.6	U	N/A	5.9	U	48.55	10.1	10.3	100	109		
216-B-50B 15.5-17.5	B015G9	0.6	UJ												
216-B-50B 28-30.5	B015H1	0.6	UJ	0.6	U	N/A	5.9	U	48.55	9.3	10.5	100	112		
216-B-50B 28-30.5	B015H4	0.8	UJ												
216-B-49A 135-137.5	B015H6	1.5		1.7		7.9	5.9	U	48.55	11.2	9.96	96	106		
											Mean	99	109		
											Std. Dev.	2	2		

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.

9/11/92

9413497.2768

TABLE 4a: TOTAL CYANIDE ANALYSIS DATA FOR TASK 284
SDG #9

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#
													1,2,3 (ALL)
216-B-50C 3.5-6 D B015H8	92-00570	1.0 ~~0.6~~	U	0.6	U	N/A	5.9 U	48.55	10.0	9.67	99	103	
216-B-50C 3.5-6 DUP B015J8	92-00571	1.0 0.6	U										
216-B-50C 11-15 B015K0	92-00572	1.0 ~~0.6~~	U	0.6	U	N/A	5.9 U	48.55	9.7	9.59	95	102	
216-B-49A 16.24-16.5 B015K2	92-00922	0.8	B										
216B-50C 29-30.5 B015K6	92-00931	1.0 ~~0.6~~	U	0.6	U	N/A	5.9 U	48.55	10.1	10	101	106	
216B-50C 19-20.5 B015K3	92-00921	1.0 ~~0.6~~	U										
~~B015L0~~	~~92-01202*~~	~~0.7~~	~~B~~	~~0.8~~	~~B~~	~~N/A~~	~~5.9 U~~	~~48.6~~	~~11~~	~~9.5~~	~~103~~	~~101~~	~~4,5~~
~~B015K8~~	~~92-00977~~	~~1.2~~											~~5~~
~~B015L0~~	92-01202*	1.0 ~~0.6~~	U	1.5		N/A	5.9 U	49.38	11.7	11.05	113	118	4,6
216-B-49A 190.5-193 B015K8	92-00977	1.2 ~~1.4~~	J										6
										Mean	100	103	
										Std. Dev.	3	2	

* Not samples in the SDG but reported for QC purposes

Data not used HT exceeded

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.
4. Sample B015L0 is not part of this data package.
5. Repeat of cyanide analyses for samples B015L0 and B015K8, as the ICV in initial analysis run (6) exceeded the CLP control limit of 115%
6. Initial analysis run for samples B015L0 and B015K8.

CLP Flags

U = Analyzed but not detected (less than IDL)
B = Less than CRDL but greater than or equal to IDL

9 11/11/92

9613497.2769

TABLE 4b: TOTAL CYANIDE ANALYSIS DATA FOR TASK 2&4
SDG #9

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	Footnotes#
216-B-50c el. Blank B00X88	92-00975	5.9	U	5.9	U	N/A	5.9	U	49.4	98.5	9.39	102.0	100.0		1,2,3
216-B-44A H2O field blank B015H0	92-00976	5.9	U												1,2,3
											Mean	102.0	100.0		
											Std. Dev.	NA	NA		

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 ug/L.
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)
B = Less than CRDL but greater than or equal to IDL

9613497.2770

TABLE 3: ANION IC ANALYSIS DATA

NITRATE (NO3-N)

SOLID SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (mg/Kg)	C2 SAMPLE DUP (mg/Kg)	Spike & Spk Dupl RPD	C5 BLANK (ug/mL)	C3 SPIKE+SAMPLE (mg/Kg)	C3 SPIKE (mg/Kg)	C6 DUP+SPIKE (mg/Kg)	C6 SPIKE (mg/Kg)	% RECOVERIES C3 SAMPLE + SPIKE	% RECOVERIES C6 DUP+ SPIKE	% RECOVERIES C4 BLANK+ SPIKE
B00X77 (*)	92-7421	5.3	**			1273	380	333.6 1302	415	384 116		
216-B-49A 17-20 B00X75	91-1815	887 ~~200~~	**	2.4%	<IDL	~~287.0~~	~~83.4~~	~~294.0~~	86.9	~~104.3~~	108.2	98.2
									C3 & C6 mean	106.3		
									std. dev.	n/a		

IDL = 0.6 mg/Kg, 6.8 ug/L
CRDL = 1 mg/Kg, 15 ug/L
* Sample not part of data package
** No sample duplicates analyzed; Spike duplicates MS(C3) and MSD(C6) used to evaluate precision.

2/4/93

9/14/92

9613196.2271

TABLE 3: ANION IC ANALYSIS DATA

NITRITE (NO2-N)

SOLID SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (mg/Kg)	C2 SAMPLE DUP (mg/Kg)	Spike & Spk Dupl RPD	C5 BLANK (ug/mL)	C3 SPIKE+SAMPLE (mg/Kg)	C3 SPIKE (mg/Kg)	C6 DUP+SPIKE (mg/Kg)	C6 SPIKE (mg/Kg)	% RECOVERIES C3 SAMPLE + SPIKE	% RECOVERIES C6 DUP+ SPIKE	% RECOVERIES C4 BLANK+ SPIKE
B00X77 (*)	91-6421	<IDL	**									
B00X75	91-7815	~~<IDL~~	**	2.8%	<IDL	104.0	112.0	107.0	117.0	92.9	91.5	92.1
								C3 & C6 mean		92.2		
								std. dev.		n/a		

216-B-49A 17-20

2/4/93

IDL = 0.7 mg/Kg, 8.2 ug/L
CRDL = 1 mg/Kg, 15 ug/L
* Sample not part of data package
** No sample duplicates analyzed; Spike duplicates MS(C3) and MSD(C6) used to evaluate precision.

9

S 11/4/92

S 11/4/92

9213497.2272

TABLE 3: ANION IC ANALYSIS DATA

PHOSPHATE (PO4-P)

SOLID SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (mg/Kg)	C2 SAMPLE DUP (mg/Kg)	Spike & Spk Dupl RPD	C5 BLANK (ug/mL)	C3 SPIKE+SAMPLE (mg/Kg)	C3 SPIKE (mg/Kg)	C6 DUP+SPIKE (mg/Kg)	C6 SPIKE (mg/Kg)	% RECOVERIES C3 SAMPLE + SPIKE	% RECOVERIES C6 DUP+ SPIKE	% RECOVERIES C4 BLANK+ SPIKE
BOOX77 (*)	91-6421	<IDL	**									
BOOX75	91-7815	5 <IDL UJ	**	2.8%	<IDL	104.0	120.0	107.0	126.0	86.7	84.9	87.7
									C3 & C6 mean	85.8		
									std. dev.	n/a		

216-B-49A
17-20

IDL = 1.6 mg/Kg, 29.7 ug/L
CRDL = 5 mg/Kg, 60 ug/L
* Sample not part of data package
** No sample duplicates analyzed; Spike duplicates MS(C3) and MSD(C6) used to evaluate precision.

5/11/92

9115497.0273

TABLE 3: ANION IC ANALYSIS DATA

SULFATE (SO4)

SOLID SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (mg/Kg)	C2 SAMPLE DUP (mg/Kg)	Spike & Spk Dupl RPD	C5 BLANK (ug/mL)	C3 SPIKE+SAMPLE (mg/Kg)	C3 SPIKE (mg/Kg)	C6 DUP+SPIKE (mg/Kg)	C6 SPIKE (mg/Kg)	% RECOVERIES C3 SAMPLE + SPIKE	% RECOVERIES C6 DUP+ SPIKE	% RECOVERIES C4 BLANK+ SPIKE
B00X77 (*)	91-6421	23.6	**									
B00X75	91-7815	162	**	6.5%	<IDL	537.0	369.0	573.0	385.0	101.6	106.8	100.2
								C3 & C6 mean		104.2		
								std. dev.		n/a		

216 B-49A 17-20

IDL = 4.1 mg/Kg, 51 ug/L
CRDL = 20 mg/Kg, 250 ug/L
* Sample not part of data package
** No sample duplicates analyzed; Spike duplicates MS(C3) and MSD(C6) used to evaluate precision.

gi 11/4/92

8/27/91 TOC for 91-7815 Proc. # 7-40.37
Run Time = 15 min. 1

Balance WB60304 = 2.00007 OK.

			mg C - BIK/mg sol x 10^6 = mg/kg
91-7815-T-1)	.04760 g.		46.2 - 21 = 529 ppm TOC
2)	.06462 g.		55.6 - 21 = 535 " "
Std. 91-7815-T-3)	.00180 g.		677 - 21 ÷ 720 = 91 % R.
3)	.00324 g.		1215 - 21 ÷ 1296 = 92 % R.
			mg C - BIK ÷ mg CSN. = % Rec.
BIK. 91-7815-T-4)	19.5	Ave: 21 mg C	
4)	22.4		

End 8/27/91 [signature] 9/19/91

200-BP-1 TOTAL ORGANIC CARBON RESULTS

WHC Sample #	PNL Sample #	Result		Analyzed
B00X75	91-7815-T-1	529.	mg/kg	08-27-91
"	91-7815-T-2	535.	mg/kg	08-27-91
"	91-7815-T-3	91.5	%	08-27-91
"	91-7815-T-4	21.0	ug	08-27-91
B00X77	91-6421-T-1	194.	mg/kg	07-17-91
"	91-6421-T-2	168.	mg/kg	07-17-91
"	91-6421-T-3	91.0	%	07-17-91
"	91-6421-T-4	22.0	ug	07-17-91

Parenthetical results are below the reported detection limit of 50ppm.

Total Organic Carbon by PNL Procedure 7-40.37, on Instrument WA92040, 325 Bldg., rm 313. Data reported from LRB 52996, p 133.

Data reported by [signature] Date 8/27/91

Data reviewed by [signature] Date 8/27/91

LRB 52996 p 133

Project No. _____ Date of Work _____

Entered By _____ Date _____

Disclosed To and Understood By

Signed 1. [signature] Date 8/27/91

2. _____ Date _____

216-B-49A
17-20

BNW #52996

BEST COPY AVAILABLE

Gill 4/97

E03-006

TABLE 3: ANION IC ANALYSIS DATA

NITRATE (NO3-N)

SOLID SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (mg/Kg)	C2 SAMPLE DUP (mg/Kg)	Spike & Spk Dupl RPD	C5 BLANK (ug/mL)	C3 SPIKE+SAMPLE (mg/Kg)	C3 SPIKE (mg/Kg)	C6 DUP+SPIKE (mg/Kg)	C6 SPIKE (mg/Kg)	% RECOVERIES C3 SAMPLE + SPIKE	% RECOVERIES C6 DUP+ SPIKE	% RECOVERIES C4 BLANK+ SPIKE
BOOX77	91-6421	23/~~0.3~~	5**									
BOOX75 (*)	91-7815	200	5**	2.4%	<IDL	287.0	83.4	294.0	86.9	104.3	108.2	98.2
								C3 & C6 mean		106.3		
								std. dev.		n/a		

IDL = 0.6 mg/Kg, 6.8 ug/L
CRDL = 1 mg/Kg, 15 ug/L
* Sample not part of data package, for QC only
** No sample duplicates analyzed; Spike duplicates MS(C3) and MSD(C6) used to evaluate precision.

C04-003

TABLE 3: ANION IC ANALYSIS DATA

NITRITE (NO2-N)

SOLID SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (mg/Kg)	C2 SAMPLE DUP (mg/Kg)	Spike & Spk Dupl RPD	C5 BLANK (ug/mL)	C3 SPIKE+SAMPLE (mg/Kg)	C3 SPIKE (mg/Kg)	C6 DUP+SPIKE (mg/Kg)	C6 SPIKE (mg/Kg)	% RECOVERIES C3 SAMPLE + SPIKE	% RECOVERIES C6 DUP+ SPIKE	% RECOVERIES C4 BLANK+ SPIKE
216-B-57A 30-3'3												
BOOX77	91-6421	1.0	<IDL	**								
BOOX75 (*)	91-7815	1.0	<IDL	**	2.8%	<IDL	104.0	112.0	107.0	117.0	92.9	91.5	92.1
									C3 & C6 mean		92.2	
									std. dev.		n/a	

IDL = 0.7 mg/Kg, 8.2 ug/L
CRDL = 1 mg/Kg, 15 ug/L
* Sample not part of data package, for QC only
** No sample duplicates analyzed; Spike duplicates MS(C3) and MSD(C6) used to evaluate precision.

2/4/93

C04-004

Walker

9615497.0777

TABLE 3: ANION IC ANALYSIS DATA

PHOSPHATE (PO4-P)

SOLID SAMPLES

216-B-57A 30-33

SAMPLE ID#	PNL LOG#	C1 SAMPLE (mg/Kg)	C2 SAMPLE DUP (mg/Kg)	Spike & Spk Dupl RPD	C5 BLANK (ug/mL)	C3 SPIKE+SAMPLE (mg/Kg)	C3 SPIKE (mg/Kg)	C6 DUP+SPIKE (mg/Kg)	C6 SPIKE (mg/Kg)	% RECOVERIES C3 SAMPLE + SPIKE	% RECOVERIES C6 DUP+ SPIKE	% RECOVERIES C4 BLANK+ SPIKE
B00X77	91-6421	~~<IDL~~ 5	~~<IDL~~ **									
B00X75 (*)	91-7815	~~<IDL~~ 5	~~<IDL~~ **	2.8%	<IDL	104.0	120.0	107.0	126.0	86.7	84.9	87.7
									C3 & C6 mean	85.8		
									std. dev.	n/a		

IDL = 1.6 mg/Kg, 29.7 ug/L
CRDL = 5 mg/Kg, 60 ug/L
* Sample not part of data package, for QC only
** No sample duplicates analyzed; Spike duplicates MS(C3) and MSD(C6) used to evaluate precision.

2/4/93

G04-005

9613497.2778

TABLE 3: ANION IC ANALYSIS DATA

SULFATE (SO4)

SOLID SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (mg/Kg)	C2 SAMPLE DUP (mg/Kg)	Spike & Spk Dupl RPD	C5 BLANK (ug/mL)	C3 SPIKE+SAMPLE (mg/Kg)	C3 SPIKE (mg/Kg)	C6 DUP+SPIKE (mg/Kg)	C6 SPIKE (mg/Kg)	% RECOVERIES C3 SAMPLE + SPIKE	% RECOVERIES C6 DUP+ SPIKE	% RECOVERIES C6 BLANK+ SPIKE
800X77	91-6421	23.6	**									
800X75 (*)	91-7815	162	**	6.5%	<IDL	537.0	369.0	573.0	385.0	101.6	106.8	100.2
									C3 & C6 mean	104.2		
									std. dev.	n/a		

216-B-57
30-33

IDL = 4.1 mg/Kg, 51 ug/L
CRDL = 20 mg/Kg, 250 ug/L
* Sample not part of data package, for QC only
** No sample duplicates analyzed; Spike duplicates MS(C3) and MSD(C6) used to evaluate precision.

9613497.2779

C04-006

9613497.2780

8/27/91 TOC for 91-7815 Proc. # 7-40.37 Run Time = 15 min. 1.

Balance WB60304 = 2.00007 ok.

			mgC - BLK/mgsol x 10^6 = mg/kg
91-7815-T-1)	.04760 g.	46.2 - 21 =	529 ppm TOC
2)	.06462 g.	55.6 - 21 =	535 " "
Std. 91-7815-T-3)	.00180 g.	677 - 21 ÷ 720 =	91 % R.
Glucose use 0.00324 fx. 2)	.00324 g.	1215 - 21 ÷ 1296 =	92 % R.

mgC - BLK ÷ mgCSN. = % Rec.

BLK. 91-7815-T-4) 19.5 } Avg = 21 mgC
4) 22.4 }

End 8/27/91 [signature] 9/19/91

200-BP-1 TOTAL ORGANIC CARBON RESULTS

WHC Sample #	PNL Sample #	Result		Analyzed
B00X75	91-7815-T-1	529.	mg/kg	08-27-91
"	91-7815-T-2	535.	mg/kg	08-27-91
"	91-7815-T-3	91.5	%	08-27-91
"	91-7815-T-4	21.0	ug	08-27-91
B00X77	91-6421-T-1	194.	mg/kg	07-17-91
"	91-6421-T-2	168.	mg/kg	07-17-91
"	91-6421-T-3	91.0	%	07-17-91
"	91-6421-T-4	22.0	ug	07-17-91

Parenthetical results are below the reported detection limit of 50ppm.

Total Organic Carbon by PNL Procedure 7-40.37, on Instrument WA92040, 325 Bldg., rm 313. Data reported from LRB 52996, p 133.

Data reported by [signature] Date 8/27/91

Data reviewed by [signature] Date 8/27/91

LRB 52996 p 133

Project No. ____ Date of Work ____

Entered By ____ Date ____

Disclosed To and Understood By

Signed 1. [signature] Date 8/27/91

2. ____ Date ____

216-B-57A
30-33

BNW #52996

TOC

Rev.

TOC

% R.

mgC std.
1304 = 91% Rec.
1140 = 91% Rec.

194 ppm TOC
168 ppm TOC

6 = ppmC = mg/Kg.

2/12/91
2/12/91 9/19/91

E03-006

TABLE 3: ANION IC ANALYSIS DATA
NITRATE (NO3-N)

SOIL SAMPLES

SAMPLE ID#	PHL LOG#	C1 SAMPLE (mg/kg)	C	C2 SAMPLE DUP (mg/kg)	C	RPD	C5 BLANK (mg/kg)	C	C3 SPIKE+SAMPLE (mg/kg)	C3 SPIKE (mg/kg)	C6 DUP+SPIKE (mg/kg)	C6 SPIKE (mg/kg)	% RECOVERIES C3 SAMPLE + SPIKE	% RECOVERIES C6 DUP+ SPIKE	% RECOVERIES C4 CONTROL	Q
2 16-B-50B 15.5-17.5 B015G9	92-00306	~~684~~ ~~179~~	J				0.8	U								
16-B-50B 28-30.5 B015H1	92-00358	16.2 ~~3.7~~	J	19.5 ~~4.9~~		17 17										
B015K3	92-00921+	179 ~~27.4~~	J						1475 ~~349~~	11.9	1691 ~~382~~	11.7	-109	171	108	
B015L5	92-01246+	646 362	J													
B015M9	92-01827+	178 ~~30.9~~	J													

IDL= 0.8 (mg/Kg, solids)
CRDL= 1.0 (mg/Kg, solids)

Sample value greatly exceeds spike value

NOTES:

1. + Not samples in this SDG but reported for QC purposes
2. 100% spike level in extract is expected to be 5ppm each for Nitrate, Nitrite, Phosphate, and Sulfate
3. 5ppm X dil. factor / frac. solids = spike level (mg/Kg) in solid for Nitrate, Nitrite, Phosphate, and Sulfate
4. 100% extraction efficiency assumed in defining dil. factor as (diluent vol / sample wt) X 1.00 gm/ml
5. Method blank used for C5; nominal sample wt=2.00 gm

C FLAGS

B: IDL ≤ Analyte level < CRDL
U: Analyte not detected; <IDL

Q FLAGS

E: Estimated value, interference present
N: Spike recovery not within control limits
*: Duplicate analysis not within control limits

96134917.2781

TABLE 3: ANION IC ANALYSIS DATA
NITRITE (NO2-N)

SOIL SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (mg/kg)	C	C2 SAMPLE DUP (mg/kg)	C	RPD	C5 BLANK (mg/kg)	C	C3 SPIKE+SAMPLE (mg/kg)	C3 SPIKE (mg/kg)	C6 DUP+SPIKE (mg/kg)	C6 SPIKE (mg/kg)	% RECOVERIES C3 SAMPLE + SPIKE	% RECOVERIES C6 DUP+ SPIKE	% RECOVERIES C4 CONTROL	Q
216-B-50B 15.5-17.5 B015G9	92-00306	1.0 ~~0.8~~	U				0.8	U								
216-B-50B 28-30.5 B015H1	92-00358	1.0 ~~0.8~~	U	0.8	U											
B015K3	92-00921+	1.0 ~~0.8~~	U													
B015L5	92-01246+	1.0 ~~0.8~~	U						12.8	16	12.5	15.7	80	80	82	
B015M9	92-01827+	1.0 ~~0.8~~	U													

IDL= 0.8 (mg/Kg, solids)
CRDL= 1.0 (mg/Kg, solids)

NOTES:

1. + Not samples in this SDG but reported for QC purposes
2. 100% spike level in extract is expected to be 5ppm each for Nitrate, Nitrite, Phosphate, and Sulfate
3. 5ppm X dil. factor / frac. solids = spike level (mg/Kg) in solid for Nitrate, Nitrite, Phosphate, and Sulfate
4. 100% extraction efficiency assumed in defining dil. factor as (diluent vol / sample wt) X 1.00 gm/ml
5. Method blank used for C5; nominal sample wt=2.00 gm

C FLAGS

B: IDL ≤ Analyte level < CRDL
U: Analyte not detected; <IDL

Q FLAGS

E: Estimated value, interference present
N: Spike recovery not within control limits
*: Duplicate analysis not within control limits

6 11/9/92

10

9613497.2782

TABLE 3: ANION IC ANALYSIS DATA
PHOSPHATE (PO4-P)

SOIL SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (mg/kg)	C	C2 SAMPLE DUP (mg/kg)	C	RPD	C5 BLANK (mg/kg)	C	C3 SPIKE+SAMPLE (mg/kg)	C3 SPIKE (mg/kg)	C6 DUP+SPIKE (mg/kg)	C6 SPIKE (mg/kg)	% RECOVERIES C3 SAMPLE + SPIKE	% RECOVERIES C6 DUP+ SPIKE	% RECOVERIES C4 CONTROL	Q
216-B-50B 15.5-17.5 B015G9	92-00306	7.9 ~~2.5~~	~~B~~ J				1.7	U								N
216-B-50B 28-30.5 B015H1	92-00358	12.2 ~~3.9~~	~~B~~ J	12 3.8	B	2.8										N
B015K3	92-00921+	13 ~~4.2~~	~~B~~ J						37.6		36					N
B015L5	92-01246+	23 3.4	~~B~~ J						2.2	17.1	~~.8~~	16.8	28 85	16 77	94	N
B015M9	92-01827+	15 ~~11.2~~	J													N

IDL= 1.7 (mg/Kg, solids)
CRDL= 5.0 (mg/Kg, solids)

NOTES:

1. + Not samples in this SDG but reported for QC purposes
2. 100% spike level in extract is expected to be 5ppm each for Nitrate, Nitrite, Phosphate, and Sulfate
3. 5ppm X dil. factor / frac. solids = spike level (mg/Kg) in solid for Nitrate, Nitrite, Phosphate, and Sulfate
4. 100% extraction efficiency assumed in defining dil. factor as (diluent vol / sample wt) X 1.00 gm/ml
5. Method blank used for C5; nominal sample wt=2.00 gm

C FLAGS

B: IDL ≤ Analyte level < CRDL
U: Analyte not detected; <IDL

Q FLAGS

E: Estimated value, interference present
N: Spike recovery not within control limits
*: Duplicate analysis not within control limits

9613497.2783

TABLE 3: ANION IC ANALYSIS DATA
SULFATE (SO4)

SOIL SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (mg/kg)	C	C2 SAMPLE DUP (mg/kg)	C	RPD	C5 BLANK (mg/kg)	C	C3 SPIKE+SAMPLE (mg/kg)	C3 SPIKE (mg/kg)	C6 DUP+SPIKE (mg/kg)	C6 SPIKE (mg/kg)	% RECOVERIES C3 SAMPLE + SPIKE	% RECOVERIES C6 DUP+ SPIKE	% RECOVERIES C4 CONTROL	Q
216-B-50B 15.5-17.5 B015G9	92-00308	32	J				4	U								
216-B-50B 26-30.5 B015H1	92-00358	13	J	15	B	14.3										
B015K3	92-00921+	20	J													
B015L5	92-01246+	47 38 30	J						69.4	52.6	71.1	51.6	75	80	96	
B015M9	92-01827+	101	J													

IDL= 4 (mg/Kg, solids)
CRDL= 20 (mg/Kg, solids)

NOTES:

1. + Not samples in this SDG but reported for QC purposes
2. 100% spike level in extract is expected to be 5ppm each for Nitrate, Nitrite, Phosphate, and Sulfate
3. 5ppm X dil. factor / frac. solids = spike level (mg/Kg) in solid for Nitrate, Nitrite, Phosphate, and Sulfate
4. 100% extraction efficiency assumed in defining dil. factor as (diluent vol / sample wt) X 1.00 gm/ml
5. Method blank used for C5; nominal sample wt=2.00 gm

C FLAGS

B: IDL ≤ Analyte level < CRDL
U: Analyte not detected; <IDL

Q FLAGS

E: Estimated value, interference present
N: Spike recovery not within control limits
*: Duplicate analysis not within control limits

5 11/9/92

9613452784

TABLE 16: TOTAL ORGANIC CARBON ANALYSIS DATA FOR TASKS 2 & 4
SDG #8

Soil Samples

	WHC Sample #	PNL ALO #	Sample Type	Sample wt. g	ug C Results	ug C in Sample	mg/Kg Sample	RSD (%) Dups	% rec. spike	Date Received	Date Analyzed
216-B-50B 15.5-17.5	B015G9	92-0306-1	Sample	0.471	65.5	50.2	1100	5		10-08-91	10-15-91
	B015G9	92-0306-2	Duplicate	0.05347	76.4	61.1	1180			10-08-91	10-15-91
	B015G9	92-0306-3	Standard						96.8		10-15-91
	B015G9	92-0306-4	Blank		15.3						10-15-91
216-B-50B 28-30.5	B015H1	92-0358-1	Sample	0.04076	36.9	21.6	547	10		10-11-91	10-15-91
	B015H1	92-0358-2	Duplicate	0.0653	54.9	39.6	626			10-11-91	10-15-91
	B015H1	92-0358-3	Standard						96.8		10-15-91
	B015H1	92-0358-4	Blank		15.3						10-15-91

Total Organic Carbon by PNL Procedure 7-40.37, on Instrument WA92040,

325 Bldg., rm 701. Data reported from LRB 52996, pp 142-44 & 150.

9613497.2785

TABLE 3: ANION IC ANALYSIS DATA
NITRATE (NO3-N)

SOIL SAMPLES

SAMPLE ID#	PHL LOG#	C1 SAMPLE (mg/kg)	C	C2 SAMPLE DUP (mg/kg)	C	RPD	C5 BLANK (mg/kg)	C	C3 SPIKE+SAMPLE (mg/kg)	C3 SPIKE (mg/kg)	C6 DUP+SPIKE (mg/kg)	C6 SPIKE (mg/kg)	% RECOVERIES C3 SAMPLE + SPIKE	% RECOVERIES C6 DUP+ SPIKE	% RECOVERIES C4 CONTROL	Q
~~B015G9~~	~~92-00300+~~	~~179~~					~~0.8~~	~~U~~								
~~B015H1~~	~~92-00350+~~	~~3.7~~		~~4.4~~		~~17~~										
216-B-50C 19-20.5 B015K3	92-00921	2 ~~27.4~~ 5														
B015L5	~~92-01246+~~	~~362~~							~~349~~	~~11.9~~	~~382~~	~~11.7~~	~~-109~~	~~171~~	~~106~~	
~~B015M9~~	~~92-01827+~~	~~30.9~~														

IDL= 0.8 (mg/Kg, solids)
CRDL= 1.0 (mg/Kg, solids)

NOTES:

1. + Not samples in this SDG but reported for QC purposes
2. 100% spike level in extract is expected to be 5ppm each for Nitrate, Nitrite, Phosphate, and Sulfate
3. 5ppm X dil. factor / frac. solids = spike level (mg/Kg) in solid for Nitrate, Nitrite, Phosphate, and Sulfate
4. 100% extraction efficiency assumed in defining dil. factor as (diluent vol / sample wt) X 1.00 gm/ml
5. Method blank used for C5; nominal sample wt=2.00 gm

C FLAGS

B: IDL ≤ Analyte level < CRDL
U: Analyte not detected; <IDL

Q FLAGS

E: Estimated value, interference present
N: Spike recovery not within control limits
*: Duplicate analysis not within control limits

S 11/12/92

9613497.2786

TABLE 3: ANION IC ANALYSIS DATA
NITRITE (NO2-N)

SOIL SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (mg/kg)	C	C2 SAMPLE DUP (mg/kg)	C	RPD	C5 BLANK (mg/kg)	C	C3 SPIKE+SAMPLE (mg/kg)	C3 SPIKE (mg/kg)	C6 DUP+SPIKE (mg/kg)	C6 SPIKE (mg/kg)	% RECOVERIES C3 SAMPLE + SPIKE	% RECOVERIES C6 DUP+ SPIKE	% RECOVERIES C4 CONTROL	Q
~~B015G9~~	~~92-00300+~~	~~1.0 0.8~~	~~U~~				~~0.8~~	~~U~~								
~~B015H1~~	~~92-00350+~~	~~1.0 0.8~~	~~U~~	~~0.8~~	~~U~~											
B015K3	92-00921	1.0 ~~0.8~~	UJ													
~~B015L5~~	~~92-01246+~~	~~0.8~~	~~U~~						~~12.8~~	~~10~~	~~12.5~~	~~15.7~~	~~80~~	~~80~~	~~82~~	
~~B015M9~~	~~92-01827+~~	~~0.8~~	~~U~~													

216-B-50C
19.20.5

IDL= 0.8 (mg/Kg, solids)
CRDL= 1.0 (mg/Kg, solids)

NOTES:

1. + Not samples in this SDG but reported for QC purposes
2. 100% spike level in extract is expected to be 5ppm each for Nitrate, Nitrite, Phosphate, and Sulfate
3. 5ppm X dil. factor / frac. solids = spike level (mg/Kg) in solid for Nitrate, Nitrite, Phosphate, and Sulfate
4. 100% extraction efficiency assumed in defining dil. factor as (diluent vol / sample wt) X 1.00 gm/ml
5. Method blank used for C5; nominal sample wt=2.00 gm

C FLAGS

B: IDL ≤ Analyte level < CRDL
U: Analyte not detected; <IDL

Q FLAGS

E: Estimated value, interference present
N: Spike recovery not within control limits
*: Duplicate analysis not within control limits

5/11/95

9613496.2787

TABLE 3: ANION IC ANALYSIS DATA
PHOSPHATE (PO4-P)

SOIL SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (mg/kg)	C	C2 SAMPLE DUP (mg/kg)	C	RPD	C5 BLANK (mg/kg)	C	C3 SPIKE+SAMPLE (mg/kg)	C3 SPIKE (mg/kg)	C6 DUP+SPIKE (mg/kg)	C6 SPIKE (mg/kg)	% RECOVERIES C3 SAMPLE + SPIKE	% RECOVERIES C6 DUP+ SPIKE	% RECOVERIES C4 CONTROL	Q
~~B015G9~~	~~92-00306+~~	~~2.5~~	~~B~~				~~1.7~~	~~U~~								~~N~~
~~B015H1~~	~~92-00358+~~	~~3.3~~	~~B~~	~~3.6~~	~~B~~	~~2.6~~										~~N~~
2/6-B=50% 19-20.5 B015K3	92-00921	(2.7 ~~4.2~~	BJ						27.6		36		85	77		N
~~B015L5~~	~~92-01246+~~	~~3.4~~	~~B~~						~~7.2~~	~~17.1~~	~~6~~	~~16.8~~	~~22~~	~~16~~	~~84~~	~~N~~
~~B015M9~~	~~92-01827+~~	~~11.2~~														~~N~~

IDL= 1.7 (mg/Kg, solids)
CRDL= 5.0 (mg/Kg, solids)

NOTES:

1. + Not samples in this SDG but reported for QC purposes
2. 100% spike level in extract is expected to be 5ppm each for Nitrate, Nitrite, Phosphate, and Sulfate
3. 5ppm X dil. factor / frac. solids = spike level (mg/Kg) in solid for Nitrate, Nitrite, Phosphate, and Sulfate
4. 100% extraction efficiency assumed in defining dil. factor as (diluent vol / sample wt) X 1.00 gm/ml
5. Method blank used for C5; nominal sample wt=2.00 gm

C FLAGS

B: IDL ≤ Analyte level < CRDL
U: Analyte not detected; <IDL

Q FLAGS

E: Estimated value, interference present
N: Spike recovery not within control limits
*: Duplicate analysis not within control limits

6/11/12/97

96137491.2788

TABLE 3: ANION IC ANALYSIS DATA
SULFATE (SO4)

SOIL SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (mg/kg)	C	C2 SAMPLE (mg/kg)	C2 DUP (mg/kg)	C	RPD	C5 BLANK (mg/kg)	C	C3 SPIKE+SAMPLE (mg/kg)	C3 SPIKE (mg/kg)	C6 DUP+SPIKE (mg/kg)	C6 SPIKE (mg/kg)	% RECOVERIES C3 SAMPLE + SPIKE	% RECOVERIES C6 DUP+ SPIKE	% RECOVERIES C4 CONTROL	Q
~~B01509~~	~~92-00306+~~	~~32~~						~~4~~	~~U~~								
~~B015H1~~	~~92-00358+~~	~~13~~	~~B~~	~~15~~	~~8~~	~~14~~											
B015K3	92-00921	20 J															
~~B015L5~~	~~92-01246+~~	~~30~~								~~69.4~~	~~52.6~~	~~71.1~~	~~51.6~~	~~75~~	~~80~~	~~96~~	
~~B015H9~~	~~92-01827+~~	~~101~~															

216-B-50C
19-20.5

IDL= 4 (mg/Kg, solids)
CRDL= 20 (mg/Kg, solids)

NOTES:

1. + Not samples in this SDG but reported for QC purposes
2. 100% spike level in extract is expected to be 5ppm each for Nitrate, Nitrite, Phosphate, and Sulfate
3. 5ppm X dil. factor / frac. solids = spike level (mg/Kg) in solid for Nitrate, Nitrite, Phosphate, and Sulfate
4. 100% extraction efficiency assumed in defining dil. factor as (diluent vol / sample wt) X 1.00 gm/ml
5. Method blank used for C5; nominal sample wt=2.00 gm

C FLAGS

B: IDL ≤ Analyte level < CRDL
U: Analyte not detected; <IDL

Q FLAGS

E: Estimated value, interference present
N: Spike recovery not within control limits
*: Duplicate analysis not within control limits

S 11/12/92

9613349.2789

TABLE 16: TOTAL ORGANIC CARBON ANALYSIS DATA FOR TASK 2 & 4
SDG #9

Soil Samples

WHC Sample #	PNL ALO #	Sample Type	Sample wt. g	ug C Results	ug C in Sample	mg/Kg Sample	RSD (%) Dups	% rec. spike	Date Received	Date Analyzed
B015K3	92-0921-1	Sample	0.06108	45.5	35.4	579.0	3		10-23-91	11-4-91
B015K3	92-0921-2	Duplicate	0.06316	45.1	34.9	553			10-23-91	11-4-91
B015K3	92-0921-3	Standard						95.6		11-4-91
B015K3	92-0921-4	Blank		10.2						11-4-91

Total Organic Carbon by PNL Procedure 7-40.37 on Instrument WA92040, 325 Bldg., rm 701. Data reported from LRB 52996, pp 151-152.

