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

**TOTAL ORGANIC CARBON
DATA PACKAGE NO. 1**

Revision 0



November 5, 1990

Prepared by: B.M. Gillespie



Battelle, Pacific Northwest Laboratory

i KLB 5/29/96

INTRODUCTION

This data package contains the results obtained by Pacific Northwest Laboratory (PNL) staff in the characterization of samples for the 200-BP-1 Groundwater Analysis Project. The samples were submitted for analysis by Westinghouse Hanford Company (WHC) under the Draft WHC Statement of Work and a Draft PNL Statement of Work which became the Draft Technical Project Plan (TPP) 17662. The analytical procedures required for analysis were defined in a letter to the Task Leader. This data report contains no technical assessment of the analytical results.

Eleven soil samples (Table 1) were submitted with the appropriate WHC Chain of Custody (COC) and Sample Analysis Request Forms in April and May of 1990. The samples were delivered at refrigerated temperature to Building 325 in the 300 Area. The samples were analyzed in the 325 building.

The requested analysis for these eleven soil samples was Total Organic Carbon by SW 846 Method 9060. The procedure used was PNL 7-40.37, which is comparable to SW 846 Method 9060. There were no further requests for analysis of the other parameters of interest addressed in the QAPJP ALO-001. The quality control (QC) requirements for each sample were defined in a letter to the Task Leader as directed by the client, WHC. The QC requirements outlined in SW 846 Method 9060 are for quadruplicate analysis of each sample. WHC directed PNL to analyze the samples only in duplicate with a method blank per each batch of samples analyzed. All QC data that exist are include in this Data Report/Package.

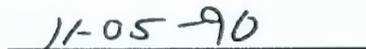
The data in this package are reported in Table 2. The chemical analysis data are reported on a per received basis. That is, no corrections were made for the weight percent water in the samples. Three appendices are provided; one for Test Instruction, one for Chain of Custody and Sample Analysis Request Forms and one that contains the primary analytical data.

CERTIFICATION STATEMENT

I certify that this data package is in compliance with the terms and conditions of the TPP 16772 and PAPjp ALO-001 for completeness. Release of the data contained in this hard copy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Project Manager or the Project Manager's designee, as verified by the following signature.



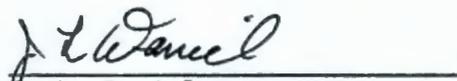
B. M. Gillespie
200-BP-1 Project Manager



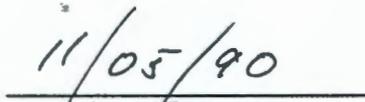
Date

Quality Control

I certify that I have reviewed all data in this report/package for completeness of the QC data and for compliance with project QC requirements as defined in the TPP 16772 and the QAPjp ALO-001.



J. L. Daniel
PNL ACL Quality Representative



Date

Table 1: 200-BP-1 Sample Numbers

<u>WHC Sample Number</u>	<u>PNL ALO Sample Number</u>
699-49-57B-157.5	90-3280
699-49-57B-157.5D	90-3281
699-49-57B-160	90-3282
699-49-57B-161	90-3283
699-50-53B-EB	90-3314
699-50-53B-155.7	90-3315
699-48-50-176	90-3460
699-48-50-176.7	90-3461
699-48-50-168-1	90-3462
699-48-50-168-2	90-3463
699-52-54-168.5	90-3728

TOTAL ORGANIC CARBON ANALYSIS RESULTS

The sample and its accompanying QC samples were prepared by procedure PNL-7-40.37, 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.

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 source of carbon in the blank is adsorbed CO₂ on the boat and ladle. The blank is obtained by removing the quartz ladle and platinum boat from the furnace tube, then these parts are placed in the furnace and carbon analysis is performed on this blank. 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 the absolute instrument detection limit (i.e., a measure of instrument sensitivity) under current laboratory operating conditions. Therefore, as the daily blank represents the background carbon level in this analysis, it sets the lower method quantification limit. 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 ~5 μ g 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 average "method detection limit" value is useful in evaluating future applicability of this analytical method.

Samples were analyzed in duplicate. Duplicate results differed significantly. The percent standard deviations (as defined in the QAPjP ALO-001) ranged from less than 1% to 53%. This variability of difference is mostly attributed to the heterogeneity of the soil samples received. Due to the large amount of sample inhomogeneity observed in the samples, WHC was consulted on this issue in order to determine an acceptable method for obtaining a representative sub-sample. However, it should be noted that the possibility, however remote, of analytical error cannot be completely eliminated based on the 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 results (of the same Kodak α -D Glucose standard) for this set of data, the recoveries ranged from 80.4% to 98%. The average recovery was 92% with a standard deviation of 5%. The conclusion is that the best that can be expected from the procedure (at concentrations >25 times the nominal detection limit) is a precision of $\pm 5\%$ relative, and a bias (accuracy) of -8% on the average.