216-B-50c
19-20.5

Sil 11/2/91

9613497.2790

9613497.2791

SDG: B00X69-PNL-050

Table 10: Gamma Energy Analysis of Soils

Batch 4

Diode L

(Radionuclide activity in pCi/g[a])

Sample ID	LRB #	Collection Date	Weight (g)	Isotope		
				^{60}Co	^{106}Ru	^{137}Cs
91-6421-L-1*	53944-63-A	7-9-91	13.9609	<0.46	<33	66990 ± 1.1%
91-7815-L-1	53944-61-A	8-6-91	13.7647	1.23 ± 9.8%	<32	21270 ± 1.3%
91-7815-L-2	53944-61-B	8-6-91	13.9586	1.44 ± 15%	<54	20330 ± 1.0%
91-7815-L-5	53944-62-A	8-6-91	13.9	<0.28	<82	<0.26

[a] The one sigma uncertainties are based on counting statistics. All "<" values are detection limits associated with each "not detected" analysis.

The detection limits are determined from Sample 91-7815-L-5. The detection limits in pCi/g for ^{60}Co, ^{106}Ru, and ^{137}Cs at one sigma are <0.11, <33, and <0.10, respectively.

* Sample not in this SDG but reported for QC purposes.

Cs-137

$$91\text{-}7815\ RPD = \frac{21270 - 20330}{\left(\frac{21270 + 20330}{2}\right)} \times 100 = 4.5\%$$

Co-60

$$91\text{-}7815\ RPD = \frac{1.23 - 1.44}{\left(\frac{1.23 + 1.44}{2}\right)} \times 100 = 16\%$$

SDG: B00X68-PNL-050

TABLE 11: TOTAL ALPHA ANALYSIS DATA
SDG #4

Sample #	Sample Type	Total Alpha (pCi/g)	+/- 1 sigma	RPD	Spike Conc. (pCi/g)	+/- 1 sigma	Spike % Rec.
91-7815-A-1a	Average value	~~49.0~~ 48.5	10.7 **				
Second Run							
91-7815-A-1a	Soil	48.9	3.5				
91-7815-A-2a	Soil duplicate	63.7	4.0	26.3			
91-7815-A-3a	Matrix Spike	68.0	4.5		34.5	0.3	34
BL-6421-A-5a*	Blank	ND<0.4					
BL-6421-A-4a*	Blank Spike	53.5	4.2		48.0	0.5	111
First Run							
91-7815-A-1a	Soil	48.1	3.2				
91-7815-A-2a	Soil duplicate	37.8	2.5	24			
91-7815-A-3a	Matrix Spike	49.4	3.2		35.3	0.3	18
BL-6421-A-5a*	Blank	ND<0.1					
BS-6421-A-4a*	Blank Spike	4.91	0.4		4.8	0.1	102

1/15/93

Reported

*Reported for QC purposes
**Standard deviation of 4 determinations

Detection limit 2.0 pCi/g
Error is based on the propagated error of volume and counting uncertainties.

9613491.2792

1/15/93

SOG: B00X68-PNL-050

Table 12:

TOTAL BETA ANALYSIS DATA

Total beta results are reported as Sr-90/Y-90

Sample #	Sample Type	Total Beta (pCi/g)	+/- 1 sigma	RPD	Spike Conc. (pCi/g)	+/- 1 sigma	Spike % Rec.
91-7815-A-1a	Soil	159330	2020				
91-7815-A-2a	Soil duplicate	114990	1500	32			
91-7815-A-3a	Matrix Spike	~~149920~~ 144640	1910		13040	650	97.8
BL-7815-A-5a	Blank	0.48	0.12				
BS-7815-A-4a	Blank Spike	3.64	0.54		4.86	0.24	65.0

1/15/93

Minimum detectable activity for a 10g water sample is approximately 0.2 pCi/g.

1/15/93

9613493.2293

SDG: B00X68-PNL-050

TABLE 13: Pu 238 and Pu 239/240 DATA ANALYSIS
SDG #4

Program Sample ID	Sample Type	Pu-239+240 pCi/g	+/- 1 sigma	Pu-239+240 RPD	Pu-238 pCi/g	+/- 1 sigma	Pu-238 RPD	Pu-239 Spike pCi/g	+/- 1 sigma	% Recovery
91-7815-A-1c	Soil	3.23E+01	1.31E+00 R	8.4	4.28E-01 R	2.47E-02	19			
91-7815-A-2c	Duplicate	2.97E+01	1.01E+00 R		3.54E-01 R	1.66E-02				
91-7815-A-4c	Blank Spike	1.15E+00	4.11E-02 R		< 1E-03 R			1.20E+00	2.24E-02	95.8
91-7815-A-5c	Blank	~~4.26E-03~~ 4.16E-03	1.63E-03 R		<2.4E-03 R					

Pu-239+240 detection limit is approximately 3E-03 pCi/g.
Pu-238 detection limit is approximately 2E-03 pCi/g.

Errors quoted are the propagated error of individual measurements.

9/20/93

11/5/93

4627.1615391.2794

SDG: B00X68-PNL-050

9613497.2795

TABLE 14: STRONTIUM-90 DATA ANALYSIS RESULTS

SOILS

Sample #	Sample Type	Total Beta (pCi/g)	+/- 1 sigma*	RPD	Spike Conc. (pCi/g)	+/- 1 sigma*	Spike % Rec.	Normalized % Yield**
91-7815-A-b	Triplicate Avg	65850	3290					
91-7815-A-1b	Soil	62600 J	4570					
91-7815-A-2b	Soil Duplicate	69170 J	4980	10				
91-7815-A-3b	Matrix Spike	65840 ~~65830~~ J	4660		51.5	2.6	N/A	
BL-7815-A-5b	Blank	2.68pCi/ml R	0.23					
BS-7815-A-4b	Blank Spike	2.64pCi/ml R	0.30		2.42pCi/ml	0.12pCi/ml	109	
BL2-7815-A-5b	Second Blank	Used for X-ray Fluorescence impurity assay						
91-7815-A-3b	Blank Soil Matrix Spike Used to Determine Batch Yield							99.8

Not Reported

Reported

115R3

61

Minimum detectable activity for a sample is approximately 0.06 pCi/g.

*One sigma uncertainties are based on propagation of mass, volume, and counting uncertainties.

**All Sr-90 analyses are calculated on the basis of their ratio to the blank soil spike recovery which has been normalized to 100% chemical recovery.

SDG: B00X68-PNL-050

TABLE 15: TRITIUM DATA ANALYSIS RESULTS
SDG #4

Project Sample ID	Sample Type	Tritium (pCi/g)	+/- 1 sigma	RPD	Spike Conc. (pCi/g)	+/- 1 sigma	Recov. Corr. Factor, % Fs
91-6421-K-1**	Soil	16 J	7.8				
91-6421-K-2**	Duplicate	18 J	7	12			
91-6421-K-4	Method Spike Used to determine batch yield						75
91-6421-K-5	Blank	<18 * UJ					
91-7815-K-1	Soil	39 J	11				

Approximate Detection Limit = 18 pCi/g (variations occur due to actual sample size)

* Based on 0.1 g sample size

** Included for QC purposes

96127.2796
96135491

1/5/93

9613497.2797

Table 10: Gamma Energy Analysis of Soils

Batch 4

SOG:BOOX64-PNL-051

Diode L

(Radionuclide activity in pCi/g[a])

Sample ID	LRB #	Collection Date	Weight (g)	Isotope		
				^{60}Co	^{106}Ru	^{137}Cs
91-6421-L-1	53944-63-A	7-9-91	13.9609	<0.46	<33	67000 ± 1.1%
91-7815-L-1	53944-61-A	8-6-91	13.7647	1.23 ± 9.8%	<32	21300 ± 1.3%
91-7815-L-2	53944-61-B	8-6-91	13.9586	1.44 ± 15%	<54	20300 ± 1.0%
91-7815-L-5	53944-62-A	8-6-91	13.9	<0.28	<82	<0.26

The one sigma uncertainties are based on counting statistics. All "<" values are detection limits associated with each "not detected" analysis.

The detection limits are determined from Sample 91-7815-L-5. The detection limits in pCi/g for ^{60}Co, ^{106}Ru, and ^{137}Cs at one sigma are <0.11, <33, and <0.10, respectively.

1/19/96

SDG: B00X64-PNL-051

TABLE 11: TOTAL ALPHA ANALYSIS DATA
SDG #3

Sample #	Sample Type	Total Alpha (pCi/g)	+/- 1 sigma	RPD	Spike Conc. (pCi/g)	+/- 1 sigma	Spike % Rec.
91-6421-A-1a	Average value	4.0	2.0				
Third run							
91-6421-A-1a	Soil	6.3	1.0				
91-7815-A-1a*	Soil	48.9	3.5				
91-7815-A-2a*	Soil duplicate	63.7	4.0	26.3			
91-7815-A-3a*	Matrix Spike	68.0	4.5		34.5	0.3	34
BL-6421-A-5a	Blank	ND<0.4					
BS-6421-A-4a	Blank Spike	53.5	4.2		48.0	0.5	111
Second run							
91-6421-A-1a	Soil	3.2	0.6				
91-7815-A-1a*	Soil	48.1	3.2				
91-7815-A-2a*	Soil duplicate	37.8	2.5	24			
91-7815-A-3a*	Matrix Spike	49.4	3.2		35.3	0.3	18
BL-6421-A-5a	Blank	ND<0.1					
BS-6421-A-4a	Blank Spike	4.91	0.4		4.8	0.1	102
First run							
91-6421-A-1a	Soil	2.5	0.6				
91-6421-A-2a	Soil duplicate	ND<2.0		NA			
91-6421-A-3a	Matrix Spike	29.2	2.2		61.8	0.4	~~47.2~~ 45.2
BL-6421-A-5a	Blank	ND<0.16					
BS-6421-A-4a	Blank Spike	3.46	0.2		48.5	0.7	7.1

Not qualified not reported

The third run data was included on the verification sheet and in the database.

Not qualified. and not Reported 1/15/93

$$MS\%R = \left(\frac{29.2 - \left(\frac{2.5+0}{2}\right)}{61.8}\right) \times 100 = 45.2\%$$

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

Detection limit 2.0 pCi/g

One sigma uncertainties are based on propagation of mass, volumetric and counting uncertainties.

1/15/93

9613498.2798

SDG: B00X64-PNL-051

Table 12:

TOTAL BETA ANALYSIS DATA

Total beta results are reported as Sr-90/Y-90

Sample #	Sample Type	Total Beta (pCi/g)	+/- 1 sigma	RPD	Spike Conc. (pCi/g)	+/- 1 sigma	Spike % Rec.
91-6421-1a	Sample	47771	1047				
91-6421-1a	Duplicate	45055	1040	5.9			
91-6421-1a	Matrix Spike	46033	850		257	13	NA
91-6421-1a	Blank	0.50pCi/ml	0.1				
91-6421-1a	Blank Spike	4.74pCi/ml	0.6		4.89pCi/ml	0.2	86.7

Detection limit = 0.051 pCi/g

One sigma uncertainties are based on propagation of mass, volumetric and counting uncertainties

9613497.2799

SDG: B00X64-PNL-051

TABLE 13: Pu 238 and Pu 239/240 DATA ANALYSIS
SDG #3

SOILS

Program Sample ID	Sample Type	pCi/g Pu 239+240	+/-1s error*	pCi/g Pu-238	+/-1s error*	Spike pCi/g Pu-239 added	+/-1s error*	% Recovery	RPD
91-6421-A-1c	Soil	3.25E-03	6.95E-04	6.23E-03	9.70E-04				78
91-6421-A-2c	Duplicate	1.43E-03	4.31E-04	4.66E-03	7.90E-04				
91-6421-A-4c	Blank Spike	1.090	0.025	1.25E-02	1.25E-03	1.197	0.013	91.1	
91-6421-A-5c	Blank	ND	<4E-04	3.60E-03	6.70E-04				

Pu-239+240 detection limit approximately 4E-04 pCi/g
*The errors quoted (1 sigma) are the propagated error of individual measurements.

ND = Not detected

00087-61491-28000

SDG: B00X64-PNL-051

TABLE 14: STRONTIUM-90* DATA ANALYSIS RESULTS
SDG #3

SOILS

Sample #	Sample Type	Sr-90 pCi/g	+/- 1 sigma	RPD	Spike Conc. pCi/g	+/- 1 sigma	Spike % Recov.	+/- 1 sigma	Normalized % Yield (1)
91-6421-A-1b	Soil	1.2	0.1						
91-6421-A-2b	Duplicate	0.8	0.1	36					
91-6421-A-3b	Matrix Spike**	31	2		40.2	1.0	77	5	
91-6421-A-4b	Blank Spike	2.66	0.26		2.44	0.06	109	11	
91-6421-A-5b	Blank	5.6	0.4						
91-6421-A-6b	Blank Spike Dup Used to determine the batch yield								84

One sigma uncertainties are based on propagation of mass, volumetric and counting uncertainties.

Detection limit = 0.06 pCi/g based on nominal sample aliquot of 10 g and worst case background and counting efficiency

*This does not take into consideration Strontium-89.
**A blank soil was used, not a replicate aliquot of 91-6421.

(1) All Sr-90 analyses are calculated on the basis of their ratio to the blank spike dup recovery which has been normalized to 100% chemical recovery.

9613497.2801

1/18/93

SDG:B00X64-PNL-051

TABLE 15: TRITIUM DATA ANALYSIS RESULTS
SDG #3

Project Sample ID	Sample Type	Tritium (pCi/g)	+/- 1 sigma	RPD	Spike Conc. (pCi/g)	+/- 1 sigma	Recov. Corr. Factor, % Fa
91-6421-K-1	Soil	16	7.8				
91-6421-K-2	Duplicate	18	7	12			
91-6421-K-4	Method Spike Used to determine batch yield						75
91-6421-K-5	Blank	<18 *					

Approximate Detection Limit = 18 pCi/g (variations occur due to actual sample size)

* Based on 0.1 g sample size

One sigma uncertainties are based on propagation of mass, volumetric and counting uncertainties.

9213187.2802

1/18/93

9613497.2803

SDG: B015G4-PNL-052

Table 10: Gamma Energy Analysis of Soils

Recommended Values

Batch 5

Diode L

(Radionuclide activity in pCi/g[a])

Customer ID	Sample ID	Collection Date	Weight (g)	^{60}Co	^{106}Ru	^{137}Cs
B015G9	92-00306-L-1	10/4/91 14:20	14.200	<8	<500	$(5.72 \pm 0.06) \times 10^5$
B015H1	92-00358-L-1	10/9/91 10:45	14.205	<0.4	<18	1890 ± 20
B015H1	92-00358-L-2	10/9/91 10:45	14.201	<0.3	<15	2200 ± 20
Blank B015H1	92-00358-L-5	11/8/91 11:06	14.212	<0.15	<1.6	<0.11
B015K3	92-00921-L-1*	10/22/91 11:31	13.975	28.6 ± 1.6	<280	$(5.62 \pm 0.06) \times 10^5$
B015L5	92-01246-L-1*	11/8/91 11:44	1.6300	<30	<2300	$(2.00 \pm 0.02) \times 10^6$
B015M9	92-01827-L-1*	11/14/91 14:06	1.5020	<20	<1200	$(1.23 \pm 0.01) \times 10^6$

02/5/93 02/5/93

[a] The one sigma uncertainties are based on counting statistics. All "<" values are detection limits associated with each "not detected" analysis.

The detection limits are determined from Sample 92-00358-L-5. The detection limits in pCi/g for ^{60}Co, ^{106}, and ^{137}Cs at one sigma are < 0.06, <0.6, and <0.04. Note that the detection limits quoted above were calculated as if the isotope were present at a level that is 2.5 times the square root of twice the average background.

* Samples not in SDG but reported as a part of analytical batch.

92-00358-L-5 is the Method Blank.

Cs 137 B015H1 RPD = $\frac{2200 - 1890}{\left(\frac{2200 + 1890}{2}\right)} \times 100 = 15.2\%$

1/13/92

SOG: B015G4-PNL-052

TABLE 11: TOTAL ALPHA ANALYSIS DATA
TASK 2 & 4 SDG #8

WHC Sample #	Sample #	Sample Type	Total Alpha (pCi/g)	+/- 1 sigma	RPD	Spike Conc. (pCi/g)	+/- 1 sigma	Spike % Rec.
B015G9	92-00306-A-1a	Soil	107.5	6.9				
B015H1	92-00358-A-1a	Soil	2.9	0.7				
	92-00358-A-2a	Soil duplicate	2.5	0.6	15			
	92-00358-A-3a	Matrix Spike	12.79	1.3		9.08	0.09	111
	92-00358-A-3a	Matrix Spike	9.25	1.1		10.13	0.11	84.5
	BL-00306-A-5a	Blank	<0.58					
	BS-00358-A-4a	Blank Spike	10.9	1.1		9.57	0.1	114

Detection limit for 5g soil samples: 0.6 pCi/g

Error is based on the propagated error of volume and counting uncertainties.

9613497.2804

1/19/93

SDG: B015G4-PNL-052

TABLE 12: TOTAL BETA ANALYSIS DATA
TASK 2 & 4 SDG #8

WHC Sample #	Sample #	Sample Type	Total Beta (pCi/g)	+/- 1 sigma	RPD	Spike Conc. (pCi/g)	+/- 1 sigma	Spike % Rec.
B015G9	92-00306-A-1a	Soil	622300	13300				
B015H1	92-00358-A-1a	Soil	2590	63				
	92-00358-A-2a	Soil duplicate	2440	R 62	6.1			
	92-00358-A-3a	Matrix Spike	2990	69		18.4	0.9	NA
	BL-00306-A-5a	Blank	<7.7					
	BS-00306-A-4a	Blank Spike	22.1 *	2.4		19.39	1.0	114

*Average of 21.4 +/- 3.8 , 24.0 +/- 3.7, 21.8 +/- 4.0 and 21.1 +/- 7.1 pCi/g

Minimum detectable activity for a 5g soil sample is approximately 7.7 pCi/g.

Contract detection limits can be achieved by use of the low background beta counters; the results from this batch were counted on the regular background beta counters due to high sample activity.

Error is based on the propagated error of volume and counting uncertainties.

1/13/93

SDG: B015G4-PNL-052

TABLE 13: Pu 238 and Pu 239/240 DATA ANALYSIS
SDG #8

WHC Sample #	Program Sample ID	Sample Type	Pu-239+240 pCi/g	+/- 1 sigma	Pu-239+240 RPD	Pu-238 pCi/g	+/- 1 sigma	Pu-238 RPD	Pu-239 Spike pCi/g	+/- 1 sigma	% Recovery
B015G9	92-00306-A-1c	Soil	1.21E+02	4.95E+00 R		1.87E+00	1.30E-01 R				
B015H1	92-00358-A-1c	Soil	2.39E-01	1.01E-02 R	11	~~2.92E-03~~	8.37E-04 R	~~32~~ 35			
	92-00358-A-2c	Duplicate	2.68E-01	1.04E-02 R		4.03E-03	8.48E-04 R				
	92-00306-A-4c	Blank Spike	2.23E+00	7.61E-02 R		< 1E-03	R		2.35E+00	1.48E-02	95
	92-00306-A-5c	Blank	< 5E-04	R		< 1E-03	R				

2.83 E-03 R

Pu-239+240 detection limit is approximately 5 E-04 pCi/g.
Pu-238 detection limit is approximately 1 E-03 pCi/g.

Errors quoted are the propagated error of individual measurements.

9613497.2806

1/13/93

SDG: B015G4-PNL-052

TABLE 14: STRONTIUM-90 ANALYSIS DATA FOR TASK 2 & 4
SDG #8

Parameters of Interest

WHC Sample #	Sample #	Sample Type	Strontium (pCi/g)	+/- 1 sigma*	RPD	Spike Conc. (pCi/g)	+/- 1 sigma*	Spike % Rec.	Normalized % Yield**
B015G9	92-00306-A-1b	Soil	67700	4900					
B015H1	92-00358-A-1b	Soil	452	33					
	92-00358-A-2b	Soil Duplicate	461	34	1.8				
	92-00306-A-3b	Matrix Spike	46.3	3.6		49.5	2.5	93.5	
	BL-00306-A-5b	Blank	0.1	0.02					
	BL-00306-A-5b	Blank duplicate	0.3	0.04					
	BS-00306-A-4b	Blank Spike	Used to determine batch yield						103.5

Minimum detectable activity for a sample is approximately 0.06 pCi/g.

* One sigma uncertainties are based on propagation of mass, volume, and counting uncertainties.

** All Sr-90 analyses are calculated on the basis of their ratio to the blank spike recovery which has been normalized to 100% chemical recovery.

The MS%R is not applicable since the ~~spike concentration~~ sample result is greater than the spike conc. by a factor greater than four.

1/14/93

1/14/93

9613497.2807

SDG: B015G4-PNL-052

TABLE 15: TRITIUM ANALYSIS FOR TASK 2 & 4
SDG #8

WHC Sample #	Project Sample ID	Sample Type	Tritium (pCi/g)	+/- 1 sigma	RPD	Spike Conc. (pCi/g)	+/- 1 sigma	Recov. Corr. Factor, % Fa
B015G9	92-00306-K-1	Soil	16	3	R			
B015H1	92-00358-K-1	Soil	23	3	R			
B015K3	92-00921-K-1*	Soil	56	4	R			
	92-00921-K-2*	Duplicate	37	3	R	41		
	92-00921-K-5*	Blank	<4 *		R			
	92-00921-K-4*	Method Spike Used to Determine Batch Yield						75

Approximate Detection Limit = 10 pCi/g (variations occur due to actual sample size)
* Not samples in the SDG but reported for QC purposes
* Based on 0.3 g sample size

9613497.2808

1/14/93

SDG: B015H8-PNL-053

Table 10: Gamma Energy Analysis of Soils

Recommended Values

Batch 5

Diode L

(Radionuclide activity in pCi/g[a])

Client ID	Sample ID	Collection Date	Weight (g)	^{60}Co	^{106}Ru	^{137}Cs
B015G9	92-00306-L-1*	10/4/91 14:20	14.200	<8	<500	$(5.72 \pm 0.06) \times 10^5$ J
B015H1	92-00358-L-1*	10/9/91 10:45	14.205	<0.4	<18	1890 ± 20 J
B015H1	92-00358-L-2*	10/9/91 10:45	14.201	<0.3	<15	2200 ± 20 J
B015H1	92-00358-L-5*	11/8/91 11:06	14.212	<0.15	<1.6	<0.11
B015K3	92-00921-L-1	10/22/91 11:31	13.975	28.6 ± 1.6 J	<280	$(5.62 \pm 0.06) \times 10^5$ J
B015L5	92-01246-L-1*	11/6/91 11:44	1.6300	<30	<2300	$(2.00 \pm 0.02) \times 10^6$ J
B015M9	92-01827-L-1*	11/14/91 14:06	1.5020	<20	<1200	$(1.23 \pm 0.01) \times 10^6$ J

02/5/93 02/5/93

[a] The one sigma uncertainties are based on counting statistics. All "<" values are detection limits associated with each "not detected" analysis.

The detection limits are determined from Sample 92-00358-L-5. The detection limits in pCi/g for ^{60}Co, ^{106}, and ^{137}Cs at one sigma are < 0.06, <0.6, and <0.04. Note that the detection limits quoted above were calculated as if the isotope were present at a level that is 2.5 times the square root of twice the average background.

* Samples not in the SDG but reported for QC purposes.

Cs-137 B015H1 $RPD = \frac{(2200-1890)}{\left(\frac{2200+1890}{2}\right)} \times 100 = 15.16 = 15\%$ RPD

1/14/93

SDG: B015H8-PNL-053

TABLE 11: TOTAL ALPHA ANALYSIS DATA FOR TASKS 2 & 4
SDG #9

SOIL SAMPLES

Client #	Sample #	Sample Type	Total Alpha (pCi/g)	+/- 1 sigma	RPD	Spike Conc. (pCi/g)	+/- 1 sigma	Spike % Rec.
B015K3	92-00921-A-1a	Soil	25.7	5.8				
B015K3	92-00921-A-2a	Duplicate	23.9	5.7	7			
	92-00306-A-5a*	Blank	<4.7					
	92-00921-A-4a	Blank Spike	57.1	8.4		54.8	0.6	104.0
	92-00921-A-3a	Matrix Spike	66.7	4.6		45.4	0.5	92.3

Average % recovery 98 +/- 8

* Not samples in the SDG but reported for QC purposes
The detection limit for soil samples of this size is approximatedly 5 pCi/g. Contract detection limits can be achieved by use of a larger sample size and longer counting time. Due to the high activity of the samples in this batch, a smaller sample size and shorter counting time were used.

Error is based on the propagated error of volume and counting uncertainties.

1/4/93

SOG: ~~Pr~~ B015HB-PNL-053
1/21/93

TABLE 12: TOTAL BETA ANAYSIS RESULTS FOR TASKS 2 & 4
SDG #9

SOIL SAMPLES

WHC #	Sample #	Sample Type	Total Beta (pCi/g)	+/- 1 sigma	RPD	Spike Conc. (pCi/g)	+/- 1 sigma	Spike % Rec.
B015K3	92-00921-A-1a	Soil	64500	1990				
B015K3	92-00921-A-2a	Soil	60600	1880	6			
	92-00358-A-3a*	Matrix Spike	4790	145		1536	78	~~100~~ 1142 1/14/93
	92-00921-A-5a	Blank	97	21				
	92-00921-A-4 a	Blank Spike	491	29		477	29	83

* Not samples in the SDG but reported for QC purposes
The detection limit for soil samples of this size is approximatedly 36 pCi/g. Contract detection limits can be achieved by use of a larger sample size and longer counting time. Due to the high activity of the samples in this batch, a smaller sample size and shorter counting time were used.

Error is based on the propagated error of volume and counting uncertainties.

$$MS\%R = \left(\frac{4790 - 3036}{1536}\right) \times 100 = 114\%$$

the original result for the spiked sample is 3036 pCi/g.

1/14/93

9613497.2811

SDG: B015HB-PNL-053

TABLE 13: Pu 238 and Pu 239/240 DATA ANALYSIS
SDG #9

WHC Sample #	Program Sample ID	Sample Type	Pu-239+240 pCi/g	+/- 1 sigma	Pu-239+240 RPD	Pu-238 pCi/g	+/- 1 sigma	Pu-238 RPD	Pu-239 Spike pCi/g	+/- 1 sigma	% Recovery
B015H1	92-00358-A-1c*	Soil	2.39E-01	1.01E-02 R	11	~~2.92E-03~~	8.37E-04 R	~~32~~ 35			
	92-00358-A-2c*	Duplicate	2.68E-01	1.04E-02 R		4.03E-03	8.48E-04 R				
B015K3	92-00921-A-1c	Soil	2.96E+00	1.06E-01 R		~~4.42E-02~~	7.65E-03 R				
	92-00306-A-4c*	Blank Spike	2.23E+00	7.61E-02 R		< 1E-03	R		2.35E+00	1.46E-02	95
	92-00306-A-5c*	Blank	< 5E-04	R		< 1E-03	R				
						4.46E-02	R				
						2.83E-03	R				

Pu-239+240 detection limit is approximately 5 E-04 pCi/g.
Pu-238 detection limit is approximately 1 E-03 pCi/g.

Errors quoted are the propagated error of individual measurements.

* Samples not in the SDG but reported for QC purposes

1/14/93

$$B015H1\ RPD = \frac{((4.03E-03)-(2.83E-03))}{\left(\frac{((4.03E-03)+(2.83E-03))}{2}\right)} \times 100 = 34.99 = 35\%$$

1/14/93

SDG: B01SH8-PNL-053

TABLE 14: STRONTIUM-90 ANALYSIS DATA FOR TASK 2 & 4
SDG #9

Parameters of Interest

WHC Sample #	Sample #	Sample Type	Strontium (pCi/g)	+/- 1 sigma*	RPD	Spike Conc. (pCi/g)	+/- 1 sigma*	Spike % Rec.	Normalize % Yield**
B015H1	92-00358-A-1b+	Soil	452	33					
	92-00358-A-2b+	Soil Duplicate	461	34	1.8				
In this SDG B015K3	92-00921-A-1b	Soil	7750	570					
	92-00306-A-3b+	Matrix Spike	46.3	3.6		49.5	2.5	93.5	
	BL-00306-A-5b+	Blank	0.1	0.02					
	BL-00306-A-5b+	Blank duplicate	0.3	0.04					
	BS-00306-A-4b+	Blank Spike	Used to determine batch yield						103.5

1/19/93

1/19/93

Minimum detectable activity for a sample is approximately 0.06 pCi/g.
+ Sample not in the SDG but reported for QC purposes
* One sigma uncertainties are based on propagation of mass, volume, and counting uncertainties.

** All Sr-90 analyses are calculated on the basis of their ratio to the blank spike recovery which has been normalized to 100% chemical recovery.

9613497.2813

1/15/93

SDG: 8015H8-PNL-053

TABLE 15: TRITIUM ANALYSIS FOR TASK 2 & 4
SDG #9

WHC Sample #	Project Sample ID	Sample Type	Tritium (pCi/g)	+/- 1 sigma	RPD	Spike Conc. (pCi/g)	+/- 1 sigma	Recov. Corr. Factor, % Fs
B015K3	92-00921-K-1	Soil	56	4 R				
	92-00921-K-2	Duplicate	37	3 R	41			
	92-00921-K-5	Blank	<4 **	R				
	92-00921-K-4	Method Spike Used to Determine Batch Yield						75

Approximate Detection Limit = 10 pCi/g (variations occur due to actual sample size)
* Not samples in the SDG but reported for QC purposes
** Based on 0.3 g sample size

9613497.2814

1/14/93

SDG: 800X68-PNL-050

TABLE 9: TECHNITIUM 200-BP-1 SOILS ANALYSIS: Sample 91-7815
Tc-99 and Uranium Determinations by ICP - Mass Spectrometry

All values corrected for 1% HNO3 diluent blank contribution

PNL sample I.D. Number (a)	DRY WEIGHT	DILUTION FACTOR (b)	ICP/MS Analysis No.		Tc-99, ng/ml solution analyzed	Tc-99, ng/g soil (c,d)	Tc-99, ng/g spiked (d)	Tc-99, spike recovery, (e)	Tc-99, pCi/g, %dry soil	U, ng/ml solution analyzed (f)	U, ng/g soil (c,d)	U, ng/g spiked (d)	U, spike recovery, % (e)	U, pCi/g (total), dry soil (g)
			U											
91-7815-B1	1.0626	941.1	8	6	0.003	2.8			48 ~~7~~ R	62.4	58700			41.0
91-7815-B2	1.0086	991.5	10	9	0.002±.001	2±1			34±17 ~~7~~ R	59.6	59100			41.3
91-7815-B3	1.1016	907.8	12	8	0.013	11.8	7.2	125 ~~122~~	200 ~~7~~ R	66.6	60500	7.22	103	42.3
91-7815-B5	N/A	1000.0		12	<0.001	<1			N/A	0.001	1.2			N/A
91-7815-B6	N/A	1000.0		5	0.010	10.0	8.0	125 ~~111~~	N/A	0.009	9.5	7.95	103	N/A
0.00988ppb Tc	N/A	N/A		4	0.010									
0.0494ppb Tc	N/A	N/A		10	0.048									
3.0 pCi/L U in water (EPA)				7						2.95 pCi/L				
20.0 pCi/L U in water (EPA)				15						20.4 pCi/L				

1/21/93

(a) Sample types:
B1 = sample
B2 = sample, duplicate
B3 = sample + Tc/U spike
B5 = procedural blank
B6 = procedural blank + Tc/U spike

(b) units of mL/g dry soil except for -B5 and -B6 samples (blank/blank spike) units of mL; includes 5X addition dil.
(c) leachate concentration corrected for preparation dilution factor and additional dilution for analysis (5X).
(d) -B3 reported in units of ng/g; -B6 reported in ng
(e) Spike Recovery Formula: [Spiked Sample]/([Sample] + [Spike])
(f) Samples were re-analyzed for uranium under procedure 1a21q. See LRB 54321 page 66.
(g) total uranium activity calculated using natural isotopic abundance for soil leachate [U] < 200 ppb: pCi = [U]*0.000336/0.481

Tc99 91-7815-B3 $\%R = \frac{11.8-2.8}{7.2} \times 100 = 125\%$

RPD: TC-99: $\frac{2.8-2}{\left(\frac{2.8+2}{2}\right)} \times 100 = 33.3\%$ 1/20/93

Tc99 ~~7-10~~ 91-7815-B6 $\%R \frac{10-0}{8} \times 100 = 125\%$

1/21/93

RPD U: $\frac{58700-59100}{\left(\frac{58700+59100}{2}\right)} \times 100 = 1\%$

1/20/93

SDG: B00X64- PNL-051

TABLE 9: TECHNETIUM 200-BP-1 SOILS ANALYSIS: Sample 91-6421

Tc-99 and Uranium Determinations by ICP - Mass Spectrometry

All values corrected for 1% HNO3 diluent blank contribution

PNL sample I.D. Number (a)	DRY WEIGHT	DILUTION FACTOR (b)	ICP/MS Analysis No.	Tc-99, ng/ml solution analyzed	Tc-99, ng/g soil (c,d)	Tc-99, ng/g spiked (d)	Tc-99, spike recovery, %	Tc-99, pCi/g, %dry soil	U, ng/ml solution analyzed	U, ng/g soil (c,d)	U, ng/g spiked (d)	U, spike recovery, %	U, pCi/g (total dry soil (f)
91-6421-B1	1.1246	1778.5	12	0.002±0.001	4±2 3.91			66±30	0.30	535			0.4
91-6421-B2	1.1177	1789.4	13	0.0017	3.0			52	0.32	574			0.4
91-6421-B3	1.1248	1778.1	14	0.0061	10.8	7.1	103 110	N/A	0.52	926	7.07	(e)	N/A
91-6421-B4	1.1808	1693.8	5	0.0013	2.2			37	9.9	16700			11.7
91-6421-B5	N/A	2000.0	16	<0.001	<2			N/A	0.003	6.6			N/A
91-6421-B6	N/A	2000.0	17	0.0045	9.0	8.0	113	N/A	0.012	24.2	7.95	(e)	N/A
0.0997ppb Tc/0.994ppb U S	N/A	N/A	15	0.094					0.995				
0.499ppb Tc/4.97ppb U STD	N/A	N/A	8	0.501					4.930				

(a) Sample types:
B1 = sample
B2 = sample, duplicate
B3 = sample + Tc/U spike
B4 = laboratory control sample (ICP LCS-0287, no Tc or U data available)
B5 = procedural blank
B6 = procedural blank + Tc/U spike

(b) units of mL/g dry soil except for -B5 and -B6 samples (blank/blank spike) units of mL; includes 10X addition dil.
(c) leachate concentration corrected for preparation dilution factor and additional dilution for analysis (10X).
(d) -B3 reported in units of ng/g; -B6 reported in ng
(e) Uranium yields not applicable: for sample spike, [U] of added spike << [U] in leachate, thus invalidating recovery data; for blank spike, [U] in diluted sample approached LLD.
(f) total uranium activity calculated using natural isotopic abundance for soil leachate [U] < 200 ppb: pCi = [U]*0.000336/0.481

$$MS\%R = \frac{10.8 - \left(\frac{3.91 + 3.0}{2}\right)}{7.1} \times 100 = 103\%$$

1/19/93

9613497.2816

SDG: B015G4-PNL-052

TABLE 9: ICP-MS ANALYSIS DATA FOR TASKS 2 & 4
SDG #8

Spike recovery values corrected for contributions from blank or sample

PNL sample I.D. Number (a)	DRY WEIGHT	DILUTION FACTOR (b)	ICP/MS Analysis No.	Tc-99, ng/ml solution analyzed	Tc-99, ng/g soil (c,d)	Tc-99, ng/g spiked (d)	Tc-99, spike recovery, % (e,f)	Tc-99, pCi/g, dry soil (f)	U, ng/ml solution analyzed	U, ng/g soil (c,d)	U, ng/g spiked (d)	U, spike recovery, % (e,g)	U, pCi/g (total), dry soil (h)
92-00306-B1	1.0165	2007.6	6	0.001	2.0			34	1.1860	2380			1.7
92-00306-B2	1.0223	1996.3	8	0.005±.001	10.0			170±35	1.0640	2120			1.5
92-00306-B3	1.0205	1999.8	10	0.0114	22.8	7.8	215 ~~105~~	386	0.9810	1960	7.79	87	1.4
92-00306-B5	N/A	1000.0	4	0.0012	1.2			20	0.0040	4.0			0.0
92-00306-B6	N/A	1000.0	3	0.0084	8.4	8.0	91	142	0.0078	7.8	7.95	47.8 ~~65~~	N/A
92-00358-B1	1.1623	894.8	12	0.010±.004	9.2			160±70	1.973	1770			1.2
92-00921-B1*	1.1150	1899.0	14	0.0041	7.8			132	16.984	32300			22.6

(a) Sample types:
B1 = sample
B2 = sample, duplicate
B3 = sample + Tc/U spike
B5 = procedural blank
B6 = procedural blank + Tc/U spike
* Not samples in the SDG but reported for QC purposes

(b) units of mL/g dry soil except for -B5 and -B6 samples (blank/blank spike) units of mL; includes 5X or 10X addition dil.
(c) leachate concentration corrected for preparation dilution factor and additional dilution for analysis (5X or 10X).
(d) -B3 reported in units of ng/g; -B6 reported in ng
(e) Recovery = [Spiked Sample]/([Sample]+[Spike])
(f) Despite positive values obtained for Tc, only spike samples had an observable Tc peak. Values >LLD are due to an increased background observed for soil digestate samples.
(g) For blank spike, [U] in diluted sample approached LLD.
(h) total uranium activity calculated using natural isotopic abundance for soil leachate [U] < 200 ppb: pCi = [U]*0.000336/0.481
DL= Detection Limit is dependent on sample weight and dilution volume (see footnote C).

Tc-99 MS %R = $\frac{22.8 - \left(\frac{2+10}{2}\right)}{7.8} \times 100 = 215\%$

Tc-99 RPD = $\frac{10-2}{\left(\frac{10+2}{2}\right)} \times 100 = 133\%$

Total-U
Blank Spike %R = $\frac{7.8 - 4.0}{7.95} \times 100 = 47.8\%$

U RPD = $\frac{2380 - 2120}{\left(\frac{2380+2120}{2}\right)} \times 100 = 11.6\%$

1/20/93

SDG: B015H8-PNL-053

TABLE 9: ICP-MS ANALYSIS DATA FOR TASKS 2 & 4
SDG #9

Spike recovery values corrected for contributions from blank or sample

PNL sample I.D. Number (a)	DRY WEIGHT	DILUTION FACTOR (b)	ICP/MS Analysis No.		Tc-99, ng/ml solution analyzed	Tc-99, ng/g soil (c,d)	Tc-99, ng/g spiked (d)	Tc-99, spike recovery, % (e,f)	Tc-99, pCi/g, dry soil (f)	U, ng/ml solution analyzed	U, ng/g soil (c,d)	U, ng/g spiked (d)	U, spike recovery, % (e,g)	U, pCi/g (total), dry soil (h)
92-00306-B1	1.0165	2007.6	10	6	0.001	~~2.0~~	2.0		34 ~~35~~ ~~34~~	1.1860	2380			1.7 R
92-00306-B2	1.0223	1996.3	10	8	0.005±.001	10.0			170±35	1.0640	2120			1.5 R
92-00306-B3	1.0205	1999.6	10	10	0.0114	22.8	7.8	215 ~~185~~	386	0.9810	1960	7.79	87	1.4 R
92-00306-B5	N/A	1000.0	5	4	0.0012	1.2			20	0.0040	4.0			0.0
92-00306-B6	N/A	1000.0	5	3	0.0084	8.4	8.0	91	142	0.0078	7.8	7.95	47 ~~30.2~~ ~~65~~	N/A
92-00358-B1	1.1623	894.8	5	12	0.010±.004	9.2			160±70	1.973	1770			1.2
92-00921-B1	1.1159	1899.0	10	14	0.0041	7.8			132	16.984	32300			22.6

(a) Sample types:
B1 = sample
B2 = sample, duplicate
B3 = sample + Tc/U spike
B5 = procedural blank
B6 = procedural blank + Tc/U spike
* Not samples in the SDG but reported for QC purposes

Sample 92-00921 (B015K3) is in this SDG. Samples 92-00306 (B015G9) and 92-00358 (B015H1) are not in this SDG.

(b) units of mL/g dry soil except for -B5 and -B6 samples (blank/blank spike) units of mL; includes 5X or 10X addition dil.
(c) leachate concentration corrected for preparation dilution factor and additional dilution for analysis (5X or 10X).
(d) -B3 reported in units of ng/g; -B6 reported in ng
(e) Recovery = [Spiked Sample]/([Sample]+[Spike])
(f) Despite positive values obtained for Tc, only spike samples had an observable Tc peak. Values >LLD are due to an increased background observed for soil digestate samples.
(g) For blank spike, [U] in diluted sample approached LLD.
(h) total uranium activity calculated using natural isotopic abundance for soil leachate [U] < 200 ppb: pCi = [U]*0.000336/0.481
DL= Detection Limit is dependent on sample weight and dilution volume (see footnote C).

Tc-99 MS %R = $\frac{22.8 - \left(\frac{10+2.1}{2}\right)}{7.8}$ = 215%

Tc-99 RPD = $\frac{10 - 2.0}{\left(\frac{10+2.0}{2}\right)}$ x100 = 133%

U MS %R = $\frac{7.8-4}{7.95}$ x100 = 47.8%

U RPD = $\frac{2380-2120}{\left(\frac{2380+2120}{2}\right)}$ x100 = 11.6%

1/21/93

9613497.2819

APPENDIX E

DATA VALIDATION SUPPORTING DOCUMENTATION

SDG B015H8-PNL-053

VOLATILE ORGANIC DATA VALIDATION CHECKLIST - FORM A-1

PROJECT: 200 BP1	REVIEWER: S	DATE: 11/12/97
LABORATORY: PNL	CASE:	SDG: 9B015H8
SAMPLES/MATRIX: SOIL/B015K3		

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.

Data Package Item	Present?: Yes	No	N/A
Case Narrative	✓		
Data Summary		✓	
Chain-of-Custody	✓		
QC Summary			
Surrogate report	✓		
MS/MSD report	✓		
Blank summary report	✓		
GC/MS tuning report	✓		
Internal standard summary report	✓		
Sample Data			
Sample reports	✓		
TIC reports for each sample	✓		
RIC reports for all samples	✓		
Raw and corrected spectra for all detected results	✓		
Raw and corrected library search data for all reported TIC	✓		
Quantitation and calculation data for all TIC			✓
Standards Data			
Initial calibration report	✓		
RIC and quantitation reports for initial calibration		✓	
Continuing calibration reports	✓		
RIC and quantitation reports for cont. calibrations	✓		
Internal standard summary report	✓		
Raw QC Data			
Tuning report, spectra and mass lists	✓		
Blank analysis reports	✓		
TIC reports for all blanks	✓		
RIC and quantitation reports for blanks	✓		
Raw and corrected spectra for all detected results in blanks	✓		
Raw and corrected library search data for all reported TIC	✓		

Data Package Item	Present?: Yes	No	N/A
Quantitation and calculation data for all TIC			✓
MS/MSD report forms	✓		
RIC and quantitation reports for MS/MSD	✓		
Additional Data			
Moisture/% solids data sheets		✓	
Reduction formulae		✓	
Instrument time logs		✓	
Chemist notebook pages		✓	
Sample preparation sheets		✓	

2. HOLDING TIMES

Complete the holding time summary form listing all samples and dates of collection and analysis.

Were all samples analyzed within holding time?	(Yes)	No	N/A

ACTION: If any holding times were exceeded, but not by greater than a factor of two, qualify associated samples as estimated (J for detects or UJ for nondetects), otherwise reject all nondetects (R) and qualify all associated detects as estimated (J).

3. INSTRUMENT CALIBRATION, TUNING AND PERFORMANCE CHECKS

3.1 GC/MS TUNING AND PERFORMANCE CHECKS

Is a bromofluorobenzene tune report present for each applicable 12-h period?	(Yes)	No	N/A
Do all tunes on all instruments meet the tuning criteria?	(Yes)	No	N/A
Do all tunes on all instruments meet the expanded criteria?	Yes	No	(N/A)
Has the laboratory made any calculation or transciption errors?	Yes	(No)	N/A
Have the proper significant figures been reported?	(Yes)	No	N/A

ACTION: If the mass calibration is out of specification but within the expanded criteria, qualify associated data as estimated (J for detects or UJ for nondetects). If all tuning criteria are missed, qualify all associated data as unusable (R).

3.2 INITIAL CALIBRATION

Is an initial calibration report provided for all instruments?	(Yes)	No	N/A
Are all RSD values ≤30% (2/88 SOW)?	(Yes)	No	N/A
Are all RRF values ≥0.05 (2/88 SOW)?	(Yes)	No	N/A

Are all applicable RSD values ≤20.5% (3/90 SOW)?	Yes	No	N/A
Are all applicable RSD values ≤40% (3/90 SOW)?	Yes	No	N/A
Are all applicable RRF values within SOW limits (3/90 SOW)?	Yes	No	N/A
Are all erratic performance compound RRF values ≥0.01 (3/90 SOW)?	Yes	No	N/A

ACTION: With the exception of compounds that exhibit erratic performance and making allowances for up to two TCL compounds, if any RRF value is out of specification qualify all detected results for the particular compound as estimated (J) and all nondetects as unusable (R). Making allowances for up to two TCL compounds, if any RSD value is out of specification qualify all associated data as estimated (J for detects or UJ for nondetects).

3.3. CONTINUING CALIBRATION

Is a continuing calibration report present for all 12-h periods in which associated samples were analyzed?	Yes	No	N/A
Are all RRF values ≥0.05 (2/88 SOW)?	Yes	No	N/A
Are all %D values ≤25% (2/88 or 3/90 SOW)?	Yes	No	N/A
Are all %D values ≤40% (3/90 SOW)?	Yes	No	N/A
Are all RRF values within SOW limits (3/90 SOW)?	Yes	No	N/A
Are all erratic performance compound RRF values ≥0.01 (3/90 SOW)?	Yes	No	N/A

ACTION: With the exception of compounds that exhibit erratic performance and making allowances for up to two TCL compounds, if any RRF value is out of specification qualify all associated detected results as estimated and all nondetects as unusable (R). Making allowances for up to two TCL compounds, if any %D is out of specification, qualify all associated results as estimated (J for detects or UJ for nondetects).

4. BLANKS

4.1 LABORATORY BLANKS

Has the laboratory conducted a method blank analysis per matrix for every 12-h period in which samples were analyzed?	Yes	No	N/A
Are TCL compounds present in the laboratory blanks?	Yes	No	N/A

ACTION: Qualify all sample results ≤10 time the highest blank concentration for the common laboratory contaminants, as nondetects (U) or at the SQL if the result is <CRQL. Qualify all remaining sample results ≤5 times the blank concentration in similar fashion.

4.2. FIELD BLANKS

Are TCL compounds present in the field blanks? Yes No N/A

ACTION: Qualify all detected sample results ≤5 times the amount in any valid field blank as nondetects (U) and note the field blank results in the validation narrative.

5. ACCURACY

5.1 SURROGATE/SYSTEM MONITORING COMPOUND RECOVERY

Are any surrogate recoveries out of specification? Yes No N/A

Are any surrogate recoveries < 10%? Yes No N/A

Are any method blank surrogate recoveries out of specification? Yes No N/A

ACTION: Qualify all associated sample results as estimated (J for detects or UJ for nondetects) for surrogates out of specification but > 10%. Qualify all associated positive sample results as estimated (J) and all nondetect results as unusable (R) for all surrogates below 10%. If method blank surrogates are out of specification and the associated sample surrogates are acceptable no qualification is necessary, however, the laboratory should be contacted for an explanation.

5.2 MATRIX SPIKE RECOVERY

Has an MS/MSD analysis been conducted per matrix in the sample group? Yes No N/A

Are MS/MSD recoveries within specification? Yes No N/A

Are there any calculation errors? Yes No N/A

ACTION: If an MS/MSD analysis has not been conducted contact the laboratory for an explanation. Review the MS/MSD recoveries in conjunction with other QC data such as surrogate recoveries and note the results in the validation narrative. If MS/MSD recoveries are out of specification and sample concentration is > 5 times the spike concentration, no qualification is required, otherwise qualify results as follows: Qualify positive results for the specific class of compound (aromatics and non-aromatics) as estimated (J) in all samples if associated surrogates are also out of specification. The qualification shall only be done on samples of similar matrix as the MS/MSD samples. If it is determined from the review that only the spiked samples are affected by low recoveries, qualify only the results for the spiked sample as described above. If it is determined from the review that out of specification MS/MSD recoveries are indicative of systematic problems in the laboratory such as sample preparation or sample-specific matrix interferences this must be noted in the validation narrative along with the potential affect on the sample results.

5.3 PERFORMANCE AUDIT SAMPLES

Are the performance audit sample results within the acceptance limits? Yes No N/A

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

6. PRECISION

6.1 MATRIX SPIKE/MATRIX SPIKE DUPLICATES

Are RPD values within specification? Yes No N/A

Are there any calculation errors? Yes No N/A

ACTION: Review the MS/MSD results in conjunction with other QC data such as field duplicates and note the results in the validation narrative. If MS/MSD RPDs are out of specification and sample results are >5xCRQL qualify positive results for the specific class of compound (aromatics and non-aromatics) as estimated (J). If it is determined from the review that out of specification MS/MSD results are indicative of systematic problems in the laboratory such as sample preparation or sample-specific matrix interferences this must be noted in the validation narrative along with the potential affect on the sample results.

6.2 FIELD DUPLICATE SAMPLES

See comment

Are field duplicate RPD values acceptable? Yes No N/A

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

6.3 FIELD SPLIT SAMPLES

Are field split RPD values acceptable? Yes No N/A

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

7. SYSTEM PERFORMANCE

7.1 INTERNAL STANDARDS PERFORMANCE

Are any internal standard area counts outside the acceptance limits? Yes No N/A

Are retention times for any internal standard outside the ±30 second windows established by the most recent calibration check? Yes No N/A

ACTION: If the area counts are outside the acceptance limits qualify all associated results as estimated (J for detects or UJ for nondetects). If it is determined from the review that out of specification area counts and relative retention times are indicative of systematic problems within the laboratory the reviewer may consider rejection of all affected sample data (R).

8. COMPOUND IDENTIFICATION AND QUANTITATION

8.1 COMPOUND IDENTIFICATION

Are detected compounds within ±0.06 relative retention time units of the associated calibration standard?	Yes	No	N/A
Are all ions at a relative intensity of ≥10% in the standard spectra present in the sample spectra?	Yes	No	N/A
Do the relative intensities between the standard and sample spectra agree within 20%?	Yes	No	N/A
Have all ions > 10% in the sample spectra that are not present in the standard spectra been reviewed for possible background contamination?	Yes	No	N/A
Are molecular ions present in the reference specrum present in the sample spectrum?	Yes	No	N/A

ACTION: If compound identification is in error and retention time and mass spectral criteria are exceeded qualify all affected positive results as unusable (R). If cross-contamination between analyses is suspected, qualify affected data as unusable (R). Note the results in the validation narrative.

8.2 REPORTED RESULTS AND QUANTITATION LIMITS

Has the laboratory used the correct RRF values and internal standard(s) for quantitation?	Yes	No	N/A
Are results and quantitation limits calculated properly?	Yes	No	N/A
Has the laboratory reported the sample quantitation limits within 5xCRQL values?	Yes	No	N/A

ACTION: If the results and quantitation limits are in error contact the laboratory for clarification and note in the validation narrative.

8.3 TENTATIVELY IDENTIFIED COMPOUNDS (TIC)

Has the laboratory conducted a spectral library search on all candidate TIC peaks in accordance with the analytical SOW?	Yes	No	N/A
Has the laboratory properly identified and coded all TIC?	Yes	No	N/A

ACTION: If the laboratory has failed to search the minimum number of TIC peaks in the chromatogram contact the laboratory for submittal of the required data. Qualify as nondetects (U) all TIC compounds present in samples and blanks using the review criteria specified in the validation requirements. If TIC identification is in error sample results should be qualified as nondetects (U) or unusable (R). If TIC identifications are judged valid, qualify the results as presumptive and estimated (JN).

9. 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 recommended in the foregoing sections, and complete the data validation narrative according to the requirements of Section 10.0 of the data validation requirements.

COMMENTS (attach additional sheets as necessary):

1. Laboratory conducted a duplicate analysis of B015K3. All results were non-detects.

HOLDING TIME SUMMARY - FORM B-1

SDG: 9	REVIEWER: C. Jensen	DATE: 11/12/92	PAGE___OF___
COMMENTS: Volatile Organics			

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
B015K3	VOA	10/22/91	—	11/5/91	—	14	none

9613497.0838

DATA QUALIFICATION SUMMARY - FORM B-7

pg 1 of 1

SDG: B015H8	REVIEWER: [illegible]	DATE: 1/22/93	PAGE 1 OF 7
COMMENTS: Volatiles			
COMPOUND	**QUALIFIER**	**SAMPLES AFFECTED**	**REASON**
Acetone	u	B015K3 Dup	Present in blank
2-Butanone	u	B015K3	"

2/5/93

9613497.2830

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015K3
216-B-50C 19-20.5

Name: BATTELLE-PNL Contract: ------

Lab Code: ------ Case No.: ----- SAS No.: ----- SDG No.: ------

Matrix: (soil/water) SOIL Lab Sample ID: 92-00921

Sample wt/vol: 1.5311 (g/mL) G Lab File ID: >WA507

Level: (low/med) LOW Date Received: 10/23/91

% Moisture: not dec. 4.0 Date Analyzed: 11/05/91

Column: (pack/cap) CAP Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
74-87-3	Chloromethane	34.	U
74-83-9	Bromomethane	34.	U
75-01-4	Vinyl Chloride	34.	U
75-00-3	Chloroethane	34.	U
75-09-2	Methylene Chloride	17.	U
67-64-1	Acetone	34.	U
75-15-0	Carbon Disulfide	17.	U
75-35-4	1,1-Dichloroethene	17.	U
75-34-3	1,1-Dichloroethane	17.	U
540-59-0	1,2-Dichloroethene (total)	17.	U
67-66-3	Chloroform	17.	U
107-02-2	1,2-Dichloroethane	17.	U
78-93-3	2-Butanone	17.	~~JB~~ U
71-55-6	1,1,1-Trichloroethane	17.	U
56-23-5	Carbon Tetrachloride	17.	U
108-05-4	Vinyl Acetate	34.	U
75-27-4	Bromodichloromethane	17.	U
78-87-5	1,2-Dichloropropane	17.	U
10061-01-5	cis-1,3-Dichloropropene	17.	U
79-01-6	Trichloroethene	17.	U
124-48-1	Dibromochloromethane	17.	U
79-00-5	1,1,2-Trichloroethane	17.	U
71-43-2	Benzene	17.	U
10061-02-6	trans-1,3-Dichloropropene	17.	U
75-25-2	Bromoform	17.	U
108-10-1	4-Methyl-2-pentanone	34.	U
591-78-6	2-Hexanone	34.	U
127-18-4	Tetrachloroethene	17.	U
79-34-5	1,1,2,2-Tetrachloroethane	17.	U
108-88-3	Toluene	17.	U
108-90-7	Chlorobenzene	17.	U
100-41-4	Ethylbenzene	17.	U
100-42-5	Styrene	17.	U
133-02-7	Xylene (total)	17.	U

FORM I VOA 11/12/89 Rev.

9613497.2831

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015K3 DUP

Z16-B-SDC 79-3015

al Name: BATTELLE-PNL Contract: ------

ab Code: ------ Case No.: ----- SAS No.: ----- SDG No.: ------

atrix: (soil/water) SOIL Lab Sample ID: 92-00921 DU

ample wt/vol: 1.2235 (g/mL) G Lab File ID: >WA508

evel: (low/med) LOW Date Received: 10/23/91

Moisture: not dec. 4.0 Date Analyzed: 11/05/91

olumn: (pack/cap) CAP Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
74-87-3	Chloromethane	43.	U
74-83-9	Bromomethane	43.	U
75-01-4	Vinyl Chloride	43.	U
75-00-3	Chloroethane	43.	U
75-09-2	Methylene Chloride	21.	U
67-64-1	Acetone	13.	~~JB~~ U
75-15-0	Carbon Disulfide	21.	U
75-35-4	1,1-Dichloroethene	21.	U
75-34-3	1,1-Dichloroethane	21.	U
540-59-0	1,2-Dichloroethene (total)	21.	U
67-66-3	Chloroform	21.	U
107-02-2	1,2-Dichloroethane	21.	U
78-93-3	2-Butanone	43.	U
71-55-6	1,1,1-Trichloroethane	21.	U
56-23-5	Carbon Tetrachloride	21.	U
108-05-4	Vinyl Acetate	43.	U
75-27-4	Bromodichloromethane	21.	U
78-87-5	1,2-Dichloropropane	21.	U
10061-01-5	cis-1,3-Dichloropropene	21.	U
79-01-6	Trichloroethene	21.	U
124-48-1	Dibromochloromethane	21.	U
79-00-5	1,1,2-Trichloroethane	21.	U
71-43-2	Benzene	21.	U
10061-02-6	trans-1,3-Dichloropropene	21.	U
75-25-2	Bromoform	21.	U
108-10-1	4-Methyl-2-pentanone	43.	U
591-78-6	2-Hexanone	43.	U
127-18-4	Tetrachloroethene	21.	U
79-34-5	1,1,2,2-Tetrachloroethane	21.	U
108-88-3	Toluene	21.	U
108-90-7	Chlorobenzene	21.	U
100-41-4	Ethylbenzene	21.	U
100-42-5	Styrene	21.	U
133-02-7	Xylene (total)	21.	U

gj 11/12/92

FORM I VOA 1/89 Rev.

9613497.2832

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLANK

ame: BATTELLE-PNL Contract: ------

b Code: ------ Case No.: ----- SAS No.: ----- SDG No.: ------

trix: (soil/water) SOIL Lab Sample ID: BLANK

mple wt/vol: 5 (g/mL) G Lab File ID: >WA504

vel: (low/med) LOW Date Received: 11/05/91

Moisture: not dec. 100 Date Analyzed: 11/05/91

lumn: (pack/cap) CAP Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	5.	U
67-64-1	Acetone	2 ~~5~~ 2.	~~JB~~ ~~U~~ J
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene	5.	U
75-34-3	1,1-Dichloroethane	5.	U
540-59-0	1,2-Dichloroethene (total)	5.	U
67-66-3	Chloroform	5.	U
107-02-2	1,2-Dichloroethane	5.	U
78-93-3	2-Butanone	5.	J~~B~~
71-55-6	1,1,1-Trichloroethane	5.	U
56-23-5	Carbon Tetrachloride	5.	U
108-05-4	Vinyl Acetate	10.	U
75-27-4	Bromodichloromethane	5.	U
78-87-5	1,2-Dichloropropane	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	5.	U
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene	5.	U
10061-02-6	trans-1,3-Dichloropropene	5.	U
75-25-2	Bromoform	5.	U
108-10-1	4-Methyl-2-pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	5.	U
79-34-5	1,1,2,2-Tetrachloroethane	5.	U
108-88-3	Toluene	5.	U
108-90-7	Chlorobenzene	5.	U
100-41-4	Ethylbenzene	5.	U
100-42-5	Styrene	5.	U
133-02-7	Xylene (total)	5.	U

Appl. qva

X10 = 50

FORM I VOA 1/89 Rev.

11/12/92

SEMI-VOLATILE ORGANIC DATA VALIDATION CHECKLIST - FORM A-2

PROJECT: 200BP1	REVIEWER: G	DATE: 11/13/92
LABORATORY: PNL	CASE:	SDG: 9B015H8
SAMPLES/MATRIX: Soil / B015K3		

2/5/93

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.

Data Package Item	Present?: Yes	No	N/A
Case Narrative	✓		
Data Summary		✓	
Chain-of-Custody	✓		
QC Summary			
Surrogate report	✓		
MS/MSD report	✓		
Blank summary report	✓		
GC/MS tuning report	✓		
Internal standard summary report	✓		
Sample Data			
Sample reports	✓		
TIC reports for each sample	✓		
RIC reports for all samples	✓		
Raw and corrected spectra for all detected results	✓		
Raw and corrected library search data for all reported TIC	✓		
Quantitation and calculation data for all TIC	✓		
Standards Data			
Initial calibration report	✓		
RIC and quantitation reports for initial calibration		✓	
Continuing calibration reports	✓		
RIC and quantitation reports for cont. calibrations	✓		
Internal standard summary report	✓		
Raw QC Data			
Tuning report, spectra and mass lists	✓		
Blank analysis reports	✓		
TIC reports for all blanks	✓		
RIC and quantitation reports for blanks	✓		
Raw and corrected spectra for all detected results in blanks	✓		
Raw and corrected library search data for all reported TIC	✓		
Quantitation and calculation data for all TIC	✓		
MS/MSD report forms	✓		

Data Package Item	Present?: Yes	No	N/A
RIC and quantitation reports for MS/MSD	✓		
Additional Data			
Moisture/% solids data sheets	✓		
Reduction formulae		✓	
Instrument time logs		✓	
Chemist notebook pages		✓	
Sample preparation sheets	✓		

2. HOLDING TIMES

Were all samples extracted within holding time?	Yes	(No)	N/A
Were all samples analyzed within holding time?	(Yes)	No	N/A

ACTION: If any holding times were exceeded, but not by greater than a factor of two, qualify associated samples as estimated (J for detects or UJ for nondetects), otherwise reject all nondetects (R) and qualify all associated detects as estimated (J).

3. INSTRUMENT CALIBRATION, TUNING AND PERFORMANCE CHECKS

3.1 GC/MS TUNING AND PERFORMANCE CHECKS

Is a DFTPP tune report present for each applicable 12h period?	(Yes)	No	N/A
Do all tunes on all instruments meet the tuning criteria?	(Yes)	No	N/A
Do all tunes on all instruments meet the expanded criteria?	Yes	No	(N/A)
Has the laboratory made any calculation or transciption errors?	Yes	(No)	N/A
Have the proper significant figures been reported?	(Yes)	No	N/A

ACTION: If the mass calibration is out of specification but within the expanded criteria, qualify associated data as estimated (J for detects and UJ for nondetects). If all tuning criteria are not met, qualify all associated data as unusable (R).

3.2 INITIAL CALIBRATION

Is an initial calibration report provided for all instruments?	(Yes)	No	N/A
Are all RSD values ≤30% (2/88 SOW)?	(Yes)	No	N/A
Are all RRF values ≥0.05 (2/88 SOW)?	(Yes)	No	N/A
Are all applicable RSD values ≤20.5% (3/90 SOW)?	Yes	No	(N/A)
Are all applicable RSD values ≤40% (3/90 SOW)?	Yes	No	(N/A)

Are all applicable RRF values within SOW limits (3/90 SOW)?	Yes	No	N/A
Are all erratic performance compound RRF values ≥0.01 (3/90 SOW)?	Yes	No	N/A

ACTION: With the exception of compounds that exhibit erratic performance and making allowances for up to four TCL compounds or surrogates, if any RRF value is out of specification qualify all detected results for the particular compound as estimated (J) and all nondetects as unusable (R). Making allowances for up to four TCL compounds or surrogates, if any RSD value is out of specification qualify all associated data as estimated (J for detects or UJ for nondetects).

3.3. CONTINUING CALIBRATION

Is a continuing calibration report present for all 12-h periods in which associated samples were analyzed?	Yes	No	N/A
Are all RRF values ≥0.05 (2/88 SOW)?	Yes	No	N/A
Are all %D values ≤25% (2/88 or 3/90 SOW)?	Yes	No	N/A
Are all %D values ≤40% (3/90 SOW)?	Yes	No	N/A
Are all RRF values within SOW limits (3/90 SOW)?	Yes	No	N/A
Are all erratic performance compound RRF values ≥0.01 (3/90 SOW)?	Yes	No	N/A

ACTION: With the exception of compounds that exhibit erratic performance and making allowances for up to four TCL compounds or surrogates, if any RRF value is out of specification qualify all associated detected results as estimated and all nondetects as unusable (R). Making allowances for up to four TCL compounds or surrogates, if any %D is out of specification, qualify all associated results as estimated (J for detects or UJ for nondetects).

4. BLANKS

4.1 LABORATORY BLANKS

Has the laboratory conducted a method blank analysis per matrix for every extraction batch?	Yes	No	N/A
Are compounds reported in the laboratory blanks?	Yes	No	N/A

ACTION: Qualify all sample results < 10 times the highest blank concentration for the common laboratory contaminants, as nondetects (U) or at the SQL if the result is < CRQL. Qualify all remaining sample results < 5 times the blank concentration in similar fashion.

4.2. FIELD BLANKS

Are compounds reported in the field blanks? Yes No N/A

ACTION: Qualify all detected sample results ≤5 times the amount in any valid field blank as nondetects (U) and note the results of the field blanks in the validation narrative.

5. ACCURACY

5.1 SURROGATE RECOVERY/SYSTEM MONITORING COMPOUND RECOVERY

See, comment 1

Are any surrogate recoveries out of specification? Yes No N/A

Are any surrogate recoveries < 10%? Yes No N/A

Are any method blank surrogate recoveries out of specification? Yes No N/A

ACTION: Qualify all associated data as estimated (J for detects and UJ for nondetects) if at least two semivolatile surrogates are out of specification. If any surrogate is below 10% recovery qualify associated detected results as estimated (J) and associated nondetect results as unusable (R). If method blank surrogates are out of specification and associated sample surrogates are acceptable no qualification is required, however, the laboratory should be contacted for an explanation.

5.2 MATRIX SPIKE RECOVERY

Has an MS/MSD analysis been conducted per matrix in the sample group? Yes No N/A

Are MS/MSD recoveries within specification? Yes No N/A

Are there any calculation errors? Yes No N/A

ACTION: If an MS/MSD analysis has not been conducted contact the laboratory for an explanation. Review the MS/MSD recoveries in conjunction with other QC data such as surrogate recoveries and note the results in the validation narrative. If MS/MSD recoveries are out of specification and sample concentration is >5 times the spike concentration, no qualification is required, otherwise qualify results as follows: Qualify positive results for the specific class of compound (aromatics and non-aromatics) as estimated (J) in all samples if associated surrogates are also out of specification. The qualification shall only be done on samples of similar matrix as the MS/MSD samples. If it is determined from the review that only the spiked samples are affected by low recoveries, qualify only the results for the spiked sample as described above. If it is determined from the review that out of specification MS/MSD recoveries are indicative of systematic problems in the laboratory such as sample preparation or sample-specific matrix interferences this must be noted in the validation narrative along with the potential affect on the sample results.

5.3 PERFORMANCE AUDIT SAMPLES

Are the results for the performance audit samples within the acceptance limits? Yes No (N/A)

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

6. PRECISION

6.1 MATRIX SPIKE/MATRIX SPIKE DUPLICATES

Are all RPD values within specification? (Yes) No N/A

Are there any calculation errors? Yes (No) N/A

ACTION: Review the MS/MSD results in conjunction with other QC data such as field duplicates and note the results in the validation narrative. If MS/MSD RPDs are out of specification and sample results are >5xCRQL qualify positive results for the specific class of compound (aromatics and non-aromatics) as estimated (J). If it is determined from the review that out of specification MS/MSD results are indicative of systematic problems in the laboratory such as sample preparation or sample-specific matrix interferences this must be noted in the validation narrative along with the potential affect on the sample results.

6.2 FIELD DUPLICATE SAMPLES

See comment.

Are field duplicate RPD values acceptable? Yes No (N/A)

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

6.3 FIELD SPLIT SAMPLES

Are field split RPD values acceptable? Yes No (N/A)

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

7. SYSTEM PERFORMANCE

7.1 INTERNAL STANDARDS PERFORMANCE

Are any internal standard area counts outside the acceptance limits? Yes (No) N/A

Are retention times for any internal standard outside the ±30 second windows established by the most recent calibration check? Yes (No) N/A

ACTION: If the area counts are outside the acceptance limits qualify all associated results as estimated (J for detects and UJ for nondetects. If it is determined from the review that out of specification area counts and relative retention times are indicative of systematic problems within the laboratory the reviewer may consider rejection of all affected sample data (R).

8. COMPOUND IDENTIFICATION AND QUANTITATION

8.1 COMPOUND IDENTIFICATION

target compounds not detected

Are detected compounds within ±0.06 relative retention time units of the associated calibration standard?	Yes	No	N/A
Are all ions at a relative intensity of ≥10% in the standard spectra present in the sample spectra?	Yes	No	N/A
Do the relative intensities between the standard and sample spectra agree within 20%?	Yes	No	N/A
Have all ions > 10% in the sample spectra that are not present in the standard spectra been reviewed for possible background contamination?	Yes	No	N/A
Are molecular ions in the reference spectrum present in the sample spectrum?	Yes	No	N/A

ACTION: If compound identification is in error and retention time and mass spectral criteria are exceeded qualify all affected positive results as unusable (R). If cross-contamination between analyses is suspected, qualify affected data as unusable (R).

8.2 REPORTED RESULTS AND QUANTITATION LIMITS

Has the laboratory used the correct RRF values and internal standards for quantitation?	Yes	No	N/A
Are results and quantitation limits calculated properly?	Yes	No	N/A
Has the laboratory reported the sample quantitation limits within 5xCRQL values?	Yes	No	N/A

ACTION: If the quantitation limits are in error contact the laboratory for clarification and note in the validation narrative.

8.3 TENTATIVELY IDENTIFIED COMPOUNDS

Has the laboratory conducted a spectral library search on all candidate TIC peaks in accordance with the analytical SOW?	Yes	No	N/A
Has the laboratory properly identified and coded all TIC?	Yes	No	N/A

ACTION: If the laboratory has failed to search the minimum number of TIC peaks in the chromatogram contact the laboratory for submittal of the required data. Qualify as nondetects (U) all TIC compounds present in samples and blanks using the review criteria specified in the validation requirements. If TIC identification is in error sample results should be qualified as nondetects (U) or unusable (R). If TIC identifications are judged valid, qualify the results as presumptive and estimated (JN).

9. 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):

1. Laboratory wrote the wrong sample names on Surrogate Form 2D. Values were checked with no problems identified.

2. Laboratory conducted a duplicate analysis for sample B015K3. Both results of sample and duplicate have no target compounds detected.

HOLDING TIME SUMMARY - FORM B-1

SDG: 9	REVIEWER: C. Jensen	DATE: 11/12/92	PAGE 1 OF 1
COMMENTS: Semivolatile			

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
B015K3	SVOA	10/22/91	10/30/91	11/25/91	8	26	J or UJ
B015K3D	↓	↓	↓	↓	↓	↓	↓
B015K3MS	↓	↓	↓	↓	↓	↓	↓
B015K3MSD	↓	↓	↓	↓	↓	↓	↓

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pg 1 of 1

DATA QUALIFICATION SUMMARY - FORM B-7

~~2 of 7~~ 2/5/93

2/5/93

SDG: 9B015H8	REVIEWER: cj	DATE: 11/12/92	PAGE 1 OF 1
COMMENTS: Semivolatile			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
All	J or UJ	B015K3, K3DUP, K3MS, K3MSD	HT exceeded
bis(2-chloroisopropyl) ether	J or UJ	all	CCAL %D 725
4-chloroaniline	↓	↓	↓
Hexachlorocyclopentadiene	↓	↓	↓
3-nitroaniline	↓	↓	↓
Di-n-butylphthalate	U	B015K3MSD, B015K3MS, B015K3D, B015K3	Blank contam.
unknown @ 4.37	U	B015K3, B015K3D	↓
unknown @ 5.09	↓	↓	↓
unknown @ 5.32	↓	↓	↓
	R 11/12/92		

2/5/93

1/25/93

9613497.2843

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015K3

216-B-50C 19-20.5

ıl ame: BATTELLE-PNL Contract: -------

ıb Code: ------- Case No.: ------ SAS No.: ------ SDG No.: #9

ıtrix: (soil/water) SOIL Lab Sample ID: 92-921-E-1

ımple wt/vol: 30.1 (g/mL) G Lab File ID: >XC509

ɜvel: (low/med) LOW Date Received: 10/23/91

Moisture: not dec. 4.7 dec. -- Date Extracted: 10/30/91

ctraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/25/91

ᵊC Cleanup: (Y/N) N pH: 7.5 Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
108-95-2	Phenol	350.	U
111-44-4	bis(2-Chloroethyl)Ether	350.	U
95-57-8	2-Chlorophenol	350.	U
541-73-1	1,3-Dichlorobenzene	350.	U
106-46-7	1,4-Dichlorobenzene	350.	U
100-51-6	Benzyl_alcohol	350.	U
95-50-1	1,2-Dichlorobenzene	350.	U
95-48-7	2-Methylphenol	350.	U
39638-32-9	bis(2-chloroisopropyl)ether	350.	U
106-44-5	4-Methylphenol	350.	U
621-64-7	N-Nitroso-Di-n-propylamine	350.	U
67-72-1	Hexachloroethane	350.	U
98-95-3	Nitrobenzene	350.	U
78-59-1	Isophorone	350.	U
88-75-5	2-Nitrophenol	350.	U
105-67-9	2,4-Dimethylphenol	350.	U
65-85-0	Benzoic_acid	1700.	U
111-91-1	bis(2-Chloroethoxy)methane	350.	U
120-83-2	2,4-Dichlorophenol	350.	U
120-82-1	1,2,4-Trichlorobenzene	350.	U
91-20-3	Naphthalene	350.	U
106-47-8	4-Chloroaniline	350.	U
87-68-3	Hexachlorobutadiene	350.	U
59-50-7	4-Chloro-3-methylphenol	350.	U
91-57-6	2-Methylnaphthalene	350.	U
77-47-4	Hexachlorocyclopentadiene	350.	U
88-06-2	2,4,6-Trichlorophenol	350.	U
95-95-4	2,4,5-Trichlorophenol	1700.	U
91-58-7	2-Chloronaphthalene	350.	U
88-74-4	2-Nitroaniline	1700.	U
131-11-3	Dimethylphthalate	350.	U
208-96-8	Acenaphthylene	350.	U
606-20-2	2,6-Dinitrotoluene	350.	U

UJ

FORM I SV-1 1/87 Rev.

9111214?

9613497.2844

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015K3

216-B-50C 19-20.5

ame: BATTELLE-PNL Contract: -------

b Code: ------- Case No.: ------ SAS No.: ------ SDG No.: #9

trix: (soil/water) SOIL Lab Sample ID: 92-921-E-1

mple wt/vol: 30.1 (g/mL) G Lab File ID: >XC509

vel: (low/med) LOW Date Received: 10/23/91

Moisture: not dec. 4.7 dec. -- Date Extracted: 10/30/91

traction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/25/91

C Cleanup: (Y/N) N pH: 7.5 Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q	
99-09-2	3-Nitroaniline	1700.	U	UJ
83-32-9	Acenaphthene	350.	U	
51-28-5	2,4-Dinitrophenol	1700.	U	
100-02-7	4-Nitrophenol	1700.	U	
132-64-9	Dibenzofuran	350.	U	
121-14-2	2,4-Dinitrotoluene	350.	U	
84-66-2	Diethylphthalate	350.	U	
7005-72-3	4-Chlorophenyl-phenylether	350.	U	
86-73-7	Fluorene	350.	U	
100-01-6	4-Nitroaniline	1700.	U	
534-52-1	4,6-Dinitro-2-methylphenol	1700.	U	
86-30-6	N-Nitrosodiphenylamine (1)	350.	U	
101-55-3	4-Bromophenyl-phenylether	350.	U	
118-74-1	Hexachlorobenzene	350.	U	
87-86-5	Pentachlorophenol	1700.	U	
85-01-8	Phenanthrene	350.	U	
120-12-7	Anthracene	350.	U	
84-74-2	Di-n-butylphthalate	580.	~~B~~	~~B~~ UJ
206-44-0	Fluoranthene	350.	U	UJ
129-00-0	Pyrene	350.	U	
85-68-7	Butylbenzylphthalate	350.	U	
91-94-1	3,3'-Dichlorobenzidine	700.	U	
56-55-3	Benzo(a)anthracene	350.	U	
218-01-9	Chrysene	350.	U	
117-81-7	bis(2-Ethylhexyl)phthalate	350.	U	
117-84-0	Di-n-octylphthalate	350.	U	
205-99-2	Benzo(b)fluoranthene	350.	U	
207-08-9	Benzo(k)fluoranthene	350.	U	
50-32-8	Benzo(a)pyrene	350.	U	
193-39-5	Indeno(1,2,3-cd)pyrene	350.	U	
53-70-3	Dibenz(a,h)anthracene	350.	U	
191-24-2	Benzo(g,h,i)perylene	350.	U	

(1) -- Cannot be separated from Diphenylamine

FORM I SV-2 1/87 Rev.

G 11/12/93

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1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B015K3
216-A-50C 19-20.5

b ame: BATTELLE-PNL Contract: -------

b Code: ------- Case No.: ------ SAS No.: ------ SDG No.: 9

trix: (soil/water) SOIL Lab Sample ID: 92-921-E-1

mple wt/vol: 30.1 (g/mL) G Lab File ID: >XC509

vel: (low/med) LOW Date Received: 10/23/91

Moisture: not dec. 4.7 dec. -- Date Extracted: 10/30/91

traction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/25/91

C Cleanup: (Y/N) N pH: 7.5 Dilution Factor: 1.00000

umber TICs found: 4

CONCENTRATION UNITS:
(ug/L or ug/Kg) ug/Kg

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	Unknown	4.37	1700.	~~JAB~~ U
2.	Unknown	5.09	790.	~~JAB~~ U
	Unknown	5.32	770.	~~JAB~~ U
4.	Unknown	19.46	430.	J
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28				
29				
30.				

FORM I SV-TIC 1/87 Rev.

4/11/2/92

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1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015K3 D
216-B-SDC 79-80.5 Dup

ame: BATTELLE-PNL Contract: -------

ab Code: ------- Case No.: ------ SAS No.: ------ SDG No.: #9

atrix: (soil/water) SOIL Lab Sample ID: 92-921-E-1D

ample wt/vol: 30.3 (g/mL) G Lab File ID: >XC510

evel: (low/med) LOW Date Received: 10/23/91

Moisture: not dec. 4.7 dec. -- Date Extracted: 10/30/91

xtraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/25/91

PC Cleanup: (Y/N) N pH: 7.5 Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
108-95-2	Phenol	350.	U
111-44-4	bis(2-Chloroethyl)Ether	350.	U
95-57-8	2-Chlorophenol	350.	U
541-73-1	1,3-Dichlorobenzene	350.	U
106-46-7	1,4-Dichlorobenzene	350.	U
100-51-6	Benzyl alcohol	350.	U
95-50-1	1,2-Dichlorobenzene	350.	U
95-48-7	2-Methylphenol	350.	U
39638-32-9	bis(2-chloroisopropyl)ether	350.	U
106-44-5	4-Methylphenol	350.	U
621-64-7	N-Nitroso-Di-n-propylamine	350.	U
67-72-1	Hexachloroethane	350.	U
98-95-3	Nitrobenzene	350.	U
78-59-1	Isophorone	350.	U
88-75-5	2-Nitrophenol	350.	U
105-67-9	2,4-Dimethylphenol	350.	U
65-85-0	Benzoic acid	1700.	U
111-91-1	bis(2-Chloroethoxy)methane	350.	U
120-83-2	2,4-Dichlorophenol	350.	U
120-82-1	1,2,4-Trichlorobenzene	350.	U
91-20-3	Naphthalene	350.	U
106-47-8	4-Chloroaniline	350.	U
87-68-3	Hexachlorobutadiene	350.	U
59-50-7	4-Chloro-3-methylphenol	350.	U
91-57-6	2-Methylnaphthalene	350.	U
77-47-4	Hexachlorocyclopentadiene	350.	U
88-06-2	2,4,6-Trichlorophenol	350.	U
95-95-4	2,4,5-Trichlorophenol	1700.	U
91-58-7	2-Chloronaphthalene	350.	U
88-74-4	2-Nitroaniline	1700.	U
131-11-3	Dimethylphthalate	350.	U
208-96-8	Acenaphthylene	350.	U
606-20-2	2,6-Dinitrotoluene	350.	U

US

FORM I SV-1 1/87 Rev.

GJ 11/12/92

9613497.2847

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015K3 D
216-B-50C 19-20.5 Dc

ab ame: BATTELLE-PNL Contract: -------

ab Code: ------- Case No.: ------ SAS No.: ------ SDG No.: #9

atrix: (soil/water) SOIL Lab Sample ID: 92-921-E-1D

ample wt/vol: 30.3 (g/mL) G Lab File ID: >XC510

evel: (low/med) LOW Date Received: 10/23/91

Moisture: not dec.4.7 dec. -- Date Extracted: 10/30/91

xtraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/25/91

PC Cleanup: (Y/N) N pH: 7.5 Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q	
99-09-2	3-Nitroaniline	1700.	U	UJ
83-32-9	Acenaphthene	350.	U	
51-28-5	2,4-Dinitrophenol	1700.	U	
100-02-7	4-Nitrophenol	1700.	U	
132-64-9	Dibenzofuran	350.	U	
121-14-2	2,4-Dinitrotoluene	350.	U	
84-66-2	Diethylphthalate	350.	U	
7005-72-3	4-Chlorophenyl-phenylether	350.	U	
86-73-7	Fluorene	350.	U	
100-01-6	4-Nitroaniline	1700.	U	
534-52-1	4,6-Dinitro-2-methylphenol	1700.	U	
86-30-6	N-Nitrosodiphenylamine (1)	350.	U	
101-55-3	4-Bromophenyl-phenylether	350.	U	
118-74-1	Hexachlorobenzene	350.	U	
87-86-5	Pentachlorophenol	1700.	U	
85-01-8	Phenanthrene	350.	U	
120-12-7	Anthracene	350.	U	
84-74-2	Di-n-butylphthalate	500.	B	~~B~~ UJ
206-44-0	Fluoranthene	350.	U	
129-00-0	Pyrene	350.	U	
85-68-7	Butylbenzylphthalate	350.	U	
91-94-1	3,3'-Dichlorobenzidine	690.	U	
56-55-3	Benzo(a)anthracene	350.	U	
218-01-9	Chrysene	350.	U	
117-81-7	bis(2-Ethylhexyl)phthalate	350.	U	
117-84-0	Di-n-octylphthalate	350.	U	
205-99-2	Benzo(b)fluoranthene	350.	U	
207-08-9	Benzo(k)fluoranthene	350.	U	
50-32-8	Benzo(a)pyrene	350.	U	
193-39-5	Indeno(1,2,3-cd)pyrene	350.	U	
53-70-3	Dibenz(a,h)anthracene	350.	U	
191-24-2	Benzo(g,h,i)perylene	350.	U	

(1) - Cannot be separated from Diphenylamine

11/12/92

9613497.2848

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B015K3 D
216-B-50C 19-20.5 Du

ame: BATTELLE-PNL Contract: -------

b Code: ------- Case No.: ------ SAS No.: ------ SDG No.: 9

trix: (soil/water) SOIL Lab Sample ID: 92-921-E-1D

mple wt/vol: 30.3 (g/mL) G Lab File ID: >XC510

vel: (low/med) LOW Date Received: 10/23/91

Moisture: not dec. 4.7 dec. -- Date Extracted: 10/30/91

traction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/25/91

C Cleanup: (Y/N) N pH: 7.5 Dilution Factor: 1.00000

umber TICs found: 4 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	Unknown	4.39	1900.	~~JAB~~ U
2.	Unknown	5.09	1000.	~~JAB~~ U
	Unknown	5.33	720.	~~JAB~~ U
	Unknown	19.49	430.	J
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28				
2				

FORM I SV-TIC 1/87 Rev.

G 11/12/92

9613492 2849

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015K3 MS
216-B-50C 19-20.5 M

ame: BATTELLE-PNL Contract: -------

b Code: ------- Case No.: ------ SAS No.: ------ SDG No.: #9

trix: (soil/water) SOIL Lab Sample ID: 92-921-E-2

mple wt/vol: 30.2 (g/mL) G Lab File ID: >XC511

vel: (low/med) LOW Date Received: 10/23/91

Moisture: not dec.4.7 dec. -- Date Extracted: 10/30/91

traction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/25/91

C Cleanup: (Y/N) N pH: 7.5 Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q	
108-95-2	Phenol	4800.		J
111-44-4	bis(2-Chloroethyl)Ether	350.	~~U~~	UJ
95-57-8	2-Chlorophenol	4300.		J
541-73-1	1,3-Dichlorobenzene	350.	~~U~~	UJ
106-46-7	1,4-Dichlorobenzene	2500.		J
100-51-6	Benzyl alcohol	350.	U	UJ
95-50-1	1,2-Dichlorobenzene	350.	U	
95-48-7	2-Methylphenol	350.	U	
39638-32-9	bis(2-chloroisopropyl)ether	350.	U	
106-44-5	4-Methylphenol	350.	U	
621-64-7	N-Nitroso-Di-n-propylamine	2900.		UJ
67-72-1	Hexachloroethane	350.	U	UJ
98-95-3	Nitrobenzene	350.	U	
78-59-1	Isophorone	350.	U	
88-75-5	2-Nitrophenol	350.	U	
105-67-9	2,4-Dimethylphenol	350.	U	
65-85-0	Benzoic acid	1700.	U	
111-91-1	bis(2-Chloroethoxy)methane	350.	U	
120-83-2	2,4-Dichlorophenol	350.	U	
120-82-1	1,2,4-Trichlorobenzene	2500.		J
91-20-3	Naphthalene	350.	U	UJ
106-47-8	4-Chloroaniline	350.	U	
87-68-3	Hexachlorobutadiene	350.	U	
59-50-7	4-Chloro-3-methylphenol	5300.		J
91-57-6	2-Methylnaphthalene	350.	U	UJ
77-47-4	Hexachlorocyclopentadiene	350.	U	
88-06-2	2,4,6-Trichlorophenol	350.	U	
95-95-4	2,4,5-Trichlorophenol	1700.	U	
91-58-7	2-Chloronaphthalene	350.	U	
88-74-4	2-Nitroaniline	1700.	U	
131-11-3	Dimethylphthalate	350.	U	
208-96-8	Acenaphthylene	350.	U	
606-20-2	2,6-Dinitrotoluene	350.	U	

S 11/12/92

9613497.2850

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015K3 MS
216-B-50a 19-20.5 MS

Name: BATTELLE-PNL Contract: -------

Lab Code: ------- Case No.: ------ SAS No.: ------ SDG No.: #9

Matrix: (soil/water) SOIL Lab Sample ID: 92-921-E-2

Sample wt/vol: 30.2 (g/mL) G Lab File ID: >XC511

Level: (low/med) LOW Date Received: 10/23/91

% Moisture: not dec. 4.7 dec. -- Date Extracted: 10/30/91

Extraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/25/91

GPC Cleanup: (Y/N) N pH: 7.5 Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q.	
99-09-2	3-Nitroaniline	1700.	U	UJ
83-32-9	Acenaphthene	2600.		J
51-28-5	2,4-Dinitrophenol	1700.	U	UJ
100-02-7	4-Nitrophenol	5500.		J
132-64-9	Dibenzofuran	350.	U	UJ
121-14-2	2,4-Dinitrotoluene	2500.		J
84-66-2	Diethylphthalate	350.	U	UJ
7005-72-3	4-Chlorophenyl-phenylether	350.	U	
86-73-7	Fluorene	350.	U	
100-01-6	4-Nitroaniline	1700.	U	
534-52-1	4,6-Dinitro-2-methylphenol	1700.	U	
86-30-6	N-Nitrosodiphenylamine (1)	350.	U	
101-55-3	4-Bromophenyl-phenylether	350.	U	
118-74-1	Hexachlorobenzene	350.	U	
87-86-5	Pentachlorophenol	4100.		J
85-01-8	Phenanthrene	350.	U	UJ
120-12-7	Anthracene	350.	U	
84-74-2	Di-n-butylphthalate	350 ~~280~~.	~~JB~~	~~BJ~~ U
206-44-0	Fluoranthene	350.	U	UJ
129-00-0	Pyrene	2700.		J
85-68-7	Butylbenzylphthalate	350.	U	UJ
91-94-1	3,3'-Dichlorobenzidine	690.	U	
56-55-3	Benzo(a)anthracene	350.	U	
218-01-9	Chrysene	350.	U	
117-81-7	bis(2-Ethylhexyl)phthalate	350.	U	
117-84-0	Di-n-octylphthalate	350.	U	
205-99-2	Benzo(b)fluoranthene	350.	U	
207-08-9	Benzo(k)fluoranthene	350.	U	
50-32-8	Benzo(a)pyrene	350.	U	
193-39-5	Indeno(1,2,3-cd)pyrene	350.	U	
53-70-3	Dibenz(a,h)anthracene	350.	U	
191-24-2	Benzo(g,h,i)perylene	350.	U	

(1) - Cannot be separated from Diphenylamine

8/11/2/92

9613497.2851

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015K3 MSD
216-B-50C 19-20.5

a{ ame:BATTELLE-PNL Contract:-------

ab Code: ------- Case No.: ------ SAS No.: ------ SDG No.: #9

atrix: (soil/water) SOIL Lab Sample ID: 92-921-E-3

ample wt/vol: 30.3 (g/mL) G Lab File ID: >XC512

evel: (low/med) LOW Date Received: 10/23/91

Moisture: not dec.4.7 dec. -- Date Extracted:10/30/91

xtraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/25/91

PC Cleanup: (Y/N) N pH:7.5 Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q	
108-95-2	Phenol	4900.		J
111-44-4	bis(2-Chloroethyl)Ether	350.	U	UJ
95-57-8	2-Chlorophenol	4400.		J
541-73-1	1,3-Dichlorobenzene	350.	U	UJ
106-46-7	1,4-Dichlorobenzene	2500.		J
100-51-6	Benzyl_alcohol	350.	U	UJ
95-50-1	1,2-Dichlorobenzene	350.	U	↓
95-48-7	2-Methylphenol	350.	U	↓
39638-32-9	bis(2-chloroisopropyl)ether	350.	U	↓
106-44-5	4-Methylphenol	350.	U	↓
621-64-7	N-Nitroso-Di-n-propylamine	3000.		J
67-72-1	Hexachloroethane	350.	U	UJ
98-95-3	Nitrobenzene	350.	U	↓
78-59-1	Isophorone	350.	U	↓
88-75-5	2-Nitrophenol	350.	U	↓
105-67-9	2,4-Dimethylphenol	350.	U	↓
65-85-0	Benzoic_acid	1700.	U	↓
111-91-1	bis(2-Chloroethoxy)methane	350.	U	↓
120-83-2	2,4-Dichlorophenol	350.	U	↓
120-82-1	1,2,4-Trichlorobenzene	2600.		J
91-20-3	Naphthalene	350.	U	UJ
106-47-8	4-Chloroaniline	350.	U	↓
87-68-3	Hexachlorobutadiene	350.	U	↓
59-50-7	4-Chloro-3-methylphenol	5600.	E	JE
91-57-6	2-Methylnaphthalene	350.	U	UJ
77-47-4	Hexachlorocyclopentadiene	350.	U	↓
88-06-2	2,4,6-Trichlorophenol	350.	U	↓
95-95-4	2,4,5-Trichlorophenol	1700.	U	↓
91-58-7	2-Chloronaphthalene	350.	U	↓
88-74-4	2-Nitroaniline	1700.	U	↓
131-11-3	Dimethylphthalate	350.	U	↓
208-96-8	Acenaphthylene	350.	U	↓
606-20-2	2,6-Dinitrotoluene	350.	U	↓

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8 11/12/92

9613497.2852

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015K3 MSD
216B-50C 19-20.5 MSL

ame: BATTELLE-PNL Contract: -------

b Code: ------- Case No.: ------ SAS No.: ------ SDG No.: #9

trix: (soil/water) SOIL Lab Sample ID: 92-921-E-3

mple wt/vol: 30.3 (g/mL) G Lab File ID: >XC512

vel: (low/med) LOW Date Received: 10/23/91

Moisture: not dec. 4.7 dec. -- Date Extracted: 10/30/91

traction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/25/91

C Cleanup: (Y/N) N pH: 7.5 Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q	
99-09-2	3-Nitroaniline	1700.	U	UJ
83-32-9	Acenaphthene	2800.		J
51-28-5	2,4-Dinitrophenol	1700.	U	UJ
100-02-7	4-Nitrophenol	6000.	E	JE
132-64-9	Dibenzofuran	350.	U	UJ
121-14-2	2,4-Dinitrotoluene	2700.		J
84-66-2	Diethylphthalate	350.	U	UJ
7005-72-3	4-Chlorophenyl-phenylether	350.	U	
86-73-7	Fluorene	350.	U	
100-01-6	4-Nitroaniline	1700.	U	
534-52-1	4,6-Dinitro-2-methylphenol	1700.	U	
86-30-6	N-Nitrosodiphenylamine (1)	350.	U	
101-55-3	4-Bromophenyl-phenylether	350.	U	
118-74-1	Hexachlorobenzene	350.	U	
87-86-5	Pentachlorophenol	4800.		J
85-01-8	Phenanthrene	350.	U	UJ
120-12-7	Anthracene	350.	U	
84-74-2	Di-n-butylphthalate	350 ~~210~~.	JB	~~JB~~ U
206-44-0	Fluoranthene	350.	U	UJ
129-00-0	Pyrene	3100.		J
85-68-7	Butylbenzylphthalate	350.	U	UJ
91-94-1	3,3'-Dichlorobenzidine	690.	U	
56-55-3	Benzo(a)anthracene	350.	U	
218-01-9	Chrysene	350.	U	
117-81-7	bis(2-Ethylhexyl)phthalate	350.	U	
117-84-0	Di-n-octylphthalate	350.	U	
205-99-2	Benzo(b)fluoranthene	350.	U	
207-08-9	Benzo(k)fluoranthene	350.	U	
50-32-8	Benzo(a)pyrene	350.	U	
193-39-5	Indeno(1,2,3-cd)pyrene	350.	U	
53-70-3	Dibenz(a,h)anthracene	350.	U	
191-24-2	Benzo(g,h,i)perylene	350.	U	

(1) - Cannot be separated from Diphenylamine

11/12/92

9613498 2853

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SBLKX2

ab ame: BATTELLE-PNL Contract: -------

ab Code: ------- Case No.: ------ SAS No.: ------ SDG No.: #9

atrix: (soil/water) SOIL Lab Sample ID: 92-921-E-4

ample wt/vol: 30 (g/mL) G Lab File ID: >XC508

evel: (low/med) LOW Date Received: 10/23/91

Moisture: not dec. -- dec. -- Date Extracted: 10/30/91

xtraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/25/91

PC Cleanup: (Y/N) N pH: --- Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q	
108-95-2	Phenol	330.	U	
111-44-4	bis(2-Chloroethyl)Ether	330.	U	
95-57-8	2-Chlorophenol	330.	U	
541-73-1	1,3-Dichlorobenzene	330.	U	
106-46-7	1,4-Dichlorobenzene	330.	U	
100-51-6	Benzyl_alcohol	330.	U	
95-50-1	1,2-Dichlorobenzene	330.	U	
95-48-7	2-Methylphenol	330.	U	
39638-32-9	bis(2-chloroisopropyl)ether	330.	~~U~~	UJ
106-44-5	4-Methylphenol	330.	U	
621-64-7	N-Nitroso-Di-n-propylamine	330.	U	
67-72-1	Hexachloroethane	330.	U	
98-95-3	Nitrobenzene	330.	U	
78-59-1	Isophorone	330.	U	
88-75-5	2-Nitrophenol	330.	U	
105-67-9	2,4-Dimethylphenol	330.	U	
65-85-0	Benzoic_acid	1700.	U	
111-91-1	bis(2-Chloroethoxy)methane	330.	U	
120-83-2	2,4-Dichlorophenol	330.	U	
120-82-1	1,2,4-Trichlorobenzene	330.	U	
91-20-3	Naphthalene	330.	U	
106-47-8	4-Chloroaniline	330.	~~U~~	UJ
87-68-3	Hexachlorobutadiene	330.	U	
59-50-7	4-Chloro-3-methylphenol	330.	U	
91-57-6	2-Methylnaphthalene	330.	U	
77-47-4	Hexachlorocyclopentadiene	330.	~~U~~	UJ
88-06-2	2,4,6-Trichlorophenol	330.	U	
95-95-4	2,4,5-Trichlorophenol	1700.	U	
91-58-7	2-Chloronaphthalene	330.	U	
88-74-4	2-Nitroaniline	1700.	U	
131-11-3	Dimethylphthalate	330.	U	
208-96-8	Acenaphthylene	330.	U	
606-20-2	2,6-Dinitrotoluene	330.	U	

gi 11/12/92

9613497.2854

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SBLKX2

ame: BATTELLE-PNL Contract: -------

ıb Code: ------- Case No.: ------ SAS No.: ------ SDG No.: #9

ıtrix: (soil/water) SOIL Lab Sample ID: 92-921-E-4

ımple wt/vol: 30 (g/mL) G Lab File ID: >XC508

ɜvel: (low/med) LOW Date Received: 10/23/91

Moisture: not dec. -- dec. -- Date Extracted: 10/30/91

ctraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/25/91

ᵊC Cleanup: (Y/N) N pH: --- Dilution Factor: 1.00000

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
99-09-2	3-Nitroaniline	1700.	~~U~~
83-32-9	Acenaphthene	330.	U
51-28-5	2,4-Dinitrophenol	1700.	U
100-02-7	4-Nitrophenol	1700.	U
132-64-9	Dibenzofuran	330.	U
121-14-2	2,4-Dinitrotoluene	330.	U
84-66-2	Diethylphthalate	330.	U
7005-72-3	4-Chlorophenyl-phenylether	330.	U
86-73-7	Fluorene	330.	U
100-01-6	4-Nitroaniline	1700.	U
534-52-1	4,6-Dinitro-2-methylphenol	1700.	U
86-30-6	N-Nitrosodiphenylamine (1)	330.	U
101-55-3	4-Bromophenyl-phenylether	330.	U
118-74-1	Hexachlorobenzene	330.	U
87-86-5	Pentachlorophenol	1700.	U
85-01-8	Phenanthrene	330.	U
120-12-7	Anthracene	330.	U
84-74-2	Di-n-butylphthalate	410.	
206-44-0	Fluoranthene	330.	U
129-00-0	Pyrene	330.	U
85-68-7	Butylbenzylphthalate	330.	U
91-94-1	3,3'-Dichlorobenzidine	670.	U
56-55-3	Benzo(a)anthracene	330.	U
218-01-9	Chrysene	330.	U
117-81-7	bis(2-Ethylhexyl)phthalate	330.	U
117-84-0	Di-n-octylphthalate	330.	U
205-99-2	Benzo(b)fluoranthene	330.	U
207-08-9	Benzo(k)fluoranthene	330.	U
50-32-8	Benzo(a)pyrene	330.	U
193-39-5	Indeno(1,2,3-cd)pyrene	330.	U
53-70-3	Dibenz(a,h)anthracene	330.	U
191-24-2	Benzo(g,h,i)perylene	330.	U

u5

Spl. gr

J x 5 = 205

(1) - Cannot be separated from Diphenylamine

FORM I SV-2 1/87 Rev.

9613497.2855

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

SBLKX2

ıl ame: BATTELLE-PNL Contract: -------

ıb Code: ------- Case No.: ------ SAS No.: ------ SDG No.: 9

ıtrix: (soil/water) SOIL Lab Sample ID: 92-921-E-4

ımple wt/vol: 30 (g/mL) G Lab File ID: >XC508

ıvel: (low/med) LOW Date Received: 10/23/91

Moisture: not dec. -- dec. -- Date Extracted: 10/30/91

ıtraction: (Sepf/Cont/Sonc) SONC Date Analyzed: 11/25/91

C Cleanup: (Y/N) N pH: -- Dilution Factor: 1.00000

umber TICs found: 3

CONCENTRATION UNITS:
(ug/L or ug/Kg) ug/Kg

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	Unknown	4.37	1700.	JA
2.	Unknown	5.09	920.	JA
	Unknown	5.32	770.	JA
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
2				
2.				
30.				

9613497.2856

PESTICIDE/PCB DATA VALIDATION CHECKLIST - FORM A-3

PROJECT: 200 BP1	REVIEWER: CJ	DATE: 11/12/92
LABORATORY: PNL	CASE:	SDG: 9B01548
SAMPLES/MATRIX: Soil / B01543		

2/5/93

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 resubmittal.

Data Package Item	Present?: Yes	No	N/A
Case Narrative	✓		
Data Summary		✓	
Chain-of-Custody	✓		
QC Summary			
Surrogate report	✓		
MS/MSD report	✓		
Blank summary report	✓		
Sample Data			
Sample reports	✓		
Chromatograms	✓		
GC integration reports	✓		
Worksheets		✓	
UV traces from GPC		✓	
GC/MS confirmation spectra		✓	
Standards Data			
Pesticides Evaluation Standards Summary	✓		
Pesticides/PCB Standards Summary	✓		
Pesticides/PCB identification	✓		
Pesticides standard chromatograms	✓		
Raw QC Data			
Blank analysis report forms and chromatograms	✓		
MS/MSD report forms and chromatograms	✓		

Data Package Item	Present?: Yes	No	N/A
Additional Data			
Moisture/% solids data sheets	✓		
Reduction formulae		✓	
Instrument time logs		✓	
Chemist notebook pages		✓	
Sample preparation sheets	✓		

2. HOLDING TIMES

Were all samples extracted within holding time? Yes **(No)** N/A

Were all samples analyzed within holding time? **(Yes)** No N/A

ACTION: If any holding times were exceeded, but not by greater than a factor of two, qualify associated samples as estimated (J for detects or UJ for nondetects), otherwise reject all nondetects (R) and qualify all associated detects as estimated (J).

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

3.1 INSTRUMENT PERFORMANCE (2/88 SOW)

Are DDT retention times greater than 12 minutes? **(Yes)** No N/A

ACTION: If DDT retention time is $\leq$12 minutes and resolution is <25% qualify associated data as unusable (R).

Is resolution between DDT peaks acceptable? **(Yes)** No N/A

ACTION: If resolution between DDT peaks is unacceptable qualify associated data as unusable (R).

Do all pesticide standards elute within the established retention time windows? **(Yes)** No N/A

ACTION: If the standards do not meet the retention time criteria and peaks are not present near or within the retention time windows no sample qualification is necessary. If peaks are near or within the retention time windows and the standards and matrix spikes do not fall within the expanded retention time windows calculated according to the validation requirements, qualify all associated sample results from the last in-control point as unusable (R).

Are DDT breakdowns $\leq$20%? **(Yes)** No N/A

ACTION: If the DDT percent breakdown exceeds 20%, qualify all detected results for DDT as estimated (J) and all nondetects as unusable (R) if DDD and DDE are detected. In addition qualify all results for DDD or DDE as presumptive and estimated (NJ).

Are endrin breakdowns $\leq$20%? **(Yes)** No N/A

9613497.2858

ACTION: If the endrin breakdown exceeds 20%, qualify all detected results for endrin as estimated (J) and all nondetects as unusable (R) if endrin aldehyde or endrin ketone are detected. In addition, qualify all results for endrin ketone as presumptive and estimated (NJ).

Are DBC retention time differences within specification?	Yes	No	N/A

ACTION: If DBC %D values are outside the limits and the shift is ocurring repeatedly in samples and standards, qualify affected sample results as unusable (R).

3.2 CALIBRATIONS (2/88 SOW)

Are RSD values for aldrin, endrin, DDT and DBC ≤10%?	Yes	No	N/A
Have all standards been analyzed within 72 h of any sample?	Yes	No	N/A
Has a 3-point calibration been conducted for DDT or toxaphene?	Yes	No	N/A
Have all standards been analyzed at the start of each 72-h sequence?	Yes	No	N/A
Have evaluation standards A, B, and C been analyzed within 72 h of any sample?	Yes	No	N/A
Has the confirmation standard mix been analyzed after every five samples?	Yes	No	N/A
Has evaluation standard B analyzed every 10 samples?	Yes	No	N/A
Are %D values for initial and subsequent standards ≤15% for quantitation standards and ≤20% for confirmation standards?	Yes	No	N/A

ACTION: If the RSD criteria were exceeded or three point calibrations not conducted qualify associated detects as estimated (J). If all standards were not analyzed at the beginning of each 72-h sequence qualify associated data as unusable (R). If the confirmation standards were not analyzed properly qualify associated detects as estimated (J). If the continuing calibration criteria were not met qualify associated quantitation data as estimated (J).

3.3 INSTRUMENT PERFORMANCE AND INITIAL CALIBRATION (3/90 SOW)

Is peak resolution acceptable? Yes No N/A

ACTION: If the resolution criteria are not met, reject positive sample results generated after initial calibration (R).

Are DDT and endrin breakdowns ≤20.0% Yes No N/A

ACTION: If the breakdown criteria are not met qualify sample results as described in Section 5.3.1 of the validation requirements.

Are single component target compounds in the PEMs, INDA, INDB and the calibration standards within the retention time windows? Yes No N/A

ACTION: If the retention time criteria are not met and no peaks are present in the samples within two times the retention time windows (±0.04, ±0.05 for methoxychlor), no qualification is necessary. If peaks are present in samples within the retention time window a review is made of the raw data to determine expanded retention time windows (see Section 5.3.1 of the validation requirements). If all standards and matrix spikes fall within the expanded windows then no qualification of sample results is necessary. If all standards and matrix spikes do not fall within the expanded windows then all affected sample results are qualified as unusable (R).

Are the RPDs acceptable for the PEMs? Yes No N/A

ACTION: If the RPD criteria are not met qualify associated positive sample results as estimated (J).

Are the RSDs for the calibration factors < 10.0% (< 15.0% for the BHC series, DDT, endrin, and methoxychlor)? Yes No N/A

ACTION: If the RSD criteria are not met qualify associated positive sample results as estimated (J).

3.4 CALIBRATION VERIFICATION (3/90 SOW)

Have the analytical sequence requirements been met for the analysis of instrument blanks, PEMs, INDA and INDB mixes? Yes No N/A

ACTION: If the analytical sequence requirements are not followed and any of the resolution or retention time criteria listed below are exceeded, reject associated positive results (R).

Is peak resolution acceptable for PEMs, INDA and INDB mixes? Yes No N/A

ACTION: If the resolution criteria are not met reject positive sample results generated after a noncompliant standard analysis (R).

Are single component target compounds in the PEMs, INDA and INDB mixes within the retention time windows? Yes No N/A

ACTION: If the retention time criteria are not met and no peaks are present in the samples analyzed after the noncompliant standard within two times the retention time windows (±0.04, ±0.05 for methoxychlor), no qualification is necessary. If peaks are present in samples within the expanded windows rejected associated positive and nondetect results (R).

Are RPDs between the calculated and true amounts in the PEMs, INDA and INDB mixes ≤25.0%? Yes No N/A

ACTION: If the RPD criteria are not met qualify associated positive sample results as estimated (J).

Are DDT and endrin breakdowns in the PEMs ≤20.0% (≤30.0% total combined)? Yes No N/A

ACTION: If the breakdown criteria are not met qualify associated positive sample results in accordance with the criteria specified in Section 5.3.1.

4. BLANKS

4.1 LABORATORY BLANKS

Has the laboratory analyzed the method blanks at the required frequency? Yes No N/A

Has the laboratory analyzed a sulfur clean-up blank if required? Yes No N/A

Has the laboratory analyzed instrument blanks at the required frequency? Yes No N/A

Are target compounds present in the blanks? Yes No N/A

ACTION: Qualify all associated positive results as nondetects (U) that are <5 times the highest concentration in any acceptable blank.

4.2 FIELD BLANKS

Are target compounds present in the field blanks? Yes No N/A

ACTION: If target compounds are present in the field blanks qualify all positive sample results <5 times the highest valid field blank concentrations as nondetects (U) and note the results in the validation narrative.

5. ACCURACY

5.1 SURROGATE RECOVERY

Are any surrogate recoveries out of specification?	Yes	(No)	N/A
Do any samples show nondetects for surrogates?	Yes	(No)	N/A
Are any method blank surrogates out of specification?	Yes	(No)	N/A

ACTION: Qualify all associated sample results as estimated (J for detects and UJ for nondetects) for surrogates out of specification. If the surrogate was not detected (0% recovery) in the sample qualify associated nondetects as unusable (R). If method blank surrogates are out of specification and sample surrogates are acceptable, no qualification is required however, the laboratory should be contacted for an explanation.

5.2 MATRIX SPIKE RECOVERY

Has the laboratory analyzed a MS/MSD per matrix for the the sample group?	(Yes)	No	N/A
Are MS/MSD recoveries within specification?	Yes	(No) See comment 1	N/A
Are there any calculation or transcription errors?	Yes	(No)	N/A

ACTION: If MS/MSD analyses have not been conducted contact the laboratory for clarification. Review the MS/MSD recoveries in conjunction with other QC data such as surrogate recoveries and note the results in the validation narrative. If MS/MSD recoveries are out of specification and sample concentration is >5 times the spike concentration, no qualification is required, otherwise qualify results as follows: Qualify positive results as estimated (J) in all samples if associated surrogates are also out of specification. The qualification shall only be done on samples of similar matrix as the MS/MSD samples. If it is determined from the review that only the spiked samples are affected by the low recoveries, qualify only the results for the spiked sample as described above. If it is determined from the review that out of specification MS/MSD recoveries are indicative of systematic problems in the laboratory such as sample preparation or sample-specific matrix interferences this must be noted in the validation narrative along with the potential affect on the sample results.

5.3 PERFORMANCE AUDIT SAMPLES

Are 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.

6. PRECISION

6.1 MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLES

Are the RPD values within specification? Yes (No) N/A

ACTION: Review the MS/MSD results in conjunction with other QC data such as field duplicates and note the results in the validation narrative. If MS/MSD RPD values are out of specification and sample results are >5xCRQL qualify positive results as estimated (J). If it is determined from the review that out of specification MS/MSD results are indicative of systematic problems in the laboratory such as sample preparation or sample-specific matrix interferences this must be noted in the validation narrative along with the potential affect on the sample results.

6.2 FIELD DUPLICATE SAMPLES

Are field duplicate RPD values acceptable? Yes No (N/A)

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

6.3 FIELD SPLIT SAMPLES

Are field split RPD values acceptable? Yes No (N/A)

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

7. COMPOUND IDENTIFICATION AND QUANTITATION

7.1 COMPOUND IDENTIFICATION

no compounds detected

Do positive results meet the retention time window criteria? Yes No (N/A)

Were positive results analyzed on disimilar columns? Yes No (N/A)

If dieldrin and DDE were reported was a 3% OV-1 column used for confirmation (2/88 SOW data only)? Yes No (N/A)

Do retention times and relative peak height ratios match the expected patterns for multipeak compounds (PCB, toxaphene or chlordane)? Yes No (N/A)

Has GC/MS confirmation been conducted on sample extract concentrations >10 ppm? Yes No (N/A)

ACTION: If positive results do not meet the retention time criteria qualify all detected results as nondetects as follows: If the misidentified peak is outside the retention time windows and no interferences are noted report the CRQL and if the misidentified peak interferes with a target peak then the report value is qualified as estimated and nondetected (UJ). If positive results were not confirmed on disimilar columns, reject affected results (R). If a 3% OV-1 was used to confirm dieldrin and DDE, reject the affected data (R). If PCB, chlordane or toxaphene identification is questionable qualify the results as presumptive and estimated (NJ). If GC/MS confirmation was not conducted contact the laboratory for explanation and note in the validation narrative.

7.2 REPORTED RESULTS AND QUANTITATION LIMITS

Are results and quantitation limits calculated properly?	Yes	No	N/A
Has the laboratory reported the sample quantitation limits within 5xCRQL values?	Yes	No	N/A

ACTION: If results and quantitation limits are in error contact the laboratory for clarification and note in the validation narrative.

8. 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.

9613497.2864

COMMENTS (attach additional sheets as necessary):

1. Spike recoveries were slightly high for Heptachlor + 44'DDT in the MS sample. MSD recoveries were low but in limits, thus RPD's were out for 4 or 6 compounds. There was no sample qualification based on MS/MSD data.

HOLDING TIME SUMMARY - FORM B-1

SDG: 9	REVIEWER: C. Jensen	DATE: 11/12/92	PAGE 1 OF 1
COMMENTS: Pest/PCB			

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
B015K3	Pest/PCB	10/23/91	10/30/91	12/6/91	8	7	J or UJ

9613497.2889

DATA QUALIFICATION SUMMARY - FORM B-7

2/5/93

pg 1 of 1

SDG: 9 B015H8	REVIEWER: CJ	DATE: 11/12/92	PAGE 1 OF 1
COMMENTS: Pest/PCB			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
All	J or UJ	B015K3	HT exceeded

2/5/93

9613497.2867

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015K3
216-B-50C
19-20.5

Lab Name: Battelle-PNL Contract: - - -

Lab Code: - - - Case No.: - - - SAS No.: - - - SDG No.: 9

Matrix: (soil/water) soil Lab Sample ID: 92-00921-P-1

Sample wt/vol: 30.1 (g/mL) g Lab File ID: - - -

Level: (low/med) low Date Received: 10/23/91

% Moisture: not dec. 4.7 dec. - - - Date Extracted: 10/30/91

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 12/06/91

GPC Cleanup: (Y/N) N pH: 7.5 Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q.
319-84-6	alpha-BHC	8.0	U
319-85-7	beta-BHC	8.0	U
319-86-8	delta-BHC	8.0	U
58-89-9	gamma-BHC (Lindane)	8.0	U
76-44-8	Heptachlor	8.0	U
309-00-2	Aldrin	8.0	U
1024-57-3	Heptachlor epoxide	8.0	U
959-98-8	Endosulfan I	8.0	U
60-57-1	Dieldrin	16.0	U
72-55-9	4,4'-DDE	16.0	U
72-20-8	Endrin	16.0	U
33213-65-9	Endosulfan II	16.0	U
72-54-8	4,4'-DDD	16.0	U
1031-07-8	Endosulfan sulfate	16.0	U
50-29-3	4,4'-DDT	16.0	U
72-43-5	Methoxychlor	80.0	U
53494-70-5	Endrin ketone	16.0	U
5103-71-9	alpha-Chlordane	80.0	U
5103-74-2	gamma-Chlordane	80.0	U
8001-35-2	Toxaphene	160.0	U
12674-11-2	Aroclor-1016	80.0	U
11104-28-2	Aroclor-1221	80.0	U
11141-16-5	Aroclor-1232	80.0	U
53469-21-9	Aroclor-1242	80.0	U
12672-29-6	Aroclor-1248	80.0	U
11097-69-1	Aroclor-1254	160.0	U
11096-82-5	Aroclor-1260	160.0	U

UJ

9/11/3/92

FORM I PEST 1/87 Rev.

9613497.2868

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLANK

Lab Name: Battelle-PNL Contract: - - -

Lab Code: - - - Case No.: - - - SAS No.: - - - SDG No.: 9

Matrix: (soil/water) soil Lab Sample ID: 92-00921-P-4

Sample wt/vol: 30.0 (g/mL) g Lab File ID: - - -

Level: (low/med) low Date Received: 10-30-91

% Moisture: not dec. - - - dec. - - - Date Extracted: 10-30-91

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 12-06-91

GPC Cleanup: (Y/N) N pH: - - Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
319-84-6	alpha-BHC	8.0	U
319-85-7	beta-BHC	8.0	U
319-86-8	delta-BHC	8.0	U
58-89-9	gamma-BHC (Lindane)	8.0	U
76-44-8	Heptachlor	8.0	U
309-00-2	Aldrin	8.0	U
1024-57-3	Heptachlor epoxide	8.0	U
959-98-8	Endosulfan I	8.0	U
60-57-1	Dieldrin	16.0	U
72-55-9	4,4'-DDE	16.0	U
72-20-8	Endrin	16.0	U
33213-65-9	Endosulfan II	16.0	U
72-54-8	4,4'-DDD	16.0	U
1031-07-8	Endosulfan sulfate	16.0	U
50-29-3	4,4'-DDT	16.0	U
72-43-5	Methoxychlor	80.0	U
53494-70-5	Endrin ketone	16.0	U
5103-71-9	alpha-Chlordane	80.0	U
5103-74-2	gamma-Chlordane	80.0	U
8001-35-2	Toxaphene	160.0	U
12674-11-2	Aroclor-1016	80.0	U
11104-28-2	Aroclor-1221	80.0	U
11141-16-5	Aroclor-1232	80.0	U
53469-21-9	Aroclor-1242	80.0	U
12672-29-6	Aroclor-1248	80.0	U
11097-69-1	Aroclor-1254	160.0	U
11096-82-5	Aroclor-1260	160.0	U

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST - FORM A-6

PROJECT: 200BP1	REVIEWER: cj	DATE: 11/11/97
LABORATORY: PNL	CASE:	SDG: 9B015H8 @ 2/5/93
SAMPLES/MATRIX: Soil:		
B00X88, B015H0, B015H8, B015J8, B015K0, B015K2,		
B015K3, B015K6, B015K8		

1. COMPLETENESS AND CONTRACT COMPLIANCE

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	✓		
Sample Data			
Inorganic Analysis Data Sheets	✓		
Standards Data			
Initial and Continuing Calibration Verification	✓		
CRDL Standard for AA and ICP	✓		
QC Summary			
Blanks	✓		
ICP Interference Check Summary	✓		
Spike Sample Recovery	✓		
Post-Digestion Spike Sample Recovery	✓		
Duplicate	✓		
Laboratory Control Sample	✓		
Standard Addition Results	✓		
ICP Serial Dilutions	✓		
Instrument Detection Limits	✓		
ICP Interelement Correction Factors	✓		
ICP Linear Ranges	✓		
Preparation Log	✓		
Analysis Run Log	✓		
Raw Data			
ICP Raw Data	✓		
Furnace AA Raw Data	✓		
Mercury Raw Data	✓		
Cyanide Raw Data	✓		
Additional Data			
Internal laboratory chain-of-custody		✓	
Laboratory Sample Preparation Records	✓		

Data Package Item	Present?: Yes	No	N/A
Percent Solids Analysis Records		✓	
Reduction Formulae		✓	
Instrument Run Logs		✓	
Chemist Notebook Pages		✓	

2. HOLDING TIMES

Have all samples been analyzed within holding times? Yes **(No)** N/A

ACTION: If any holding times have been 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 midrange cyanide standard distilled? Yes **(No)** N/A See Comment 1

ACTION: Qualify all data as unusable if reported from an analysis in which an instrument was not calibrated or was calibrated with less than the minimum number of standards. Qualify associated sample results >IDL as estimated (J) and results <IDL as estimated (UJ), if the correlation coefficient is <0.995 or the laboratory did not distill the midrange cyanide standard.

4. INITIAL AND CONTINUING CALIBRATION VERIFICATION

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 Section 8.3 of the validation requirements. If calculation errors are noted, contact the laboratory for clarification.

5. ICP INTERFERENCE CHECK SAMPLE

Has an ICS sample been analyzed at the proper frequency? **(Yes)** No N/A

Are the AB solution %R values within control? **(Yes)** No N/A

Are there calculation errors? Yes **(No)** N/A

ACTION: Qualify all affected data in accordance with Section 8.3 of the validation requirements. If calculation errors are noted, contact the laboratory for clarification.

6. 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). If analyte concentrations in the blank are >CRDL or below the negative CRDL, verify the laboratory has redigested and reanalyzed associated samples with analyte concentrations <10 times the blank concentration. If the laboratory has not redigested and reanalyzed the samples, note in the validation narrative.

7. 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).

8. MATRIX SPIKE SAMPLE ANALYSIS

Are spike recoveries within the control limits? Yes No N/A

ACTION: Qualify the affected sample data according to the following requirements:

If spike recovery is >125% and sample results are <IDL no qualification is required. If spike recovery is >125% or <75% qualify all positive results as estimated (J). If spike recovery is 30% to 74% qualify all nondetects as estimated (UJ). If spike recovery is <30%, reject all nondetects (R). If the field blank has been used for spike analysis, note in the validation narrative.

9. 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 sample data 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 result 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.

10. 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 sample analyses in the data validation narrative.

11. DUPLICATE SAMPLE ANALYSIS

Are RPD values acceptable? Yes No N/A

ACTION: Qualify the results for all associated samples of the same matrix as estimated (J) if the RPD results fall outside the appropriate control limits. If field blanks were used for laboratory duplicates, note in the validation narrative.

12. ICP SERIAL DILUTION

Are the serial dilution results acceptable? Yes No N/A

Is there evidence of negative interference? Yes No N/A

ACTION: Qualify the associated data as estimated (J) for those analytes in which the %D is outside the control limits. If evidence of negative interference is found, use professional judgment to qualify the data.

13. FIELD DUPLICATE SAMPLES

Do the RPD values exceed the control limits? Yes No N/A

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

14. FIELD SPLIT SAMPLES

Do the RPD values exceed the control limits? Yes No N/A

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

1516. FURNACE ATOMIC ABSORPTION QUALITY CONTROL See Comment 2

Do all applicable analyses have duplicate injections? Yes No N/A

Are applicable duplicate injection RSD values within control? Yes No N/A

If no, were samples rerun once as required? Yes No N/A

Does the RSD for the rerun fall within the control limits? Yes No N/A

Were analytical spike recoveries within the control limits? Yes No N/A

If no, were MSA analyses performed when required?	Yes	No	N/A
Are MSA correlation coefficients ≥0.995?	Yes	No	N/A
If no, was a second MSA analysis performed?	Yes	No	N/A

ACTION: If duplicate injections are outside the acceptance limits and the sample has not been reanalyzed or the reanalysis is outside the acceptance limits, qualify the associated data as estimated (J for detects and UJ for nondetects). If the analytical spike recovery is <40% qualify detects as estimated (J). If the analytical spike recovery is ≥10% but <40%, qualify all nondetects as estimated (UJ) and if the analytical spike recovery is <10%, reject all nondetects (R). If the sample absorbance is <50% of the analytical spike absorbance and the analytical spike recovery is <85% or >115%, qualify all results as estimated (J for detects and UJ for nondetects). If method of standard additions (MSA) was required but was not performed, the MSA samples were spiked incorrectly, or the MSA correllation coefficient was <0.995, qualify the associated detected results as estimated (J).

17. ANALYTE QUANTITATION AND DETECTION LIMITS

Have results been reported and calculated correctly?	Yes	No	N/A
Are results within the calibrated range of the instruments and within the linear range of the ICP?	Yes	No	N/A
Are all detection limits below the CRQL?	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).

18. 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):

1. ICV-6 was distilled with samples
2. GFAA data not submitted with data package. Results were reviewed with raw data from PNL package B01554-PNL-052.

HOLDING TIME SUMMARY - FORM B-1

SDG: 9	REVIEWER: C Jensen	DATE: 11/11/92	PAGE 1 OF 1
COMMENTS: Inorganics			

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
B015K3	metals	10/22/91	12/3/91	12/20/91	42	17	none
~~B015M9~~	~~metals~~						
B015H8	Cn	10/17/91	10/24/91	10/29/91	7	5	none
B015J8	Cn	↓	10/24/91	10/29/91	7	5	none
B015K0	Cn	↓	10/28/91	10/29/91	9	1	none
B015K2	Cn	10/22/91	10/28/91	10/29/91	6	1	none
B015K3	Cn	10/22/91	10/28/91	10/29/91	6	1	none
B015K3	Hg	10/22/91	2/24/92 11/4/91	2/28/92	123	1	R
B015K6	Cn	10/23/91	10/28/91	10/29/91	5	1	none
B00X88	Cn	10/24/91	11/1/91	11/12/91	18	1	J or UJ
B015H0	Cn	↓	11/1/91	11/12/91	18	1	J or UJ
B015K8	Cn	↓	11/6/91 12/10/91	11/8/91 12/11/91	13 47	2 1	data not used
~~B015L0~~	~~Cn~~	~~11/11/92~~	~~12/11~~				

U.S. EPA - CLP

3
BLANKS

Lab Name: BATTELLE_PNL_____ Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 8,9,10

Preparation Blank Matrix (soil/water): SOIL_

Preparation Blank Concentration Units (ug/L or mg/kg): MG/KG

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum	29.0	U	29.0	U	29.0	U	29.0	U	5.930	U	P
Antimony	14.0	U	14.0	U	18.0	B	14.0	U	2.863	U	P
Barium	1.0	U	1.0	U	1.4	B	1.0	U	0.204	U	P
Beryllium	1.0	U	1.0	U	1.0	U	1.0	U	0.204	U	P
Cadmium	2.0	U	2.0	U	2.0	U	2.0	U	4.706		P
Calcium	14.0	U	19.4	B	14.0	U	14.0	U	4.836	B	P
Chromium	3.0	U	3.0	U	3.0	U	3.0	U	0.613	U	P
Cobalt	5.0	U	5.0	U	5.2	B	5.0	U	1.022	U	P
Copper	4.0	U	5.9	B	15.2	B	4.0	U	4.646	B	P
Iron	4.0	U	4.0	U	4.7	B	4.0	U	1.033	B	P
Magnesium	34.0	U	34.0	U	34.0	U	34.0	U	6.953	U	P
Manganese	1.0	U	1.0	U	1.0	U	1.0	U	0.204	U	P
Nickel	5.0	U	5.0	U	5.0	U	5.0	U	1.022	U	P
Potassium	1063.0	U	1063.0	U	1397.2	B	1063.0	U	217.382	U	P
Sodium	41.0	U	41.0	U	56.5	B	41.0	U	8.384	U	P
Vanadium	4.0	U	4.0	U	4.0	U	4.0	U	0.818	U	P
Zinc	2.0	U	2.0	U	2.0	U	2.0	U	2.006	B	P

g 11/12/92

FORM III - IN

3/90

5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

Lab Name: BATTELLE_PNL_____ Contract:_____ B015M9 S

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 8,9,10

Matrix: __SOIL_____ Level (low/med): _LOW____

% Solids for Sample: _97.8

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									NR
Antimony	75-125	36.2887		2.6757	U	98.32	36.9	N	P
Barium	75-125	467.4473		83.5866		393.27	97.6		P
Beryllium	75-125	9.6115		0.2427	B	9.83	95.3		P
Cadmium	75-125	12.5570		3.2930		9.83	94.2		P
Calcium									NR
Chromium	75-125	57.3738		26.0975		39.33	79.5		P
Cobalt	75-125	103.8540		9.1700	B	98.32	96.3		P
Copper	75-125	70.8491		26.0325		49.16	91.2		P
Iron									NR
Magnesium									NR
Manganese	75-125	395.4597		318.1431		98.32	78.6		P
Nickel	75-125	132.2833		35.7931		98.32	98.1		P
Potassium									NR
Sodium									NR
Vanadium	75-125	158.4356		63.9031		98.32	96.1		P
Zinc	75-125	137.4764		47.6540		98.32	91.4		P

Comments:
PRE-DIGESTION_SPIKED_SOIL_SAMPLE_LEACHATE_____ 9/11/12/92

U.S. EPA - CLP

7

LABORATORY CONTROL SAMPLE

Lab Name: BATTELLE_PNL Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 8,9,10

Solid LCS Source: US-EPA

Aqueous LCS Source: _____

Analyte	Aqueous (ug/L) True	Aqueous (ug/L) Found	Aqueous (ug/L) %R	Solid (mg/kg) True	Solid (mg/kg) Found	C	Limits	Limits	%R
Aluminum				325.0	254.6		225.0	424.0	78.3
Antimony				211.0	215.2		127.0	294.0	102.0
Barium				4.8	5.1	B	0.0	40.0	106.7
Beryllium				19.4	18.6		16.5	22.3	96.1
Cadmium				45.4	47.3		35.7	55.1	104.1
Calcium									
Chromium				99.6	95.8		79.2	120.0	96.2
Cobalt				144.0	142.6		125.0	162.0	99.0
Copper				6910.0	7064.2		6006.0	7820.0	102.2
Iron				22430.0	21835.8		17770.0	27080.0	97.4
Magnesium				118100.0	104709.2		100400.0	129900.0	88.7
Manganese				208.0	197.8		177.0	239.0	95.1
Nickel				60.9	59.7		49.2	72.6	98.0
Potassium				50.0	206.4	U	0.0	1000.0	0.0
Sodium				50.0	230.9	B	0.0	1000.0	461.7
Vanadium				65.8	60.5		51.7	79.9	91.9
Zinc				187.0	172.5		138.0	236.0	92.2

G 11/12/92

DATA QUALIFICATION SUMMARY - FORM B-7

Pg 1 of 1 ~~4 of 7~~ 02/5/93

02/5/93

SDG: 9B015H8	REVIEWER: cj	DATE: 11/11/92	PAGE 1 OF 1
COMMENTS: Inorganics			

02/5/93

COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Cn	J or UJ	B00X88, B015H0	HT exceeded
Cn	J	B015K8	ICV high
Hg	R	B015K3	HT grossly exceeded
Cadmium	U	B015K3	Blank contam.
Potassium	U	B015K3	Blank Contam
Antimony	UJ	B015K3	SSR < 75%
Aluminum	J	B015K3	LCS out
Potassium	R	B015K3	(<50%)
Sodium	J	B015K3	

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U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

B015K3
216-B-SDC 19-20.5

Name: BATTELLE_PNL' Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 8,9,10

Matrix (soil/water): SOIL_ Lab Sample ID: 92-0921B1_

Level (low/med): LOW__ Date Received: 12/03/91

% Solids: _94.4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	8700			P	J
7440-36-0	Antimony	2.9	U	N	P	UJ
7440-39-3	Barium	69.9			P	
7440-41-7	Beryllium	0.29	B		P	
7440-43-9	Cadmium	1.6			P	U
7440-70-2	Calcium	6390			P	
7440-47-3	Chromium	12.5			P	
7440-48-4	Cobalt	6.9	B		P	
7440-50-8	Copper	17.1			P	
7439-89-6	Iron	18000			P	
7439-95-4	Magnesium	4560			P	
7439-96-5	Manganese	279			P	
7440-02-0	Nickel	11.6			P	
7440-09-7	Potassium	1170			P	~~U~~ R
7440-23-5	Sodium	815	B		P	J
7440-62-2	Vanadium	35.9			P	
7440-66-6	Zinc	37.7			P	

Color Before: _____ Clarity Before: _____ Texture: NON-HO

Color After: _____ Clarity After: _____ Artifacts: _____

Comments:
ORIGINAL_SOIL_SAMPLE_LEACHATE G 11/11/92

FORM I - IN

3/90

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U.S.EPA-CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

B015K3

Lab Name: BATTELLE/PNL Contract: 2W-B-50C 14+20.5

Lab Code: Case No.: SAS No.: SDG No.:

Matrix (soil/water): SOIL Lab SAMPLE ID: 92-00921

Level (low/med): LOW Date Received: 10/23/91

% Solid: 97.0

Concentration Units (ug/L or mg/Kg dry weight): mg/Kg

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum					
7440-36-0	Antimony					
7440-38-2	Arsenic	8.22			F	B
7440-39-3	Barium					
7440-41-7	Beryllium					
7440-69-9	Bismuth	0.17	~~U~~		F	~~UJ~~ U
7440-43-9	Cadmuim					
7440-70-2	Calcium					
7440-47-3	Chromium					
7440-48-4	Cobalt					
7440-50-8	Copper					
7439-89-6	Iron					
7439-92-1	Lead	3.21			F	
7439-95-4	Magnesium					
7439-96-5	Manganese					
7439-97-6	Mercury					
7440-02-0	Nickle					
7440-09-7	Potassium					
7782-49-2	Selenium	~~0.06~~ 5	U		F	
7440-22-4	Silver	~~0.04~~ 10	~~U~~		F	~~UJ~~ U
7440-23-5	Sodium					
7440-28-0	Thallium	~~0.13~~ 10	U		F	
7440-62-2	Vanadium					
7440-66-6	Zinc					
	Cyanide					

Color Before: gray-brown Clarity Before: N/A Texture: hetrogeneous

Color After: gray Clarity After: clear-digst Artifact: N/A

Comments:

These samples were undesirably heterogeneous.

cj 11/9/92

TABLE 4a: TOTAL CYANIDE ANALYSIS DATA FOR TASK 2&4
SDG #9

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#
															1,2,3 (ALL)
216-B-50C 3.5-6 D B015H8	92-00570	1.0 ~~0.6~~	U	0.6	U	N/A	5.9	U	48.55	10.0	9.67	99	103		
216-B-50C 3.5-6 Dup B015J8	92-00571	1.0 0.6	U												
216-B-50C 11-15 B015K0	92-00572	1.0 ~~0.6~~	U	0.6	U	N/A	5.9	U	48.55	9.7	9.59	95	102		
216-B-49A 102-106.5 B015K2	92-00922	0.8	B												
216B-50C 29-30.5 B015K6	92-00931	1.0 ~~0.6~~	U	0.6	U	N/A	5.9	U	48.55	10.1	10	101	106		
216B-50C 19-20.5 B015K3	92-00921	1.0 ~~0.6~~	U												
~~B015L0~~	~~92-01202*~~	~~0.7~~	~~B~~	~~0.8~~	~~B~~	~~N/A~~	~~5.9~~	~~U~~	~~48.6~~	~~11~~	~~9.5~~	~~103~~	~~101~~	~~4.5~~	
~~B015K8~~	~~92-00977~~	~~1.2~~													~~5~~
~~B015L0~~	92-01202*	1.0 ~~0.6~~	U	1.5		N/A	5.9	U	49.38	11.7	11.05	113	118	4.6	
216-B-49A 190.5-193 B015K8	92-00977	1.2 ~~1.4~~	J												6
											Mean	100	103		
											Std. Dev.	3	2		

* Not samples in the SDG but reported for QC purposes

Data not used HT exceeded

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.
4. Sample B015L0 is not part of this data package.
5. Repeat of cyanide analyses for samples B015L0 and B015K8, as the ICV in initial analysis run (6) exceeded the CLP control limit of 115%
6. Initial analysis run for samples B015L0 and B015K8.

CLP Flags

U = Analyzed but not detected (less than IDL)
B = Less than CRDL but greater than or equal to IDL

gj 11/11/92

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TABLE 4b: TOTAL CYANIDE ANALYSIS DATA FOR TASK 2&4
SDG #9

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#
216-B-50c eq. Blank B00X88	92-00975	5.9	UJ	5.9	U	N/A	5.9 U	49.4	98.5	9.39	102.0	100.0		1,2,3
216-B-44A H2O field blank B015H0	92-00976	5.9	UJ											1,2,3
										Mean	102.0	100.0		
										Std. Dev.	NA	NA		

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 ug/L.
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)
B = Less than CRDL but greater than or equal to IDL

11/11/92

TABLE 8: Hg COLD VAPOR AA ANALYSIS DATA FOR TASKS 2 & 4
SDG #9

SOLID SAMPLES

Sample ID#	PNL Log#	B1 Sample mg/Kg	B1 Flags C	B1 Flags Q	B2 Dupl. mg/Kg	B2 C	B1&B2 %RPD	B5 Blank ug/L	B5 C	B3 (a) Sample +Spike mg/Kg	B3 (a) Digest Spike %rec	B4 (b,c) LCS mg/Kg	B4 (b,c) LCS %rec
BOOX75 (h)	91-07815	0.14		N	0.15		5.0%	0.04	U	0.23	71.3%	10.1	79.3%
	10/16/91	(0.10)		N									
NIST SRM2704												1.3	88.3%
B015K3	92-00921	0.09	R	N									
	~~11/04/91~~	~~(0.06)~~	~~B~~	~~N~~	~~(0.06)~~	~~U~~							

216-B-50C 19-20.5

(a) B3 Predigestion Spike Level = 0.05 ug Hg
(b) LCS 0287 Hg certified at 12.7 mg/Kg (Range 8.5 to 17.0 mg/Kg)
(c) NIST SRM2704 certified at 1.47 ug/g Hg
(d) RPD only calculated if both sample and duplicate are >IDL
(e) IDL = 0.04 ug/L [or 0.005 mg/kg -> 0.2g sample, 25 mL analysis aliquot]
(f) CRDL = 0.2 ug/L [or 0.1 mg/kg -> 0.2g sample, 100 mL analysis aliquot]
(g) Calibration standards NIST SRM3133, ICV/CCV standard Johnson-Matthey 14395
(h) BOOX75 not part of SDG; sample used for QC during batch analysis.
(i) Values in ( ) were analyzed originally on the date indicated.

CLP Forms

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

11/11/92

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WET CHEMISTRY DATA VALIDATION CHECKLIST - FORM A-7

PROJECT: 200BP1	REVIEWER: G	DATE: 11/12/92
LABORATORY: PNL	CASE:	SDG: 9B015HB
SAMPLES/MATRIX: B015K3		

2/5/93

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	✓	TG 11/12/92	
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-Custory	✓		
Percent Solids Analysis Records	✓		
Reduction Formulae		✓	
Chemist Notebook Pages		✓	

2. HOLDING TIMES

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

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

3. INITIAL CALIBRATIONS

Were all instruments calibrated daily, each set-up time and were the proper number of standards used?	Yes	No	N/A
Are the correlation coefficients ≥0.995?	Yes	No	N/A
Was a balance check conducted prior to the TDS analysis?	Yes	No	N/A
Was the titrant normality checked?	Yes	No	N/A

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

4. INITIAL AND CONTINUING CALIBRATION VERIFICATION

Have ICV and CCV been analyzed at the proper frequency?	Yes	No	N/A
Are ICV and CCV percent recoveries within control?	Yes	No	N/A
Are there calculation errors?	Yes	No	N/A

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

5. LABORATORY BLANKS

Are target analytes present in the laboratory blanks?	Yes	No	N/A

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

6. FIELD BLANKS

Are target analytes present in the field blanks?	Yes	No	N/A

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

7. MATRIX SPIKE SAMPLE ANALYSIS

Are spike recoveries within the acceptance limits?	Yes	No	N/A

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

8. LABORATORY CONTROL SAMPLE

Are percent recoveries within the acceptance limits? Yes No N/A

Are there calculation errors? Yes No N/A

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

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

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

9. PERFORMANCE AUDIT ANALYSES

Are the performance audit sample results within the acceptance limits? Yes No N/A

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

10. DUPLICATE SAMPLE ANALYSIS

Are RPD values within the acceptance limits? Yes No ~~N/A~~ 5/11/12/92

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.

HOLDING TIME SUMMARY - FORM B-1

B015H8 02/5/93

SDG: 9	REVIEWER: C. Jensen	DATE: 11/13/92	PAGE 1 OF 1
COMMENTS: Wet chemistry			

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
B015K3	Anions	10/22/91	11/25/92	11/26/91	34	1	J or UJ
B015K3	TOC	10/22/91	~~11/25/91~~ 11/4/92	~~11/26/91~~ 11/4/92	—	13	none

DATA QUALIFICATION SUMMARY - FORM B-7

pg 1 of 1 ~~5 of 7~~ 2/5/93

2/5/93

SDG: 9 B015H8	REVIEWER: CJ	DATE: 11/12/92	PAGE 1 OF 1
COMMENTS: Wet Chemistry			

1/25/93

COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
PO_4-P	J	B015K3	HT exceeded
NO_3-N	J	B015K3	
NO_2-N	UJ	B015K3	
SO_4	J	B015K3	
NO_3-N	121 J	B015K3	laboratory calc
PO_4-P	12.7	B015K3	lab. calc.

TABLE 16: TOTAL ORGANIC CARBON ANALYSIS DATA FOR TASK 2 & 4
SDG #9

Soil Samples

WHC Sample #	PNL ALO #	Sample Type	Sample wt. g	ug C Results	ug C in Sample	mg/Kg Sample	RSD (%) Dups	% rec. spike	Date Received	Date Analyzed
B015K3	92-0921-1	Sample	0.06108	45.5	35.4	579.0	3		10-23-91	11-4-91
B015K3	92-0921-2	Duplicate	0.06316	45.1	34.9	553			10-23-91	11-4-91
B015K3	92-0921-3	Standard						95.6		11-4-91
B015K3	92-0921-4	Blank		10.2						11-4-91

Total Organic Carbon by PNL Procedure 7-40.37 on Instrument WA92040, 325 Bldg., rm 701. Data reported from LRB 52996, pp 151-152.

216-B-50C
19-20.5

Sill/2/92

9413197.2891

TABLE 3: ANION IC ANALYSIS DATA
PHOSPHATE (PO4-P)

SOIL SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (mg/kg)	C	C2 SAMPLE DUP (mg/kg)	C	RPD	C5 BLANK (mg/kg)	C	C3 SPIKE+SAMPLE (mg/kg)	C3 SPIKE (mg/kg)	C6 DUP+SPIKE (mg/kg)	C6 SPIKE (mg/kg)	% RECOVERIES C3 SAMPLE + SPIKE	% RECOVERIES C6 DUP+ SPIKE	% RECOVERIES C4 CONTROL	Q
~~B015G9~~	~~92-00305+~~	~~2.5~~	~~B~~				~~1.7~~	~~U~~								~~N~~
~~B015H1~~	~~92-00358+~~	~~3.9~~	~~B~~	~~3.8~~	~~B~~	~~2.6~~										~~N~~
216-B=50C 19-20.5 B015K3	92-00921	12.7 ~~4.2~~	B J						27.6		36		85	77		N
~~B015L5~~	~~92-01246+~~	~~3.4~~	~~B~~						~~7.2~~	~~17.1~~	~~6~~	~~16.8~~	~~22~~	~~18~~	~~94~~	N
~~B015M9~~	~~92-01827+~~	~~11.2~~														N

IDL= 1.7 (mg/Kg, solids)
CRDL= 5.0 (mg/Kg, solids)

NOTES:

1. + Not samples in this SDG but reported for QC purposes
2. 100% spike level in extract is expected to be 5ppm each for Nitrate, Nitrite, Phosphate, and Sulfate
3. 5ppm X dil. factor / frac. solids = spike level (mg/Kg) in solid for Nitrate, Nitrite, Phosphate, and Sulfate
4. 100% extraction efficiency assumed in defining dil. factor as (diluent vol / sample wt) X 1.00 gm/ml
5. Method blank used for C5; nominal sample wt=2.00 gm

C FLAGS

B: IDL ≤ Analyte level < CRDL
U: Analyte not detected; <IDL

Q FLAGS

E: Estimated value, interference present
N: Spike recovery not within control limits
*: Duplicate analysis not within control limits

cj 11/17/97

9613497.2892

TABLE 3: ANION IC ANALYSIS DATA
SULFATE (SO4)

SOIL SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (mg/kg)	C	C2 SAMPLE (mg/kg)	C2 DUP (mg/kg)	C	RPD	C5 BLANK (mg/kg)	C	C3 SPIKE+SAMPLE (mg/kg)	C3 SPIKE (mg/kg)	C6 DUP+SPIKE (mg/kg)	C6 SPIKE (mg/kg)	% RECOVERIES C3 SAMPLE + SPIKE	% RECOVERIES C6 DUP+ SPIKE	% RECOVERIES C4 CONTROL	Q
~~B015G9~~	~~92-00306+~~	~~32~~						~~4~~	~~U~~								
~~B015H1~~	~~92-00358+~~	~~13~~	~~B~~		~~15~~	~~B~~	~~14~~										
B015K3	92-00921	20	J														
~~B015L5~~	~~92-01246+~~	~~30~~								69.4	52.6	71.1	51.6	75	80	96	
~~B015M9~~	~~92-01827+~~	~~101~~															

216-B-50C
19-20.5

IDL= 4 (mg/Kg, solids)
CRDL= 20 (mg/Kg, solids)

NOTES:

1. + Not samples in this SDG but reported for QC purposes
2. 100% spike level in extract is expected to be 5ppm each for Nitrate, Nitrite, Phosphate, and Sulfate
3. 5ppm X dil. factor / frac. solids = spike level (mg/Kg) in solid for Nitrate, Nitrite, Phosphate, and Sulfate
4. 100% extraction efficiency assumed in defining dil. factor as (diluent vol / sample wt) X 1.00 gm/ml
5. Method blank used for C5; nominal sample wt=2.00 gm

C FLAGS

B: IDL ≤ Analyte level < CRDL
U: Analyte not detected; <IDL

Q FLAGS

E: Estimated value, interference present
N: Spike recovery not within control limits
*: Duplicate analysis not within control limits

S 11/12/97

TABLE 3: ANION IC ANALYSIS DATA
NITRITE (NO2-N)

SOIL SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (mg/kg)	C	C2 SAMPLE DUP (mg/kg)	C	RPD	C5 BLANK (mg/kg)	C	C3 SPIKE+SAMPLE (mg/kg)	C3 SPIKE (mg/kg)	C6 DUP+SPIKE (mg/kg)	C6 SPIKE (mg/kg)	% RECOVERIES C3 SAMPLE + SPIKE	% RECOVERIES C6 DUP+ SPIKE	% RECOVERIES C4 CONTROL	Q
~~B015G9~~	~~92-00306+~~	~~1.0 0.8~~	~~U~~				~~0.8~~	~~U~~								
~~B015H1~~	~~92-00350+~~	~~1.0 0.8~~	~~U~~	~~0.8~~	~~U~~											
B015K3	92-00921	1.0 ~~0.8~~	UJ													
~~B015L5~~	~~92-01246+~~	~~0.8~~	~~U~~						~~12.8~~	~~16~~	~~12.5~~	~~15.7~~	~~80~~	~~80~~	~~82~~	
~~B015M9~~	~~92-01827+~~	~~0.8~~	~~U~~													

210-B-50C
19.20.5

IDL= 0.8 (mg/Kg, solids)
CRDL= 1.0 (mg/Kg, solids)

NOTES:

1. + Not samples in this SDG but reported for QC purposes
2. 100% spike level in extract is expected to be 5ppm each for Nitrate, Nitrite, Phosphate, and Sulfate
3. 5ppm X dil. factor / frac. solids = spike level (mg/Kg) in solid for Nitrate, Nitrite, Phosphate, and Sulfate
4. 100% extraction efficiency assumed in defining dil. factor as (diluent vol / sample wt) X 1.00 gm/ml
5. Method blank used for C5; nominal sample wt=2.00 gm

C FLAGS

B: IDL ≤ Analyte level < CRDL
U: Analyte not detected; <IDL

Q FLAGS

E: Estimated value, interference present
N: Spike recovery not within control limits
*: Duplicate analysis not within control limits

5/11/95

9613497.2804

TABLE 3: ANION IC ANALYSIS DATA
NITRATE (NO3-N)

SOIL SAMPLES

SAMPLE ID#	PNL LOG#	C1 SAMPLE (mg/kg)	C	C2 SAMPLE DUP (mg/kg)	C	RPD	C5 BLANK (mg/kg)	C	C3 SPIKE+SAMPLE (mg/kg)	C3 SPIKE (mg/kg)	C6 DUP+SPIKE (mg/kg)	C6 SPIKE (mg/kg)	% RECOVERIES C3 SAMPLE + SPIKE	% RECOVERIES C6 DUP+ SPIKE	% RECOVERIES C4 CONTROL	Q
~~B01509~~	~~92-00300+~~	~~179~~					~~0.8~~	~~U~~								
~~B015H1~~	~~92-00350+~~	~~3.7~~		~~4.4~~		~~17~~										
216-B-50C 19-20.5 B015K3	92-00921	2 ~~27.4~~ 5														
B015L5	~~92-01246+~~	~~362~~							349	11.9	382	11.7	109	171	106	
~~B015M9~~	~~92-01827+~~	~~30.9~~														

IDL= 0.8 (mg/Kg, solids)
CRDL= 1.0 (mg/Kg, solids)

NOTES:

1. + Not samples in this SDG but reported for QC purposes
2. 100% spike level in extract is expected to be 5ppm each for Nitrate, Nitrite, Phosphate, and Sulfate
3. 5ppm X dil. factor / frac. solids = spike level (mg/Kg) in solid for Nitrate, Nitrite, Phosphate, and Sulfate
4. 100% extraction efficiency assumed in defining dil. factor as (diluent vol / sample wt) X 1.00 gm/ml
5. Method blank used for C5; nominal sample wt=2.00 gm

C FLAGS

B: IDL ≤ Analyte level < CRDL
U: Analyte not detected; <IDL

Q FLAGS

E: Estimated value, interference present
N: Spike recovery not within control limits
*: Duplicate analysis not within control limits

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.5 11/12/92

9215497.2896

RADIOCHEMISTRY DATA VALIDATION CHECKLIST

Data Package ID: B015H8-PNL-053 Laboratory: PNL

Data Validator: [illegible] Date: 1/19/93

Analysis/Sample Identification/Matrix: Gross alpha, gross beta, Sr-90, plutonium-238 & 239, gamma spec., and tritium.

1. Completeness

1.1 Completeness Checklist (Complete the appropriate checklist for each analysis type and attach).

2. Calibration

2.1 Initial Calibration

Was instrument calibrated within specified time period or annually? (Y/N/NA) NA

If NO, qualify all associated data as unusable (R).

Was each detector used for the associated data calibrated? (Y/N/NA) NA

If NO, qualify all associated data as unusable (R).

Are calibration standards NIST traceable or equivalent? (Y/N/NA) Y

If NO, qualify all associated data as unusable (R).

Were calibration standards expired? (Y/N/NA) N

If YES, qualify all associated data as unusable (R).

Comments/Qualified Results:

The raw data for the initial calibration was not submitted with the data package. However, since the calibration information was present, but was not detector specific - the associated results for gross alpha, gross beta, Sr-90, and tritium have been qualified as estimated (J/UJ) 1/25/93

9613497.2897

2.2 Continuing Calibration

Is check source identified by activity and radionuclides? (Y/N/NA) Y

If NO, qualify all associated data as estimated (J).

Has check source been counted daily? (Y/N/NA) Pu-238 & 239

If NO, qualify all associated data as unusable (R).

Are check source counts within ±3S control limits? (Y/N/NA) Tritium

If NO, qualify all associated data as unusable (R).

Have background counts been performed at least weekly and before and after all field and QC samples associated with the SDG? (Y/N/NA) Pu-238 & 239

If NO, qualify all associated results as unusable (R).

Are background counts within ±3S control limits? (Y/N/NA) NA

If NO, qualify all associated results as unusable (R).

Comments/Qualified Results:

The plutonium 238 & 239 sample runs are not bracketed by CCV samples. Therefore, the assoc. results have been qualified as rejected (R).

The associated CCV for tritium is out of the control limits, therefore, the associated results have been qualified as rejected (R).

The Sr-90 counter control and bkgd data assoc. with detectors 1, 2, and 3 were not included in this SDG. And the CCV data for Sr in other SDGs of this data set do not include the associated date of analysis. Therefore, the associated results have been qualified as rejected (R).

3. Blanks 9613497.2898

Have reagent/method/field blanks been analyzed with the SDG? (Y/N/NA)

If NO, qualify all results >LLD as estimated (J).

Are positive results reported in the reagent/method/field blanks? (Y/N/NA)

If YES, qualify positive results less than the MDA as nondetects (U). Qualify sample results <10X the blank value but greater than the MDA as estimated (J).

Can blank results be verified/calculated properly? (Y/N/NA):

Comments/Notes/Qualified Results:

Positive results are reported in the blanks for the following parameters causing the associated positive results to be qualified as estimated (J):

Gross beta

Sr-90

4. Detection Limits and Sample Results

Can LLDs and MDAs be verified? (Y/N/NA) Y

If NO, qualify all results as estimated detects (J) or estimated nondetects (UJ).

Do reported results meet the detection limit requirements? (Y/N/NA) _____

Note discrepancies in the validation report narrative under representativeness.

Can reported results be verified? (Y/N/NA) Pu-238

If NO, note missing data in the validation report. Correct results on the photocopied report forms and include in the validation report.

Comments/Notes/Qualified Results: _____

Parameter	Can LLDs and MDAs be verified?	Can reported results be verified
Gross α	yes	yes
Gross β	NA	yes
Pu-239	yes	yes
Pu-238	yes	No: B015H1 Soil
		1/19/93 ~~B015K3~~
		B015K3 Soil
Sr-90	NA	yes
Tritium	yes	yes

5. Radiometric and Gravimetric Yields

Were spikes/tracers/chemical yields analyzed in each SDG and/or sample as appropriate for the analytical method? (Y/N/NA) _____

If NO or if inappropriate tracers were used qualify associated results as unusable (R).

Was a field blank used for the spike/tracer/chemical yield analysis? (Y/N/NA) _____

If YES, note in the validation narrative.

Is spike/tracer/chemical yield recovery within the limits of 30-105% for sample results <4X the spike activity? (Y/N/NA) _____

Verify the spike recoveries and qualify associated results as follows:

%R:	<30%	30-105%	>105%	>115%
<LLD	R	acceptable	UJ	R
>LLD	R	acceptable	J	R

Comments/Notes/Qualified Results:

Chemical yields:
Sr-90 chemical yields are within control limits.

MS %R

Parameter	MS %R	Blank Spike %R	Qualifier
Gross α	92.3%	104%	none
Gross β	114%	83%	J/UJ
Pu-239	NA	95%	none
Sr-90	NA	NA	NA
Tritium	NA	NA	NA

6. Duplicate Samples and Analyses

Has at least one duplicate analysis been performed for every 10 samples in the SDG? (Y/N/NA)_____

If NO, qualify all associated results as estimated (J).

Has the field blank been used for duplicate or MS/MSD analysis? (Y/N/NA)_____

Are RPD valus ≤35% for results >5X the LLD and within ±2X the LLD for results <5X the LLD? (Y/N/NA)_____

If NO, qualify associated results <LLD as estimated nondetects (UJ) and all associated results >LLD as estimated detects (J).

Comments/Notes/Qualified Results:

Parameter	RPD	Qualification
Cs-137	15%	None
Gross α	7%	None
Gross β	6%	None
Pu-239	11%	None
Pu-238	35%	None
Sr-90	1.8%	None
Tritium	41%	~~None~~ J/UJ 1/19/93

7. Laboratory Control Samples 9013097.2902

Are LCS results within the control limits of 80-120% (Y/N/NA): _____

If NO, qualify results as follows:

%R:	<50%	50-79%	>120%
Results < LLD:	R	UJ	R
Results > LLD:	R	J	R

Has at least one LCS been analyzed with the SDG? (Y/N/NA): _____

If NO, qualify all associated results as estimated (J).

Comments/Notes/Qualified Results: _____

Laboratory Control Samples were not performed with this data set. Therefore, all positive results have been qualified as estimated (J).

8. Holding Times

Have all samples/analyses been completed within 5 half-lives or 180 days, whichever comes first? (Y/N/NA): Y

If NO, qualify all associated results >LLD as estimated detects (J) and all associated results <LLD as estimated non-detects (UJ). For gross exceedances (>2X criteria) qualify all associated results as unusable (R).

Comments/Notes/Qualified Results: See the following inserts for parameter specific holding times.

9613497.2904

1/14/93

200-BP-1 RADIOCHEMISTRY DATA VALIDATION						PAGE 1	OF 2
DATA PACKAGE ID: 801548-PNL-053				REVIEWER:		DATE: 1/14/93	
COMMENTS: PNL ID: 92-00921							
HEIS SAMPLE#	SAMPLE DATE	ANALYSIS DATE	HOLDING TIME, DAYS	NUCLIDE	HALF LIVE DAYS	FIVE TIMES HALF LIFE	QUALIFIER
801543	10/22/91	11/20/91	29	TC-99	7.77E+07	3.89E+08	None
		11/22/91	31	GR-A	N/A	N/A	
		12/09/91	48	GR-B	N/A	N/A	
		11/18/91	27	SR-90	1.04E+04	5.20E+04	
		NA	NA	BE-7	53	266	
		NA		K-40	1.30E+09	6.50E+09	
				MN-54	312	1560	
				CO-58	71	355	
				FE-59	44	220	
		11/11/91	20	CO-60	365	1825	
		NA	NA	ZN-65	244	1220	
				ZR-95	64	320	
				RU-103	39	195	
		11/11/91	20	RU-106	365	1825	
		NA	—	CS-134	730	3650	
		11/11/91	20	CS-137	1.09E+04	5.48E+04	
		NA	NA	BA-140	13	64	
				CE-141	33	165	
				CE-144	285	1425	
				RA-226	5.84E+05	2.92E+06	
				TH-228	694	3470	
		11/20/91	29	TOTAL-U	1.63E+12	8.14E+12	
		11/19/91	28	PU-238	3.20E+04	1.60E+05	
		11/19/91	28	PU-239	8.80E+06	4.40E+07	
		NA	NA	U-235	2.57E+11	1.28E+12	
				U-238	1.63E+12	8.15E+12	
		12/13/91	52	H-3			

9613497.2905

200-BP-1 RADIOCHEMISTRY DATA VALIDATION						PAGE 2	OF 2
DATA PACKAGE ID: B015H8-PNL-053				REVIEWER:		DATE: 1/19/93	
COMMENTS: PNL ID: 92-00921 Dup							
HEIS SAMPLE#	SAMPLE DATE	ANALYSIS DATE	HOLDING TIME, DAYS	NUCLIDE	HALF LIVE DAYS	FIVE TIMES HALF LIFE	QUALIFIER
B015K3	10/22/91	NA	—	TC-99	7.77E+07	3.89E+08	—
		11/22/91	31	GR-A	N/A	N/A	none
		12/09/91	48	GR-B	N/A	N/A	none
		NA	NA	SR-90	1.04E+04	5.20E+04	NA
				BE-7	53	266	
				K-40	1.30E+09	6.50E+09	
				MN-54	312	1560	
				CO-58	71	355	
				FE-59	44	220	
				CO-60	365	1825	
				ZN-65	244	1220	
				ZR-95	64	320	
				RU-103	39	195	
				RU-106	365	1825	
				CS-134	730	3650	
				CS-137	1.09E+04	5.48E+04	
				BA-140	13	64	
				CE-141	33	165	
				CE-144	285	1425	
				RA-226	5.84E+05	2.92E+06	
				TH-228	694	3470	
				TOTAL-U	1.63E+12	8.14E+12	
				PU-238	3.20E+04	1.60E+05	
				PU-239	8.80E+06	4.40E+07	
				U-235	2.57E+11	1.28E+12	
				U-238	1.63E+12	8.15E+12	
		11/13/91	52	H-3			none

9. Method Specific and Other Quality Control

9.1 Gas Proportional Counters

Are field and QC sample preparations outside the range of the self absorption curves? (Y/N/NA): _____

If YES, qualify all associated data as estimated (J).

Are initial detector efficiencies <20%? (Y/N/NA): _____

If YES, qualify all associated data as unusable (R).

Have statistical tests been performed routinely (at least weekly)? (Y/N/NA): _____

If NO, qualify all associated data as estimated (J).

Have stability verifications been performed after each gas change? (Y/N/NA): _____

If NO, qualify all associated data as estimated (J).

Comments/Notes/Qualified Results: _____

Tc-99 was performed by ICP/MS.

9.2 Alpha Spectroscopy

961349?.2907

Has detector system been calibrated across the energy range of interest? (Y/N/NA): _____

If NO, qualify all results as unusable (R).

Is detector resolution adequate to identify each peak centroid? (Y/N/NA): _____

If NO or if resolution cannot be determined, qualify all results as unusable (R).

Is resolution at least 20 keV FWHM? (Y/N/NA): _____

If NO, qualify all results as estimated (J).

Do check source efficiencies agree within 5% of initial calibration efficiencies or are they within the control limits or ±3S of the mean? (Y/N/NA): _____

If NO, qualify all associated results as unusable (R).

Was each sample spiked with a tracer? (Y/N/NA): _____

If NO, qualify all associated results as unusable (R).

Are tracer recoveries within the control limits of 30 to 105%? (Y/N/NA): _____

If NO, qualify all results as follows:

%R:	<30%	30-105%	>105%	>115%
Results <LLD:	R	acceptable	UJ	R
Results >LLD:	R	acceptable	J	R

Comments/Notes/Qualified Results: _____

The assoc. sample runs are not bracketed by ccv samples. The assoc results have been qualified as rejected (R).

9.3 Gamma Spectroscopy 9613497.2908

Does efficiency calibration approximate a smooth semi-log curve? (Y/N/NA):_____

If NO, qualify all results as unusable (R).

Have geometry or matrix factors been accounted for in all analyses? (Y/N/NA):_____

If NO, qualify all associated results as unusable (R).

Does the detector calibration cover the energy range of interest and at least 0 to 2 MeV? (Y/N/NA):_____

If NO, qualify all results outside the energy range as unusable (R).

Is resolution of the detector system adequate and less than 5 FWHM? (Y/N/NA):_____

If NO, qualify all results as estimated (J).

Comments/Notes/Qualified Results:_____

9.4 Alpha Emitting Radium Isotopes

Have single radium isotopes (Ra-223, Ra-224, Ra-226) been reported? (Y/N/NA): _____

If YES, qualify all results attributed to a single radium isotope as estimated (J) if the contribution to the total from individual isotopes is unknown.

Can time from sample precipitation to counting be verified? (Y/N/NA): _____

If NO, qualify all associated results >MDA as estimated (J).

Have barium interferences been identified and accounted for? (Y/N/NA): _____

If NO, qualify all associated results with elevated barium levels as estimated (J).

Has counting efficiency for Ra-226 been determined for each SDG? (Y/N/NA): _____

If NO, qualify all associated results as unusable (R).

Have blanks been analyzed with each group to check for possible radium contamination in the reagents? (Y/N/NA): _____

If NO, qualify all associated results as estimated (J).

Are LCS recoveries with the control limits listed below? (Y/N/NA): _____

If no, qualify sample results as follows:

%R:	<50%	50-69%	70-130%	>130%
Results <MDA	R	UJ	Acceptable	R
Results >MDA	R	J	Acceptable	R

If sample was preserved at collection has analysis been completed within 180 days or 5 half-lives? (Y/N/NA): _____

If NO, qualify results >LLD as estimated detects (J) and results < LLD as estimated non-detects (UJ).

If samples were not preserved, were samples received within 5 days of sampling? (Y/N/NA): _____

- Were samples preserved at the laboratory upon receipt? (Y/N/NA): _____
- Were samples held after preservation for at least 16 days? (Y/N/NA): _____

If NO, to any of the above, qualify associated sample results as estimated (J).

Comments/Notes/Qualified Results: _____

this analysis was not performed.

9.5 Radium 226 Analysis using Scintillation (Lucas) Cell Counting

Is calibration data present and can it be associated with the samples? (Y/N/NA): _____

If NO, qualify associated sample results as unusable (R).

Was the counting system calibrated each day that samples were analyzed? (Y/N/NA): _____

If NO, qualify associated results as estimated (J).

Was the counting system calibrated after replacing the scintillation cell? (Y/N/NA): _____

If NO, qualify associated results as estimated (J) if the cell has a previously determined calibration constant and unusable (R) if no constant is available for the replacement cell.

Were blanks analyzed with each sample group to check for radium contamination in reagents? (Y/N/NA): _____

If NO, qualify associated results as estimated (J).

If sample was preserved at collection has analysis been completed within 180 days or 5 half-lives? (Y/N/NA): _____

If NO, qualify results >LLD as estimated detects (J) and results < LLD as estimated non-detects (UJ).

If samples were not preserved, were samples received within 5 days of sampling? (Y/N/NA): _____

- Were samples preserved at the laboratory upon receipt? (Y/N/NA): _____
- Were samples held after preservation for at least 16 days? (Y/N/NA): _____

If NO, to any of the above, qualify associated sample results as estimated (J).

Comments/Notes/Qualified Results: _____

This analysis was not performed.

9.6 Tritium Analysis by Liquid Scintillation Counting

Do calibration standard matrices match the sample matrices? (Y/N/NA): _____

If NO, qualify associated results as estimated (J).

Has at least one calibration standard been processed with the samples (Y/N/NA): _____

If NO, qualify results associated with runs lacking calibration standards as unusable (R).

Have results for counting efficiency determination been provided? (Y/N/NA): _____

If NO, qualify all associated results as unusable (R).

Do tritium levels in the blanks exceed the MDA? (Y/N/NA): _____

If YES, qualify associated results less than 10X the background tritium level (blanks) as estimated (J).

Have blanks been analyzed with each sample run to check for potential contamination in the chemical reagents? (Y/N/NA): _____

If NO, qualify associated results as estimated (J).

Comments/Notes/Qualified Results:

The CCV sample was out of control limits. The assoc. results have been qualified as ~~estim~~ rejected (R).

9613497.2912

9.7 Fluorometric Analysis of Uranium

Has the laboratory provided evidence that cation and anion interferences are negligible for the matrix or that matrix interferences have been accounted for? (Y/N/NA): _____

If NO, qualify associated results as estimated (J).

Has the laboratory provided a description of the method of fusion standardization or provided data supporting fusion standardization? (Y/N/NA): _____

If NO, qualify associated results as estimated (J).

Was calibration performed immediately prior to sample analysis? (Y/N/NA): _____

If NO, qualify associated results as estimated (J).

Comments/Notes/Qualified Results:

Total Uranium was performed by ICP/MS.

961349: 2913

GAS PROPORTIONAL COUNTERS
LOW BACKGROUND BETA COUNTERS

Data Package ID: B01548-PNL-053

Analysis: Gross alpha, gross beta, Sr-90.

A.0 Completeness Checklist

Analysis Results

✓ Results Report for Sample Analyses and Reanalyses
✓ Raw Data (Counting Logs, Printouts, Notebook Pages)
✓ Calculation Sheets
✓ Sample Identifications
✓ Detector Identification
✓ Analysis Date and Initials of Analyst
✓ Amounts of Samples Prepared or Counted
✓ Weights of Solids Counted

1/19/93

Initial and Continuing Calibration

~~No~~ Detector ID ~~for~~ ICV
✓ Detector Identification ~~for~~ CCV
✓ Calibration Date(s) and Initials of Analyst
✓ Identification of Calibration and Check Standards including Radionuclide, Certification, Expiration Date, and Activity
✓ Amount of Check Standard Used
✓ Raw Data including Counts and Count Duration for Standards
✓ Weights of Preparations
✓ Efficiencies
~~NA~~ Weights of Carriers Added, If Applicable
✓ Results of Statistical Tests Used to Evaluate Instrument Reliability and Efficiency Checks
✓ Raw Data of Background Counts and Count Duration
~~NA~~ Results of Statistical Test Used to Evaluate Instrument Background
✓ Control Limits fo Check Source and Background Counts

Blanks

✓ Detector Identification
✓ Date of Analysis
✓ MDA of Method
~~NA~~ Amounts of Reagents Used in Blank

Radiometric and Gravimetric Yields

✓ Amounts (Volumes, Concentrations, Activity) of Spikes, Tracers, or Carriers Used
✓ Weights of Precipitates or Solids Counted
✓ Calculated Recoveries

Duplicates 9613497.2914

✓ Detector Identification
✓ Date of Analysis
✓ Aliquots of Samples
✓ Weights of Solids Counted
✓ Count Durations
✓ Sample Identifications
✓ Calculated Precision

Laboratory Control Samples

NA Detector Identification
✓ Date of Analysis
✓ Calculation of Recoveries
✓ Results of Analyses

Comments/Qualified Results:

9613497.2915

ALPHA SPECTROSCOPY

Data Package ID: B015H8-PNL-053

Analysis: Pu-238 & 239

B.0 Completeness Checklist

Analysis Results

✓ Results Report for Sample Analyses and Reanalyses
✓ Raw Data (Spectra, Printouts, Notebook Pages)
✓ Calculation Sheets
✓ Sample Identifications
✓ Detector Identification
✓ Analysis Date and Initials of Analyst
✓ Amounts of Samples Counted (Precipitated or Deposited)

Initial and Contiuing Calibration

✓ Detector Identification
✓ Calibration Date(s) and Initials of Analyst
✓ Identification of Calibration and Check Standards including Radionuclide, Certification, Expiration Date, and Activity
✓ Amount of (Check) Standard Used
✓ Raw Data including Spectra or Counts per Channel
✓ Kev/channel
✓ Count Duration for Standards
✓ Efficiencies
✓ Raw Data of Background Counts, Dates Counted, and Duration of Counts

Blanks

✓ Detector Identification
✓ Date of Analysis
✓ MDA of Method
✓ Amounts of Reagents Used in Blank

Duplicates

✓ Detector Identification
✓ Date of Analysis
✓ Amounts of Samples Counted
✓ Count Durations
✓ Sample Identifications
✓ Calculated Precision

Radiometric and Gravimetric Yields

✓ Amounts (Volumes, Concentrations, Activity) or Spikes, Tracers, or Carriers Used
✓ NIST Traceability of Spikes, Tracers or Carriers
✓ Weights of Precipitates or Solids Counted
ND Calculated Recoveries

Laboratory Control Samples 9813197.2916

NA Detector Identification
___ Date of Analysis
___ Calculation of Recoveries
___ Results of Analyses

Comments/Qualified Results:

GAMMA SPECTROSCOPY

Data Package ID: B015H8-PNL-053

C.0 Completeness Checklist

Analysis Results

- ✓ Results Report for Sample Analyses and Reanalyses
- ✓ Raw Data (Spectra, Printouts of Counts per Channel, Notebook Pages)
- ✓ Calculation Sheets
- ✓ Sample Identifications
- ✓ Detector Identification and Counting Position
- ✓ Analysis Date and Initials of Analyst
- ✓ Amounts of Samples Counted

Initial and Continuing Calibration

- ✓ Detector Identification
- ✓ Calibration Date(s) and Initials of Analyst
- ✓ Identification of Calibration and Check Standards including Radionuclides, Certification, Expiration Date, and Activity
- ✓ Amount of (Check) Standard Used
- ✓ Raw Data including Counts and Count Duration for Standards
- ✓ Efficiencies and/or Geometry and Matrix Factors
- ✓ Raw Data of Background Counts, Count Dates, and Duration of Counts
- ✓ KeV/Channel
- NA FWHM

Blanks

- ✓ Detector Identification
- ✓ Date of Analysis
- ✓ MDA of Method
- NA Amounts of Reagents Used in Blank
- ✓ Raw Data

Duplicates

- ✓ Detector Identification
- ✓ Date of Analysis
- ✓ Amounts of Samples
- ✓ Count Durations
- ✓ Sample Identifications
- ✓ Results of Analyses and Calculated Precision
- ✓ Raw Data

Radiometric and Gravimetric Yields

- NA Amounts (Volumes, Concentrations, Activity) of Spikes, Tracers or Carriers Used
- ✓ Weights of Precipitates or Solids Counted
- ✓ Calculated Recoveries

Laboratory Control Samples 0613497.2918

NA Detector Identification
Date of Analysis
Calculation of Recoveries
Results of Analyses

Comments/Qualified Results:

9613497.3048

TRITIUM ANALYSIS USING LIQUID SCINTILLATION COUNTING

Data Package ID: R015H8-PNL-053

F.0 Completeness Checklist

Analysis Results

- ✓ Results Report for Sample Analyses and Reanalyses
- ✓ Raw Data (Gross Counts, Count Duration, Background Count, and Background Count Duration)
- ✓ Calculation Sheets
- ✓ Sample Identifications
- ✓ Instrument Identification
- ✓ Analysis Date and Analyst Initials
- ✓ Sample Weight

Initial and Continuing Instrument Calibration

- ✓ Instrument Identification
- ✓ Identification of Calibration Standards including Radionuclides, Certification, Issue or Expiration Date and Activity
- 1/19/93 ✓ ~~No~~ Raw Data (Gross Counts, Count Duration, Background Count, and Background Count Duration)
- ✓ Counting Efficiency Determination Method and Results
- No Quench Correction Method

Blanks

- ✓ Instrument Identification
- ✓ Date of Analysis
- ✓ MDA of Method
- NA Amounts of Reagents Used
- NA Lot Numbers of Reagents Used
- ✓ Raw Data (Gross Counts, Count Duration, Background Count, Background Count Duration)
- ✓ Tritium Levels in Background Water

Duplicates

- ✓ Instrument Identification
- ✓ Date of Analysis
- ✓ Amounts of Samples
- ✓ Amount of Spike for Spiked Duplicates
- ✓ Raw Data (Gross Counts, Count Duration, Background Counts, and Background Count Duration)

Radiometric Yields 9613497.2920

✓ Amount of Tritium Standard Used for Radiometric Yield Determination
✓ Radiometric Yield Calculations and Results

Laboratory Control Samples

NA Sample Identification
Instrument Identification
Date of Analysis
Calculated Recoveries
Results of Analyses

Comments/Qualified Results:

DATA QUALIFICATION SUMMARY - FORM B-7

pg 1 of 1

SDG: 801SH8	REVIEWER: [illegible]	DATE: 1/25/93	PAGE 6 OF 7
COMMENTS: Radio Chemistry			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Gross α	J/UJ	All	ICV raw data missing
Gross β	↓	↓	↓
Sr-90	↓	↓	↓
Tritium	↓	↓	↓
Pu-238 & 239	R	All	CCV does not bracket sample run.
Tritium	R	All	CCV out of CL
Sr-90	R	Blank	CCV raw data is missing
↓	↓	Blank Dup	↓
Gross β	J	All	Present in blank
Sr-90	J	All	↓
Gross β	J/UJ	All	NS2R = 1149
Tritium	J/UJ	All	RPD is 41%.
All	J	All	LCS not performed
Sr-90	R	Blank (BL-00306)	CCV raw data not provided
↓	↓	Blank (BL-00306) Dup	↓

2/5/93

2/5/93

9613497.2922

SDG: B015H0 - [illegible]

Table 10: Gamma Energy Analysis of Soils

Recommended Values

Batch 5

Diode L

(Radionuclide activity in pCi/g[a])

Client ID	Sample ID	Collection Date	Weight (g)	^{60}Co	^{106}Ru	^{137}Cs
B015G9	92-00306-L-1*	10/4/91 14:20	14.200	<8	<500	$(5.72 \pm 0.06) \times 10^5$ J
B015H1	92-00358-L-1*	10/9/91 10:45	14.205	<0.4	<18	1890 ± 20 J
B015H1	92-00358-L-2*	10/9/91 10:45	14.201	<0.3	<15	2200 ± 20 J
B015H1	92-00358-L-5*	11/8/91 11:06	14.212	<0.15	<1.6	<0.11
B015K3	92-00921-L-1	10/22/91 11:31	13.975	28.6 ± 1.6 J	<280	$(5.62 \pm 0.06) \times 10^5$ J
B015L5	92-01246-L-1*	11/6/91 11:44	1.6300	<30	<2300	$(2.00 \pm 0.02) \times 10^6$ J
B015M9	92-01827-L-1*	11/14/91 14:06	1.5020	<20	<1200	$(1.23 \pm 0.01) \times 10^6$ J

02/5/93 02/5/93

[a] The one sigma uncertainties are based on counting statistics. All "<" values are detection limits associated with each "not detected" analysis.

The detection limits are determined from Sample 92-00358-L-5. The detection limits in pCi/g for ^{60}Co, ^{106}, and ^{137}Cs at one sigma are < 0.06, <0.6, and <0.04. Note that the detection limits quoted above were calculated as if the isotope were present at a level that is 2.5 times the square root of twice the average background.

* Samples not in the SDG but reported for QC purposes.

Cs-137 B015H1 $RPD = \frac{(2200-1890)}{\left(\frac{2200+1890}{2}\right)} \times 100 = 15.16 = 15\%$ RPD

1/14/95

SDG-B015H8-PNL-053

TABLE 11: TOTAL ALPHA ANALYSIS DATA FOR TASKS 2 & 4
SDG #9

SOIL SAMPLES

Client #	Sample #	Sample Type	Total Alpha (pCi/g)	+/- 1 sigma	RPD	Spike Conc. (pCi/g)	+/- 1 sigma	Spike % Rec.
B015K3	92-00921-A-1a	Soil	25.7	5.8				
B015K3	92-00921-A-2a	Duplicate	23.9	5.7	7			
	92-00306-A-5a*	Blank	<4.7					
	92-00921-A-4a	Blank Spike	57.1	8.4		54.8	0.6	104.0
	92-00921-A-3a	Matrix Spike	66.7	4.6		45.4	0.5	92.3

Average % recovery 98 +/- 8

* Not samples in the SDG but reported for QC purposes
The detection limit for soil samples of this size is approximatedly 5 pCi/g. Contract detection limits can be achieved by use of a larger sample size and longer counting time. Due to the high activity of the samples in this batch, a smaller sample size and shorter counting time were used.

Error is based on the propagated error of volume and counting uncertainties.

1/4/93

SOG: ~~fa~~ B015H8 PNL-053
1/21/93

TABLE 12: TOTAL BETA ANAYSIS RESULTS FOR TASKS 2 & 4
SDG #9

SOIL SAMPLES

WHC #	Sample #	Sample Type	Total Beta (pCi/g)	+/- 1 sigma	RPD	Spike Conc. (pCi/g)	+/- 1 sigma	Spike % Rec.
B015K3	92-00921-A-1a	Soil	64500	1990				
B015K3	92-00921-A-2a	Soil	60600	1880	6			
	92-00358-A-3a*	Matrix Spike	4790	145		1536	78	~~108~~ 114% 1/14/93
	92-00921-A-5a	Blank	97	21				
	92-00921-A-4 a	Blank Spike	491	29		477	29	83

* Not samples in the SDG but reported for QC purposes
The detection limit for soil samples of this size is approximatedly 36 pCi/g. Contract detection limits can be achieved by use of a larger sample size and longer counting time. Due to the high activity of the samples in this batch, a smaller sample size and shorter counting time were used.

Error is based on the propagated error of volume and counting uncertainties.

$$MS\%R = \left(\frac{4790 - 3036}{1536}\right) \times 100 = 114\%$$

[illegible] result for the spiked sample is 3036 pCi/g.

1/14/93

SOG: B015H8-PNL-053

TABLE 13: Pu 238 and Pu 239/240 DATA ANALYSIS
SDG #9

WHC Sample #	Program Sample ID	Sample Type	Pu-239+240 pCi/g	+/- 1 sigma	Pu-239+240 RPD	Pu-238 pCi/g	+/- 1 sigma	Pu-238 RPD	Pu-239 Spike pCi/g	+/- 1 sigma	% Recovery
B015H1	92-00358-A-1c*	Soil	2.39E-01	1.01E-02	R 11	~~2.92E-03~~	8.37E-04	R ~~32~~ 35			
	92-00358-A-2c*	Duplicate	2.68E-01	1.04E-02	R	4.03E-03	8.48E-04	R			
B015K3	92-00921-A-1c	Soil	2.96E+00	1.06E-01	R	~~4.42E-02~~	7.65E-03	R			
	92-00306-A-4c*	Blank Spike	2.23E+00	7.61E-02	R	< 1E-03		R	2.35E+00	1.46E-02	95
	92-00306-A-5c*	Blank	< 5E-04		R	< 1E-03		R			
						4.46E-02		R			
						2.83E-03		R			

Pu-239+240 detection limit is approximately 5 E-04 pCi/g.
Pu-238 detection limit is approximately 1 E-03 pCi/g.

Errors quoted are the propagated error of individual measurements.

* Samples not in the SDG but reported for QC purposes

1/14/93

$$B015H1\ RPD = \frac{((4.03E-03)-(2.83E-03))}{\left(\frac{((4.03E-03)+(2.83E-03))}{2}\right)} \times 100 = 34.99 = 35\%$$

1/14/93

SDG: B01SH8-PNL-053

TABLE 14: STRONTIUM-90 ANALYSIS DATA FOR TASK 2 & 4
SDG #9

Parameters of Interest

WHC Sample #	Sample #	Sample Type	Strontium (pCi/g)	+/- 1 sigma*	RPD	Spike Conc. (pCi/g)	+/- 1 sigma*	Spike % Rec.	Normalize % Yield**
B015H1	92-00358-A-1b+	Soil	452	J 33					
	92-00358-A-2b+	Soil Duplicate	461	J 34	1.8				
In this SDG B015K3	92-00921-A-1b	Soil	7750	J 570					
	92-00306-A-3b+	Matrix Spike	46.3	J 3.6		49.5	2.5	93.5	
	BL-00306-A-5b+	Blank	0.1	R 0.02	R				
	BL-00306-A-5b+	Blank duplicate	0.3	R 0.04	R 1/19/93				
	BS-00306-A-4b+	Blank Spike	Used to determine batch yield						103.5

1/19/93

Minimum detectable activity for a sample is approximately 0.06 pCi/g.
+ Sample not in the SDG but reported for QC purposes
* One sigma uncertainties are based on propagation of mass, volume, and counting uncertainties.

** All Sr-90 analyses are calculated on the basis of their ratio to the blank spike recovery which has been normalized to 100% chemical recovery.

1/15/93

SDG: B015H8-PNL-053

TABLE 15: TRITIUM ANALYSIS FOR TASK 2 & 4
SDG #9

WHC Sample #	Project Sample ID	Sample Type	Tritium (pCi/g)	+/- 1 sigma	RPD	Spike Conc. (pCi/g)	+/- 1 sigma	Recov. Corr. Factor, % Fs
B015K3	92-00921-K-1	Soil	56	4 R				
	92-00921-K-2	Duplicate	37	3 R	41			
	92-00921-K-5	Blank	<4 **	R				
	92-00921-K-4	Method Spike Used to Determine Batch Yield						75

Approximate Detection Limit = 10 pCi/g (variations occur due to actual sample size)
* Not samples in the SDG but reported for QC purposes
** Based on 0.3 g sample size

1/4/93

LABORATORY: BATTELLE-PACIFIC NORTHW EST LABORATORIES

SAMPLE ID	HEIS#	LAB ID	DET ID	DATE ANALYZED	GROSS COUNTS	COUNT TIME	BKG CPM	DETECT EFF	LEACH VOLUME	SAMPLE AMOUNT	VOLUME ANALYZED
SDG B00X64-PNL-050											
91-6421-A-1a	B00X77	91-6421	2	08/30/91	94	100	0.188	14.0532	10	3.9144	1.9432
91-7815-A-1a	QC SAMPLE	91-7815	2	08/30/91	720	100	0.188	11.3273	10	3.7659	1.9432
91-7815-A-2a	QC DUP	91-7815D	1	08/30/91	1143	100	0.11	6.7164	10	2.767	1.9432
91-7815-A-3a	QC MS	91-7815MS	3	08/30/91	1130	100	0.1	9.3668	10	3.5771	1.9432
BL-6421-A-5a	BLANK	BL-6421	4	08/30/91	9	100	0.049	3.0575	8	1	1.9432
BS-6421-A-4a	BLANK SPIKE	BS-6421	1	08/30/91	761	100	0.11	3.0754	10	1	1.9432
SDG B00X68-PNL-050											
91-7815-A-1a	B00X75	91-7815	2	08/30/91	720	100	0.188	11.3273	10	3.7659	1.9432
91-7815-A-2a	B00X75 DUP	91-7815D	1	08/30/91	1143	100	0.11	6.7164	10	2.767	1.9432
91-7815-A-3a	B00X75 MS	91-7815MS	3	08/30/91	1130	100	0.1	9.3668	10	3.5771	1.9432
BL-6421-A-5a	BLANK	BL-6421	4	08/30/91	9	100	0.049	3.0575	8	1	1.9432
BL-6421-A-4a	BLANK SPIKE	BS-6421	1	08/30/91	761	100	0.11	3.0754	10	1	1.9432
SDG: B015G4-PNL-052											
92-00306-A-1a	B015G9	92-00306	1	10/24/91	1014	100	0.114	4.108	40	3.483	1.9828
92-00358-A-1a	B01GH1	92-00358	2	10/24/91	58	100	0.186	4.1017	40	5.029	1.9828
92-00358-A-2a	B01GH1 DUP	92-00358A	3	10/24/91	38	100	0.101	4.4751	40	4.524	1.9828
92-00358-A-3a	B01GH1 MS	92-00358MS	2	10/24/91	183	100	0.186	4.3795	40	5.114	1.9828
92-00358-A-3a	B01GH1 MSD	92-00358MST	2	10/24/91	130	100	0.186	4.316	40	4.725	1.9828
92-00306-A-5a	BLANK	92-00306BL	1	10/24/91	14	100	0.114	3.016	40	5	1.9828
92-00358-A-4a	BLANK SPIKE	92-00358BS	3	10/24/91	209	100	0.101	3.016	40	5	1.9828

FILE: PNL-GRA.WK1

9613497.2928

LABORATORY: BATTELLE-PACIFIC NORTHW EST LABORATORIES

SAMPLE ID	HEIS#	LAB ID	DET ID	DATE ANALYZED	GROSS COUNTS	COUNT TIME	BKG CPM	DETECT EFF	LEACH VOLUME	SAMPLE AMOUNT	VOLUME ANALYZED
SDG: B015H8-PNL-053											
92-00306-A-5a	BLANK	BL-00306	3	11/22/91	6	30	0.117	3.0101	40	1.1	1.972
92-009219-A-1	B015K3	92-00921	1	11/22/91	33	30	0.147	3.1708	40	1.075	1.972
92-009219-A-2	B015K3 DUP	92-00921D	2	11/22/91	35	30	0.216	3.1947	40	1.159	1.972
92-00921-A-4a	BLANK SPIKE	BS-00921	1	11/22/91	72	30	0.147	3.0516	40	1.1	1.972
92-00921-A-3a	MATRIX SPIKE	MS-00921	1	11/22/91	3039	1000	0.147	3.3509	40	1.328	1.972

9613497.2929

LABORATORY: BATTELLE-PACIFIC NORTHW

SAMPLE ID	HEIS#	LAB ID	CALC. RESULT	RPTD RESULT	CALC. MDA	RPTD MDA	UNITS
SDG B00X64-PNL-050							
91-6421-A-1a	B00X77	91-6421	6.26	6.258	1.08	NR	pCi/g
91-7815-A-1a	QC SAMPLE	91-7815	48.89	48.89	0.91	NR	pCi/g
91-7815-A-2a	QC DUP	91-7815D	63.69	63.69	0.56	NR	pCi/g
91-7815-A-3a	QC MS	91-7815MS	67.98	67.98	0.58	NR	pCi/g
BL-6421-A-5a	BLANK	BL-6421	0.23	0.22	0.38	0.35	pCi/g
BS-6421-A-4a	BLANK SPIKE	BS-6421	53.47	53.47	0.71	NR	pCi/g
SDG B00X68-PNL-050							
91-7815-A-1a	B00X75	91-7815	48.9	48.9	0.9	NR	pCi/g
91-7815-A-2a	B00X75 DUP	91-7815D	63.7	63.7	0.6	NR	pCi/g
91-7815-A-3a	B00X75 MS	91-7815MS	68.0	68.0	0.6	NR	pCi/g
BL-6421-A-5a	BLANK	BL-6421	0.2	0.2	0.4	0.4	pCi/g
BL-6421-A-4a	BLANK SPIKE	BS-6421	53.5	53.5	0.7	NR	pCi/g
SDG: B015G4-PNL-052							
92-00306-A-1a	B015G9	92-00306	107.46	107.46	1.09	NA	pCi/g
92-00358-A-1a	B01GH1	92-00358	2.92	2.92	0.96	NA	pCi/g
92-00358-A-2a	B01GH1 DUP	92-00358A	2.508	2.508	0.86	NA	pCi/g
92-00358-A-3a	B01GH1 MS	92-00358MS	12.794	12.794	1.01	NA	pCi/g
92-00358-A-3a	B01GH1 MSD	92-00358MST	9.247	9.247	1.07	NA	pCi/g
92-00306-A-5a	BLANK	92-00306BL	0.143	0.143	0.555	0.555	pCi/g
92-00358-A-4a	BLANK SPIKE	92-00358BS	10.902	10.902	0.523	NA	pCi/g

FILE: PNL-GRA.WK1

9613497.2930

LABORATORY: BATTELLE-PACIFIC NORTHW

SAMPLE ID	HEIS#	LAB ID	CALC. RESULT	RPTD RESULT	CALC. MDA	RPTD MDA	UNITS
SDG: B015H8-PNL-053							
92-00306-A-5a	BLANK	BL-00306	2	2	4.7	4.7	pCi/g
92-009219-A-1	B015K3	92-00921	25.7	25.7	6	NR	pCi/g
92-009219-A-2	B015K3 DUP	92-00921D	23.9	23.9	6	NR	pCi/g
92-00921-A-4a	BLANK SPIKE	BS-00921	57.1	57.1	5	NR	pCi/g
92-00921-A-3a	MATRIX SPIKE	MS-00921	66.7	66.7	1	NR	pCi/g

9613497.2931

LABORATORY: BATTELLE-PACIFIC NORTH WEST LABORATORIES

SAMPLE ID	HEIS#	LAB ID	DET. ID	DATE COUNTED	GROSS COUNTS	COUNT TIME	BKG CPM	EFF.	LEACH VOLUME	SAMPLE AMOUNT	VOLUME ANALYZED
SDG: B00X64-PNL-051											
91-6421-1a	B00X77	91-6421	66	08/09/91	162548	10	15.7	2.6524	10	2.022	2.0086
91-6421-1a	B00X77 DUP	91-6421D	67	08/09/91	207118	10	14.8	2.7054	10	2.787	2.0086
91-6421-1a	B00X77 MS	91-6421MS	68	08/09/91	157245	10	14.6	2.5086	10	1.92	2.0086
91-6421-1a	BLANK	BL-6421	LB1	08/09/91	52	30	0.623	1.9975	10	10	2.0086
91-6421-1a	BLANK SPIKE	BS-6421	69	08/09/91	909	30	19.7	1.9926	10	10	2.0086
SDG: B00X68-PNL-050											
91-7815-A-1a	B00X75	91-7815	66	08/27/91	66337	10	17	1.9426	10	3.667	0.0991
91-7815-A-2a	B00X75 DUP	91-7815D	67	08/27/91	43680	10	15.3	1.922	10	3.307	0.0991
91-7815-A-3a	B00X75 MS	91-7815MSB	68	08/27/91	32585	10	14.9	1.9426	10	0.1886	1.0037
BL-7815-A-4a	BLANK SPIKE	BS-7815B	69	08/27/91	817	30	18.9	1.9483	10	10	2.0074
BL-7815-A-5a	BLANK	BL-7815B	LB1	08/27/91	49	30	0.536	1.9575	10	10	2.0074
NONE	DL TEST	DL TEST	LB1	08/27/91	5	30	0.536	1.9575	10	10	2.0074
SDG: B015G4-PNL-052											
92-00306-A-1a	B015G9	92-00306	66	10/24/91	6352	1	16.4	1.9005	40	3.483	0.1001
92-00358-A-1a	B015H1	92-00358	67	10/24/91	3788	10	16.8	1.9786	40	5.029	0.9914
92-00358-A-2a	B015H1 DUP	92-00358D	68	10/24/91	3195	10	14.7	1.9891	40	4.524	0.9914
92-00358-A-3a	B015H1 MS	92-00358MS	69	10/24/91	4502	10	16.2	1.9975	40	5.272	0.9914
	BLANK SPIKE	92-00306BS	66	10/24/91	851	30	16.4	1.8976	40	5	1.9828
BL-00306-A-5a	BLANK	92-00306BL	67	10/24/91	537	30	16.8	1.894	40	5	1.9828
SDG: B015H8-PNL-053											

FILE: PNL-GRB.WK1

9613491.2932

LABORATORY: BATTELLE-PACIFIC NORTH WEST LABORATORIES

SAMPLE ID	HEIS#	LAB ID	DET. ID	DATE COUNTED	GROSS COUNTS	COUNT TIME	BKG CPM	EFF.	LEACH VOLUME	SAMPLE AMOUNT	VOLUME ANALYZED
92-00921-A-1a	B015K3	TB921	66	12/09/91	6664	30	17.9	1.9319	40	1.119	0.09856
92-00921-A-2a	B015K3 DUP	TB921D	67	12/09/91	6610	30	17.7	1.922	40	1.174	0.09856
92-00921-A-5a	BLANK	TB921BL	66	12/09/91	703	30	17.9	1.9119	40	1	1.96
92-00921-A-4a	BLANK SPIKE	BS-921	67	12/09/91	1372	30	17.7	1.9062	40	1	1.96
		TB358	68	12/09/91	5701	30	15.3	1.9638	40	1.039	1.96
92-00358-A-3a	MATRIX SPIKE	TB358MS	69	12/09/91	7939	30	17.6	1.9624	40	0.931	1.96

LABORATORY: BATTELLE-PACIFIC NORTH

SAMPLE ID	HEIS#	LAB ID	CALC. RESULT	RPTD RESULT	CALC. MDA	RPTD MDA	UNITS
SDG: B00X64-PNL-051							
91-6421-1a	B00X77	91-6421	47772	47772	11	NA	pCi/g
91-6421-1a	B00X77 DUP	91-6421D	45056	45056	8	NA	pCi/g
91-6421-1a	B00X77 MS	91-6421MS	46032	46032	11	NA	pCi/g
91-6421-1a	BLANK	BL-6421	0.50	0.5	0.2	NA	pCi/mL
91-6421-1a	BLANK SPIKE	BS-6421	4.74	4.74	1	NA	pCi/mL
							pCi/
SDG: B00X68-PNL-050							
91-7815-A-1a	B00X75	91-7815	159326	159326	94	NR	pCi/g
91-7815-A-2a	B00X75 DUP	91-7815D	114988	114985	98	NR	pCi/g
91-7815-A-3a	B00X75 MS	91-7815MSB	149938	149919	169	NR	pCi/g
BL-7815-A-4a	BLANK SPIKE	BS-7815B	3.64	3.64	1	NR	pCi/mL
BL-7815-A-5a	BLANK	BL-7815B	0.48	0.48	0.2	NR	pCi/mL
NONE	DL TEST	DL TEST	-0.16	-0.16	0.18	0.18	pCi/g
SDG: B015G4-PNL-052							
92-00306-A-1a	B015G9	92-00306	622265	622254	1193	NA	pCi/g
92-00358-A-1a	B015H1	92-00358	2588	2588	28	NA	pCi/g
92-00358-A-2a	B015H1 DUP	92-00358D	2436	2436	29	NA	pCi/g
92-00358-A-3a	B015H1 MS	92-00358MS	2989	2989	26	NA	pCi/g
	BLANK SPIKE	92-00306BS	41	41	8	NA	pCi/g
BL-00306-A-5a	BLANK	92-00306BL	3.79	3.79	7.73	7.73	pCi/g
SDG: B015H8-PNL-053							

FILE: PNL-GRB.WK1

9613497.2934

LABORATORY: BATTELLE-PACIFIC NORTH

SAMPLE ID	HEIS#	LAB ID	CALC. RESULT	RPTD RESULT	CALC. MDA	RPTD MDA	UNITS
92-00921-A-1a	B015K3	TB921	64460	64460	731	NR	pCi/g
92-00921-A-2a	B015K3 DUP	TB921D	60646	60644	690	NR	pCi/g
92-00921-A-5a	BLANK	TB921BL	97	97	41	NR	pCi/g
92-00921-A-4a	BLANK SPIKE	BS-921	491	491	40	NR	pCi/g
		TB358	3036	3036	37	NR	pCi/g
92-00358-A-3a	MATRIX SPIKE	TB358MS	4787	4787	45	NR	pCi/g

9613497.2935

LABORATORY: BATTELLE-PACIFIC NOR THWEST LABORATORIES

SAMPLE ID	HEIS #	LAB ID	DET ID	DATE COUNTED	SAMPLE AMOUNT	LEACH VOLUME	DIL. ALIQ.	DILUTED TO, ML	ALIQUOT ML	PU-242 DPM	PU-242 COUNTS	PU-239 COUNTS	PU-239 BKGD	PU-238 COUNTS
SDG: B00X64-PNL-051														
91-6421-A-1c	B00X77	91-6421	C5	08/19/91	10.36	1	1	1	1	21.72	6781	24	1	46
91-6421-A-2c	B00X77 DUP	91-6421D	C6	08/19/91	10.38	1	1	1	1	21.72	7274	11	0	36
91-6421-A-5c	BLANK	91-6421BL	C7	08/19/91	10	1	1	1	1	21.72	7888	2	0	29
91-6421-A-4c	BLANK SPIKE	91-6421BS	C8	08/19/91	1	1	1	1	1	21.72	9467	10550	0	131
SDG: B00X68-PNL-050														
91-7815-A-1c	B00X75	91-7815	C5	09/12/91	10.031	1	1	1	1	22.41	1370	44009	0	582
91-7815-A-2c	B00X75 DUP	91-7815D	C6	09/12/91	10.037	1	1	1	1	22.41	2744	80947	1	966
91-7815-A-5c	BLANK	BL-7815	C8	09/12/91	10	1	1	1	1	22.41	1943	9	1	3
91-7815-A-4c	BLANK SPIKE	BS-7815	C7	09/12/91	10	1	1	1	1	22.41	3659	4156	0	3
SDG: B015G4-PNL-052														
92-00306-A-1	B015G9	92-00306	C5	11/19/91	0.37	1	1	1	1	21.32	4340	20280	0	312
92-00358-A-1	B015H1	92-00358	C6	11/19/91	10.1	1	1	1	1	21.32	4366	1097	1	14
92-00358-A-2	B015H1DUP	92-00358D	C7	11/19/91	10.63	1	1	1	1	21.32	5158	1531	0	23
92-00306-A-5	BLANK	BL-00306	C5	11/20/91	10	1	1	1	1	21.32	3559	1	0	4
92-00306-A-4	BLANK SPIKE	BS-00306	C6	11/20/91	10	1	1	1	1	21.32	2811	6521	1	2
SDG: B015H8-PNL-053														
92-00358-A-1	B015H1	92-00358	C6	11/19/91	10.1	1	1	1	1	21.32	4365	1097	1	14
92-00358-A-2	B015H1DUP	92-00358D	C7	11/19/91	10.63	1	1	1	1	21.32	5158	1531	0	23
92-00921-A-1	B015K3	92-00921	C8	11/19/91	1.58	1	1	1	1	21.32	5312	2591	0	41
92-00306-A-5	BLANK	BL-00306	C5	11/20/91	10	1	1	1	1	21.32	3559	1	0	4
92-00306-A-4	BLANK SPIKE	BS-00306	C6	11/20/91	10	1	1	1	1	21.32	2810	6521	1	2

9613497.2936

LABORATORY: BATTELLE-PACIFIC NOR

SAMPLE ID	HEIS #	LAB ID	PU-238 BKGD	PU-239 CALC	PU-239 RPTD	PU-239 MDA CALC	PU-239 MDA RPTD	PU-238 CALC	PU-238 RPTD	PU-238 MDA CALC	PU-238 MDA RPTD	UNITS
SDG: B00X64-PNL-051												
91-6421-A-1c	B00X77	91-6421	1	3.20E-03	3.25E-03	4.18E-04	NR	6.27E-03	6.23E-03	4.18E-04	NR	pCi/g
91-6421-A-2c	B00X77 DUP	91-6421D	0	1.43E-03	1.43E-03	0.00E+00	NR	4.66E-03	4.66E-03	0.00E+00	NR	pCi/g
91-6421-A-5c	BLANK	91-6421BL	0	2.48E-04	2.48E-04	0.00E+00	<4E-04	3.60E-03	3.60E-03	0.00E+00	NR	pCi/g
91-6421-A-4c	BLANK SPIKE	91-6421BS	8	1.09E+01	1.09E+01	0.00E+00	NR	1.27E-01	1.27E-01	8.77E-03	NR	pCi/g
SDG: B00X68-PNL-050												
91-7815-A-1c	B00X75	91-7815	0	3.23E+01	3.23E+01	0.00E+00	NR	4.28E-01	4.28E-01	0.00E+00	NR	pCi/g
91-7815-A-2c	B00X75 DUP	91-7815D	0	2.97E+01	2.97E+01	1.10E-03	NR	3.54E-01	3.54E-01	0.00E+00	NR	pCi/g
91-7815-A-5c	BLANK	BL-7815	2	4.16E-03	4.26E-03	1.56E-03	NR	5.20E-04	2.94E-04	2.20E-03	2.43E-03	pCi/g
91-7815-A-4c	BLANK SPIKE	BS-7815	0	1.15E+00	1.15E+02	0.00E+00	NR	8.28E-04	8.28E-04	1.10E-03	1.10E-03	pCi/g
SDG: B015G4-PNL-052												
92-00306-A-1	B015G9	92-00306	0	1.21E+02	1.21E+02	0.00E+00	NR	1.87E+00	1.87E+00	0.00E+00	NR	pCi/g
92-00358-A-1	B015H1	92-00358	1	2.39E-01	2.39E-01	6.53E-04	NR	2.83E-03	2.92E-03	6.53E-04	NR	pCi/g
92-00358-A-2	B015H1DUP	92-00358D	0	2.68E-01	2.68E-01	0.00E+00	NR	4.03E-03	4.03E-03	0.00E+00	NR	pCi/g
92-00306-A-5	BLANK	BL-00306	0	2.70E-04	2.70E-04	5.40E-04	5.40E-04	1.08E-03	1.08E-03	1.08E-03	1.08E-03	pCi/g
92-00306-A-4	BLANK SPIKE	BS-00306	1	2.23E+00	2.23E+00	1.02E-03	NR	3.42E-04	5.03E-04	1E-03	1E-03	pCi/g
												pCi/
SDG: B015H8-PNL-053												
92-00358-A-1	B015H1	92-00358	1	2.39E-01	2.39E-01	6.54E-04	NR	2.83E-03	2.92E-03	6.54E-04	NR	pCi/g
92-00358-A-2	B015H1DUP	92-00358D	0	2.68E-01	2.68E-01	0.00E+00	NR	4.03E-03	4.03E-03	0.00E+00	NR	pCi/g
92-00921-A-1	B015K3	92-00921	2	2.96E+00	2.96E+00	0.00E+00	NR	4.46E-02	4.42E-02	4.85E-03	NR	pCi/g
92-00306-A-5	BLANK	BL-00306	0	2.70E-04	2.70E-04	5.40E-04	5.40E-04	1.08E-03	1.08E-03	1.08E-03	1.08E-03	pCi/g
92-00306-A-4	BLANK SPIKE	BS-00306	1	2.23E+00	2.23E+00	1.03E-03	NR	3.42E-04	5.03E-04	1E-03	1E-03	pCi/g
												pCi/

FILE: PNL4CALC.WK1

9613497.2937

LABORATORY: BATTELLE-PACIFIC NORTHWES T LABORATORIES

SAMPLE ID	HEIS #	LAB ID	DET ID	DATE COUNTED	SR90 SPK YLD	THEOR. YIELD	YIELD MG	COUNT TOTAL	COUNT TIME	MIDPOINT TIME,HR	BKG CPM	NET CPM	D/C
SDG: B00X64-PNL-051													
91-6421-A-3b	MATRIX SPIKE	91-6421-MS	66	08/21/91	0.843	66.69	57.5	7329	30	5.32	16.2	228	2.846
91-6421-A-4b	BLANK SPIKE	BS-6421	68	08/21/91	0.843	66.69	69.4	965	30	3.48	14.4	18	3.025
91-6421-A-Xb	B00X77 DL	91-6421-DL	1	08/21/91	0.843	66.69	76	1	30	3.40	0.603	-0.57	3.124
91-6421-A-5b	BLANK	BL-6421	3	08/21/91	0.843	66.69	66	1099	30	3.40	0.516	36	2.974
91-6421-A-1b	B00X77	91-6421	1	08/21/91	0.843	66.69	43.6	182	30	3.40	0.603	5	2.636
91-6421-A-2b	B00X77 DUP	91-6421D	2	08/21/91	0.843	66.69	68.6	231	30	3.40	0.472	7.23	3.013
91-6421-A-6b	BLANK SPIKE DU	91-6421-BS2	66	08/21/91	0.843	66.69	75.8	10954	30	3.40	16.2	348.93	3.121
SDG: B00X68-PNL-050													
91-7815-1b	B00X75	91-7815	68	09/13/91	0.9979	68.42	53.8	460242	1	3.25	14.5	460227	2.79
91-7815-2b	B00X75 DUP	91-7815D	69	09/13/91	0.9979	68.42	43.7	383711	1	3.25	18	383693	2.638
91-7815-3b	B00X75 MS	MS2-7815	69	09/13/91	0.9979	68.42	24.7	221651	1	3.35	18	221633	2.352
91-7815-5b	BLANK	BL-7815	1	09/13/91	0.9979	68.42	53.7	539	30	3.88	0.547	17.42	2.768
91-7815-1b	BLANK SPIKE	BS-7815	66	09/13/91	0.9979	68.42	46.7	961	30	3.88	16.5	15.53	2.683
91-7815-1b	BLANK SPIKE 2	BS2-7815	68	09/13/91	0.9979	68.42	75.4	2838	10	3.58	14.5	269.3	3.115
91-7815-3b	B00X75	91-7815	67	09/13/91	0.9979	68.42	42.1	2837	10	3.42	17.2	266.5	2.614
SDG: B015G4-PNL-052													
92-00358-A-1b	B015H1	92-00358	69	11/18/91	1.035	67.98	57.1	15121	10	4.25	16.9	1495.2	2.84
92-00358-A-2b	B015H1 DUP	92-00358D	69	11/18/91	1.035	67.98	53.6	13330	10	4.45	16.9	1316.1	2.787
92-00306-A-1b	B015G9 DUP	92-00306D	66	11/18/91	1.035	67.98	49.6	14580	10	4.45	17	1441	2.727
92-00306-A-3b	B015G9 MS	MS-00306	66	11/18/91	1.035	67.98	59.7	5149	100	5.62	17	34.49	2.879
BS-00306-A-4b	BLANK SPIKE	BS-00306	67	11/18/91	1.035	67.98	56.7	10880	30	4.42	17	345.67	2.834

FILE: PNL-SR.WK1

9613497.2938

LABORATORY: BATTELLE-PACIFIC NORTHWES T LABORATORIES

SAMPLE ID	HEIS #	LAB ID	DET ID	DATE COUNTED	SR90 SPK YLD	THEOR. YIELD	YIELD MG	COUNT TOTAL	COUNT TIME	MIDPOINT TIME,HR	BKG CPM	NET CPM	D/C
BL-00306-A-5b	BLANK	BL-00306	1	11/18/91	1.035	67.98	51.5	271	100	5.45	0.524	2.19	2.755
BL-00306-A-5b	BLANK DUP	BL-00306D	2	11/18/91	1.035	67.98	57.3	117	100	5.45	0.475	0.70	2.843
SDG: B015H8-PNL-053													
92-00921-A-1b	B015K3	92-00921	66	11/18/91	1.035	67.98	56.3	73371	10	4.25	17	7320.1	2.828
92-00358-A-1b	B015H1	92-00358	69	11/18/91	1.035	67.98	57.1	15121	10	4.25	16.9	1495.2	2.84
92-00358-A-2b	B015H1 DUP	92-00358D	69	11/18/91	1.035	67.98	53.6	13330	10	4.45	16.9	1316.1	2.787
92-00306-A-1b	B015G9 DUP	92-00306D	66	11/18/91	1.035	67.98	49.6	14580	10	4.45	17	1441	2.727
92-00306-A-3b	B015G9 MS	MS-00306	66	11/18/91	1.035	67.98	59.7	5149	100	5.62	17	34.49	2.879
BS-00306-A-4b	BLANK SPIKE	BS-00306	67	11/18/91	1.035	67.98	56.7	10880	30	4.42	17	345.67	2.834
BL-00306-A-5b	BLANK	BL-00306	1	11/18/91	1.035	67.98	51.5	271	100	5.45	0.524	2.19	2.755
BL-00306-A-5b	BLANK DUP	BL-00306D	2	11/18/91	1.035	67.98	57.3	117	100	5.45	0.475	0.70	2.843

9613491.2939

LABORATORY: BATTELLE-PACIFIC NORTHWES

SAMPLE ID	HEIS #	LAB ID	SAMPLE AMOUNT	CALC SR-90	RPTD SR-90	CALC MDA	RPTD MDA	UNITS	DPM SR-90	SR-90 YIELD
SDG: B00X64-PNL-051										
91-6421-A-3b	MATRIX SPIKE	91-6421-MS	12.262	30.977	30.973	0.122	NR	pCi/g	NA	NA
91-6421-A-4b	BLANK SPIKE	BS-6421	10	2.658	2.66	0.122	NR	pCi/g	NA	NA
91-6421-A-Xb	B00X77 DL	91-6421-DL	10	-0.080	-0.08	0.023	0.062	pCi/g	NA	NA
91-6421-A-5b	BLANK	BL-6421	10	5.590	5.589	0.024	NR	pCi/g	NA	NA
91-6421-A-1b	B00X77	91-6421	9.298	1.220	1.221	0.040	NR	pCi/g	NA	NA
91-6421-A-2b	B00X77 DUP	91-6421D	12.9	0.845	0.845	0.017	NR	pCi/g	NA	NA
91-6421-A-6b	BLANK SPIKE DU	91-6421-BS2	NA	NA	NA	NA	NA	NA	1096	0.843
SDG: B00X68-PNL-050										
91-7815-1b	B00X75	91-7815	11.368	62602	62600	0.135	NR	pCi/g		
91-7815-2b	B00X75 DUP	91-7815D	9.984	69175	69171	0.206	NR	pCi/g		
91-7815-3b	B00X75 MS	MS2-7815	9.548	65837	65834	0.359	NR	pCi/g		
91-7815-5b	BLANK	BL-7815	10	2.66	2.68	0.030	NR	pCi/mL		
91-7815-1b	BLANK SPIKE	BS-7815	10	2.64	2.64	0.185	NR	pCi/mL		
91-7815-1b	BLANK SPIKE 2	BS2-7815	10	33	33	0.116	NR	pCi/mL		
91-7815-3b	B00X75	91-7815	NA	NA	NA	NA	NA	NA	1093	0.9982
SDG: B015G4-PNL-052										
92-00358-A-1b	B015H1	92-00358	4.652	452	452	0.337	NR	pCi/g	NA	NA
92-00358-A-2b	B015H1 DUP	92-00358D	4.185	461	461	0.395	NR	pCi/g	NA	NA
92-00306-A-1b	B015G9 DUP	92-00306D	0.033	67692	67681	53.672	NR	pCi/g	NA	NA
92-00306-A-3b	B015G9 MS	MS-00306	1	46.3	46.3	1.502	NR	pCi/g	NA	NA
BS-00306-A-4b	BLANK SPIKE	BS-00306	NA	NA	NA	NA	NA	NA	1082	1.035

FILE: PNL-SR.WK1

9613497.2940

LABORATORY: BATTELLE-PACIFIC NORTHWES

SAMPLE ID	HEIS #	LAB ID	SAMPLE AMOUNT	CALC SR-90	RPTD SR-90	CALC MDA	RPTD MDA	UNITS	DPM SR-90	SR-90 YIELD
BL-00306-A-5b	BLANK	BL-00306	10	0.326	0.326	0.030	NR	pCi/g	NA	NA
BL-00306-A-5b	BLANK DUP	BL-00306D	10	0.096	0.096	0.026	NR	pCi/g	NA	NA
SDG: B015H8-PNL-053										
92-00921-A-1b	B015K3	92-00921	1.34	7754	7752	1.187	NR	pCi/g		
92-00358-A-1b	B015H1	92-00358	4.652	452	452	0.337	NR	pCi/g	NA	NA
92-00358-A-2b	B015H1 DUP	92-00358D	4.185	461	461	0.395	NR	pCi/g	NA	NA
92-00306-A-1b	B015G9 DUP	92-00306D	0.033	67692	67681	53.672	NR	pCi/g	NA	NA
92-00306-A-3b	B015G9 MS	MS-00306	1	46.3	46.3	1.502	NR	pCi/g	NA	NA
BS-00306-A-4b	BLANK SPIKE	BS-00306	NA	NA	NA	NA	NA	NA	1082	1.035
BL-00306-A-5b	BLANK	BL-00306	10	0.326	0.326	0.030	NR	pCi/g	NA	NA
BL-00306-A-5b	BLANK DUP	BL-00306D	10	0.096	0.096	0.026	NR	pCi/g	NA	NA

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LABORATORY: BATTELLE-PACIFIC NORTHWEST LABORATORIES

SAMPLE ID	HEIS #	LAB ID	DATE COUNTED	SAMPLE CPM - 1	SAMPLE CPM - 2	SAMPLE CPM-AVG	BKG CPM	VOLUME ALIQ.	BSC SOLN +FLSK, g	DRIED SOL +FLSK, g	COUNT EFF.	VOLUME LEACH.
SDG: B00X64-PNL-051												
91-6421-K-1	B00X77	91-6421	08/26/91	13.83	14.5	14.17	13.1	4.0153	143.06	120.37	3.492	175
91-6421-K-2	B00X77 DUP	91-6421D	08/26/91	14.05	14.53	14.29	13.1	4.0153	140.71	117.05	3.492	170
91-6421-K-5	BLANK	BL-6421	08/26/91	13.81	13.47	13.64	13.1	4.0153	136.52	112.78	3.492	165
		91-7015	08/26/91	15.21	15.25	15.23	13.1	4.0153	137.8	114.58	3.492	200
91-6421-K-4	B00X77 MS	91-6421MS	08/26/91	50.15	50.41	50.28	13.1	4.0153	137.32	114.72	3.492	250
SDG: B00X68-PNL-050												
91-7815-K-1	B00X75	91-7815	08/26/91	15.21	15.25	15.23	13.1	4.0153	137.8	114.58	3.492	200
91-6421-K-1	B00X77	91-6421	08/26/91	13.83	14.5	14.17	13.1	4.0153	143.06	120.37	3.492	175
91-6421-K-2	B00X77 DUP	91-6421D	08/26/91	14.05	14.53	14.29	13.1	4.0153	140.71	117.05	3.492	170
91-6421-K-5	BLANK	BL-6421	08/26/91	13.81	13.47	13.64	13.1	4.0153	136.52	112.78	3.492	165
SDG: B015G4-PNL-052												
92-00306-K-1	B015G9	92-00306	12/13/91	15.02	14.41	14.72	12.3	3.9977	110.048	85.658	3.269	70
92-00358-K-1	B015H1	92-00358	12/13/91	16.28	16.98	16.63	12.3	3.9977	108.986	85.89	3.269	60
92-00921-K-1	B015K3	92-00921	12/13/91	21.48	20.54	21.01	12.3	3.9977	112.646	87.263	3.269	75
92-00921-K-2	B015K3 DUP	92-00921D	12/13/91	17.51	17.22	17.37	12.3	3.9977	113.084	88.969	3.269	70
92-00921-K-5	BLANK	BL-921	12/13/91	12.74	13.24	12.99	12.3	3.9977	108.436	84.294	3.269	35
92-00921-K-4	BLANK SPIKE	MS-921	12/13/91	120.9	121.96	121.43	12.3	NA	NA	NA	3.269	NA
SDG: B015H8-PNL-053												
92-00921-K-1	B015K3	92-00921	12/13/91	21.48	20.54	21.01	12.3	3.9977	112.646	87.263	3.269	75
92-00921-K-2	B015K3 DUP	92-00921D	12/13/91	17.51	17.22	17.37	12.3	3.9977	113.084	88.969	3.269	70
92-00921-K-5	BLANK	BL-921	12/13/91	12.74	13.24	12.99	12.3	3.9977	108.436	84.294	3.269	35
92-00921-K-4	BLANK SPIKE	MS-921	12/13/91	120.9	121.96	121.43	12.3	NA	NA	NA	3.269	NA

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LABORATORY: BATTELLE-PACIFIC NOR

SAMPLE ID	HEIS #	LAB ID	ALIQUOT DISTILLED	RECOV. FACTOR	SAMPLE WEIGHT	CALC H3	RPTD H3	CALC MDA	RPTD MDA		SPIKE ACTIVITY	Fs VALUE
SDG: B00X64-PNL-051												
91-6421-K-1	B00X77	91-6421	25	0.7479	5.055	16.046	16.046	18	NR	pCi/g	NA	NA
91-6421-K-2	B00X77 DUP	91-6421D	25	0.7479	5.078	18.255	18.254	18	NR	pCi/g	NA	NA
91-6421-K-5	BLANK	BL-6421	25	0.7479	5	7.386	7.386	18	18	pCi/g	NA	NA
		91-7015	25	0.7479	5.05	39.305	39.304	21	NR	pCi/g	NA	NA
91-6421-K-4	B00X77 MS	91-6421MS	25	0.7479	0.998	NA	NA	NA	NA	NA	173.2	0.7478
SDG: B00X68-PNL-050												
91-7815-K-1	B00X75	91-7815	25	0.747	5.05	39	39	21	NR	pCi/g	NA	NA
91-6421-K-1	B00X77	91-6421	25	0.747	5.055	16	16	18	NR	pCi/g	NA	NA
91-6421-K-2	B00X77 DUP	91-6421D	25	0.747	5.078	18	18	18	NR	pCi/g	NA	NA
91-6421-K-5	BLANK	BL-6421	25	0.747	5	7	7	18	18	pCi/g	NA	NA
SDG: B015G4-PNL-052												
92-00306-K-1	B015G9	92-00306	25	0.7537	4.856	16.43	16.43	7	NR	pCi/g	NA	NA
92-00358-K-1	B015H1	92-00358	25	0.7537	5.002	23.31	23.32	6	NR	pCi/g	NA	NA
92-00921-K-1	B015K3	92-00921	26	0.7537	5.513	56.37	56.38	7	NR	pCi/g	NA	NA
92-00921-K-2	B015K3 DUP	92-00921D	25	0.7537	4.529	36.72	36.73	8	NR	pCi/g	NA	NA
92-00921-K-5	BLANK	BL-921	25	0.7537	5	2.20	2.2	3.5	4	pCi/g	NA	NA
92-00921-K-4	BLANK SPIKE	MS-921	NA	0.7537	NA	NA	NA	NA	NA	NA	473.3	0.7536
SDG: B015H8-PNL-053												
92-00921-K-1	B015K3	92-00921	26	0.7537	5.513	56.37	56.38	7	NR	pCi/g	NA	NA
92-00921-K-2	B015K3 DUP	92-00921D	25	0.7537	4.529	36.72	36.73	8	NR	pCi/g	NA	NA
92-00921-K-5	BLANK	BL-921	25	0.7537	5	2.20	2.2	3.5	4	pCi/g	NA	NA
92-00921-K-4	BLANK SPIKE	MS-921	NA	0.7537	NA	NA	NA	NA	NA	NA	473.3	0.7536

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INORGANIC ANALYSIS DATA VALIDATION CHECKLIST - FORM A-6

PROJECT: 200-BP-1	REVIEWER: [illegible]	DATE: 1/19/93
LABORATORY: PNL	CASE: B015H8	SDG: B015H8
SAMPLES/MATRIX: ~~B015G9 & B015H1 / Soils~~		
~~B015G9- PNL ID 92-00306~~		[illegible] 1/21/93
~~B015H1- PNL ID 92-00358~~		
B015K3 / Soil		
B015K3- PNL ID 92-00921		

1. COMPLETENESS AND CONTRACT COMPLIANCE

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	—	—	✓
Sample Data			
Inorganic Analysis Data Sheets	✓	—	—
Standards Data			
Initial and Continuing Calibration Verification	✓	—	—
CRDL Standard for AA and ICP	—	—	✓
QC Summary			
Blanks	✓	—	—
ICP Interference Check Summary	—	—	✓
Spike Sample Recovery	✓	—	—
Post-Digestion Spike Sample Recovery	—	—	✓
Duplicate	✓	—	—
Laboratory Control Sample	—	—	✓
Standard Addition Results	—	—	✓
ICP Serial Dilutions	—	—	✓
Instrument Detection Limits	—	—	✓
ICP Interelement Correction Factors	—	—	✓
ICP Linear Ranges	—	—	✓
Preparation Log	✓	—	—
Analysis Run Log	✓	—	—
Raw Data			
ICP Raw Data	✓	—	—
Furnace AA Raw Data	—	—	✓
Mercury Raw Data	—	—	✓
Cyanide Raw Data	—	—	✓
Additional Data			
Internal laboratory chain-of-custody	—	—	✓
Laboratory Sample Preparation Records	✓	—	—

Data Package Item	Present?: Yes	No	N/A
Percent Solids Analysis Records	✓		
Reduction Formulae			✓
Instrument Run Logs			✓
Chemist Notebook Pages			✓

2. HOLDING TIMES

Have all samples been analyzed within holding times? **Yes** No N/A

ACTION: If any holding times have been 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? All others are ok. Yes **No** N/A Uranium 234

Was a midrange cyanide standard distilled? Yes No **N/A**

ACTION: Qualify all data as unusable if reported from an analysis in which an instrument was not calibrated or was calibrated with less than the minimum number of standards. Qualify associated sample results > IDL as estimated (J) and results < IDL as estimated (UJ), if the correlation coefficient is <0.995 or the laboratory did not distill the midrange cyanide standard.

4. INITIAL AND CONTINUING CALIBRATION VERIFICATION

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 Section 8.3 of the validation requirements. If calculation errors are noted, contact the laboratory for clarification.

5. ICP INTERFERENCE CHECK SAMPLE

Has an ICS sample been analyzed at the proper frequency? Yes No **N/A**

Are the AB solution %R values within control? Yes No **N/A**

Are there calculation errors? Yes No **N/A**

ACTION: Qualify all affected data in accordance with Section 8.3 of the validation requirements. If calculation errors are noted, contact the laboratory for clarification.

6. 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). If analyte concentrations in the blank are >CRDL or below the negative CRDL, verify the laboratory has redigested and reanalyzed associated samples with analyte concentrations <10 times the blank concentration. If the laboratory has not redigested and reanalyzed the samples, note in the validation narrative.

7. 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).

8. MATRIX SPIKE SAMPLE ANALYSIS

Are spike recoveries within the control limits? Yes No N/A

Tc-99 & U

ACTION: Qualify the affected sample data according to the following requirements:

If spike recovery is >125% and sample results are <IDL no qualification is required. If spike recovery is >125% or <75% qualify all positive results as estimated (J). If spike recovery is 30% to 74% qualify all nondetects as estimated (UJ). If spike recovery is <30%, reject all nondetects (R). If the field blank has been used for spike analysis, note in the validation narrative.

9. 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 sample data 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 result 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.

10. 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 sample analyses in the data validation narrative.

11. DUPLICATE SAMPLE ANALYSIS

Are RPD values acceptable? Yes No N/A

ACTION: Qualify the results for all associated samples of the same matrix as estimated (J) if the RPD results fall outside the appropriate control limits. If field blanks were used for laboratory duplicates, note in the validation narrative.

12. ICP SERIAL DILUTION

Are the serial dilution results acceptable? Yes No N/A

Is there evidence of negative interference? Yes No N/A

ACTION: Qualify the associated data as estimated (J) for those analytes in which the %D is outside the control limits. If evidence of negative interference is found, use professional judgment to qualify the data.

13. FIELD DUPLICATE SAMPLES

Do the RPD values exceed the control limits? Yes No N/A

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

14. FIELD SPLIT SAMPLES

Do the RPD values exceed the control limits? Yes No N/A

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

1516. FURNACE ATOMIC ABSORPTION QUALITY CONTROL

Do all applicable analyses have duplicate injections? Yes No N/A

Are applicable duplicate injection RSD values within control? Yes No N/A

If no, were samples rerun once as required? Yes No N/A

Does the RSD for the rerun fall within the control limits? Yes No N/A

Were analytical spike recoveries within the control limits? Yes No N/A

If no, were MSA analyses performed when required?	Yes	No	N/A
Are MSA correlation coefficients ≥ 0.995?	Yes	No	N/A
If no, was a second MSA analysis performed?	Yes	No	N/A

ACTION: If duplicate injections are outside the acceptance limits and the sample has not been reanalyzed or the reanalysis is outside the acceptance limits, qualify the associated data as estimated (J for detects and UJ for nondetects). If the analytical spike recovery is <40% qualify detects as estimated (J). If the analytical spike recovery is $\geq$10% but <40%, qualify all nondetects as estimated (UJ) and if the analytical spike recovery is <10%, reject all nondetects (R). If the sample absorbance is <50% of the analytical spike absorbance and the analytical spike recovery is <85% or >115%, qualify all results as estimated (J for detects and UJ for nondetects). If method of standard additions (MSA) was required but was not performed, the MSA samples were spiked incorrectly, or the MSA correllation coefficient was <0.995, qualify the associated detected results as estimated (J).

17. ANALYTE QUANTITATION AND DETECTION LIMITS

Have results been reported and calculated correctly?	No - Uranium ~~Yes~~	~~No~~ 01/20/93	N/A 01/21
Are results within the calibrated range of the instruments and within the linear range of the ICP?	Yes	No	N/A
Are all detection limits below the CRQL?	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).

18. 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 Tc-99 MS%R is 215%. Therefore, all assoc. Tc-99 results have been qualified as ~~rejected (R)~~. estimated (J/UJ). 1/20/93

The correlation factor for U-234 is below 0.995. However, U-234 data is not used for quantitation. Therefore, no qualification is required

The RPD for Tc-99 is ~~215%~~. 133%. 1/20/93 Therefore, the assoc. results have been qualified as estimated (J/UJ)

The method blank for Tc-99 was reported at 20 pCi/g. The sample results less than 5x20 pCi/g (100 pCi/g) have been qualified as undetected. 1/21/93

The Total U %R is ~~32.2%~~ 47.8%. Therefore, the associated results have been qualified as estimated (J/UJ). 1/20/93

The uranium sample results for B015G9, B015G9 Dup, and B015G9MS (92-00306) have been rejected since the sample results cannot be verified.

LCS samples were run with this SDG- however, the true value is unknown.

1/21/93

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1/14/93

200-BP-1 RADIOCHEMISTRY DATA VALIDATION						PAGE 1	OF 2
DATA PACKAGE ID: 801548-PNL-053				REVIEWER		DATE: 1/14/93	
COMMENTS: PNL ID: 92-00921							
HEIS SAMPLE#	SAMPLE DATE	ANALYSIS DATE	HOLDING TIME, DAYS	NUCLIDE	HALF LIVE DAYS	FIVE TIMES HALF LIFE	QUALIFIER
801543	10/22/91	11/20/91	29	TC-99	7.77E+07	3.89E+08	None
		11/22/91	31	GR-A	N/A	N/A	
		12/09/91	48	GR-B	N/A	N/A	
		11/18/91	27	SR-90	1.04E+04	5.20E+04	
		NA	NA	BE-7	53	266	
		NA		K-40	1.30E+09	6.50E+09	
				MN-54	312	1560	
				CO-58	71	355	
				FE-59	44	220	
		11/11/91	20	CO-60	365	1825	
		NA	NA	ZN-65	244	1220	
				ZR-95	64	320	
				RU-103	39	195	
		11/11/91	20	RU-106	365	1825	
		NA	—	CS-134	730	3650	
		11/11/91	20	CS-137	1.09E+04	5.48E+04	
		NA	NA	BA-140	13	64	
				CE-141	33	165	
				CE-144	285	1425	
				RA-226	5.84E+05	2.92E+06	
				TH-228	694	3470	
		11/20/91	29	TOTAL-U	1.63E+12	8.14E+12	
		11/19/91	28	PU-238	3.20E+04	1.60E+05	
		11/19/91	28	PU-239	8.80E+06	4.40E+07	
		NA	NA	U-235	2.57E+11	1.28E+12	
				U-238	1.63E+12	8.15E+12	
		12/13/91	52	H-3			

9613497.2951

200-BP-1 RADIOCHEMISTRY DATA VALIDATION						PAGE 2	OF 2
DATA PACKAGE ID: B015H8-PNL-053				REVIEWER:		DATE: 1/19/93	
COMMENTS: PNL ID: 92-00921 Dup							
HEIS SAMPLE#	SAMPLE DATE	ANALYSIS DATE	HOLDING TIME, DAYS	NUCLIDE	HALF LIVE DAYS	FIVE TIMES HALF LIFE	QUALIFIER
B015K3	10/22/91	NA	—	TC-99	7.77E+07	3.89E+08	—
		11/22/91	31	GR-A	N/A	N/A	none
		12/09/91	48	GR-B	N/A	N/A	none
		NA	NA	SR-90	1.04E+04	5.20E+04	NA
				BE-7	53	266	
				K-40	1.30E+09	6.50E+09	
				MN-54	312	1560	
				CO-58	71	355	
				FE-59	44	220	
				CO-60	365	1825	
				ZN-65	244	1220	
				ZR-95	64	320	
				RU-103	39	195	
				RU-106	365	1825	
				CS-134	730	3650	
				CS-137	1.09E+04	5.48E+04	
				BA-140	13	64	
				CE-141	33	165	
				CE-144	285	1425	
				RA-226	5.84E+05	2.92E+06	
				TH-228	694	3470	
				TOTAL-U	1.63E+12	8.14E+12	
				PU-238	3.20E+04	1.60E+05	
				PU-239	8.80E+06	4.40E+07	
				U-235	2.57E+11	1.28E+12	
				U-238	1.63E+12	8.15E+12	
		12/13/91	52	H-3			none

DATA QUALIFICATION SUMMARY - FORM B-7

pg 1 of 1

SDG: B0154H8	REVIEWER: [illegible]	DATE: 1/25/93	PAGE 1 OF 1
COMMENTS: ICP MS (TC-99 & Total U):			

COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
TC-99	J/UJ	All	MS %R is 215%
TC-99	J/UJ	All	RPD is ~~215%~~ 133%
Total U	J/UJ	All	BS %R is 47.8%
All (TC-99 & Total U)	J	All	LCS not performed

2/5/93

1/25/

SDG: B015H8-PNL-053

TABLE 9: ICP-MS ANALYSIS DATA FOR TASKS 2 & 4
SDG #9

Spike recovery values corrected for contributions from blank or sample

PNL sample I.D. Number (a)	DRY WEIGHT	DILUTION FACTOR (b)	ICP/MS Analysis No.		Tc-99, ng/ml solution analyzed	Tc-99, ng/g soil (c,d)	Tc-99, ng/g spiked (d)	Tc-99, spike recovery, % (e,f)	Tc-99, pCi/g, dry soil (f)	U, ng/ml solution analyzed	U, ng/g soil (c,d)	U, ng/g spiked (d)	U, spike recovery, % (e,g)	U, pCi/g (total), dry soil (h)
92-00306-B1 *	1.0165	2007.6	10	6	0.001	~~2.0~~	2.0			1.1860	2380			1.7 R
92-00306-B2 *	1.0223	1996.3	10	8	0.005±.001	10.0		34 ~~35~~ ~~34~~	170±35	1.0640	2120			1.5 R
92-00306-B3 *	1.0205	1999.8	10	10	0.0114	22.8	7.8	215 ~~165~~	386	0.9810	1960	7.79	87	1.4 R
92-00306-B5 *	N/A	1000.0	5	4	0.0012	1.2			20	0.0040	4.0			0.0
92-00306-B6 *	N/A	1000.0	5	3	0.0084	8.4	8.0	91	142	0.0078	7.8	7.95	47 ~~83~~ ~~72~~ ~~65~~	N/A
92-00358-B1 *	1.1623	894.8	5	12	0.010±.004	9.2			160±70	1.973	1770			1.2
92-00921-B1 K	1.1159	1899.0	10	14	0.0041	7.8			132	16.984	32300			22.6

(a) Sample types:
B1 = sample
B2 = sample, duplicate
B3 = sample + Tc/U spike
B5 = procedural blank
B6 = procedural blank + Tc/U spike
* Not samples in the SDG but reported for QC purposes

Sample 92-00921 (B015K3) is in this SDG. Samples 92-00306 (B015G9) and 92-00358 (B015H1) are not in this SDG.

(b) units of mL/g dry soil except for -B5 and -B6 samples (blank/blank spike) units of mL; includes 5X or 10X addition dil.
(c) leachate concentration corrected for preparation dilution factor and additional dilution for analysis (5X or 10X).
(d) -B3 reported in units of ng/g; -B6 reported in ng
(e) Recovery = [Spiked Sample]/([Sample]+[Spike])
(f) Despite positive values obtained for Tc, only spike samples had an observable Tc peak. Values >LLD are due to an increased background observed for soil digestate samples.
(g) For blank spike, [U] in diluted sample approached LLD.
(h) total uranium activity calculated using natural isotopic abundance for soil leachate [U] < 200 ppb: pCi = [U]*0.000336/0.481
DL= Detection Limit is dependent on sample weight and dilution volume (see footnote C).

Tc-99 MS %R = $\frac{22.8 - \left(\frac{10+2.1}{2}\right)}{7.8} \times 100 = 215\%$

Tc-99 RPD = $\frac{10 - 2.0}{\left(\frac{10+2.0}{2}\right)} \times 100 = 133\%$

U BS %R = $\frac{7.8 - 4}{7.95} \times 100 = 47.8\%$

U RPD = $\frac{2380 - 2120}{\left(\frac{2380+2120}{2}\right)} \times 100 = 11.6\%$

1/21/93