The general 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 the eleven sample analyses in this data report.

Table 2: 200-BP-1 Total Organic Carbon Analysis Data

WHC Sample ID#	PNL-ALO #	Sample wt. g	ug C Blank (Pt Boat in Ladle)	ug C Result	ug C in Sample	ug C/g Sample	% std dev of Dups	Date Sampled	Date Analyzed	Glucose Spike g	ug C Spike g	ug C (Spike) Sample + Blank) Observed	% Spike Recovery
699-49-57B-157.5	90-3280	0.18792	4.75	37.29	32.54	173	26%	4/24/90	4/27/90				
"	"	0.19745	4.75	28.45	23.7	120		4/24/90	4/27/90				
699-49-57B-157.5D	90-3281	0.25495	4.75	29.06	24.31	95	39%	4/24/90	4/27/90				
"	"	0.31045	4.75	21.47	16.72	54		4/24/90	4/27/90				
699-49-57B-160	90-3282	0.27366	4.75	23.53	18.78	69	19%	4/24/90	4/27/90				
"	"	0.27637	4.75	19.3	14.55	53		4/24/90	4/27/90				
699-49-57B-161	90-3283	0.27576	3.16	34.41	31.25	113	1%	4/24/90	4/30/90				
"	"	0.34931	3.16	42.35	39.19	112		4/24/90	4/30/90				
699-50-53B-EB	90-3314	0.18475	2.92	20.23	17.31	94	34%	4/25/90	5/01/90				
"	"	0.24803	2.92	17.13	14.21	57		4/25/90	5/01/90				
699-50-53B-155.7	90-3315	0.29305	2.92	15.63	12.71	43	53%	4/25/90	5/01/90				
"	"	0.3047	2.92	31.92	29.05	95		4/25/90	5/01/90				
Spike													
699-49-57B-157.5D	90-3281	0.14141	4.8	-	(10.55)	-		4/24/90	5/03/90	0.0030	(1228)	1090.7	87.56
Spike Duplicate													
699-49-57B-157.5D	"	0.15612	4.8	-	(11.65)	-		4/24/90	5/03/90	0.0040	(1608)	1455.39	88.84
6699-48-50-168-1	90-3462	0.2176	4.67	43.02	38.35	176	15%	5/03/90	5/15/90				
"	"	0.26443	4.67	42.03	37.36	141		5/03/90	5/15/90				
699-48-50-176	90-3460	0.2063	12.48	43.29	30.81	149 *	1%	5/04/90	5/16/90				
"	"	0.2602	12.48	50.84	38.36	147 *		5/04/90	5/16/90				
699-48-50-168-2	90-3463	0.3129	4.67	45.72	41.05	131	8%	5/03/90	5/15/90				
"	"	0.30397	4.67	49.18	44.51	146		5/03/90	5/15/90				
699-48-50-176.7	90-3461	0.1986	12.48	56.34	43.86	221 *	1%	5/04/90	5/16/90				
"	"	0.1997	12.48	55.99	43.51	218 *		5/04/90	5/16/90				
699-52-54-168.5	90-3728	0.12935	4.42	40.65	36.23	280	10%	5/22/90	5/30/90				
"	"	0.11188	4.42	42.41	37.99	340		5/22/90	5/30/90				
"	"	0.1258	4.42	38.86	34.44	274		5/22/90	5/30/90				
"	"	0.12742	4.42	43.24	38.82	305		5/22/90	5/30/90				

* Results may be low due to uncertainty in blank value. Based on an average blank value of 5 ug C, the reported sample values may be ~20% low.

9613472-2024

Westinhouse Hanford Company

CHAIN OF CUSTODY

Company Contact W.S. Thompson Telephone (509) 373-3818

Sample Collected by W.S. Thompson JW Roberts Date 4/24/90 Time 0830, 0830, 1020
11:30

Sample Locations 699-49-57B

Ice Chest No. RM #9 Field Logbook and Page No. WHP-N-385-1

Remarks Soil samples in 125 ml bottles, on ice, sent to 325 PNL lab for analysis of Total Organic Carbon

Bill of Lading No. NA Offsite Property No. NA

Method of Shipment handcarry on ASL sample van to 325 PNL lab

Shipped to 325 Bldg, PNL

Sample Identification

1) 699-49-57B-157.5 (90-3280) analysis
1, 125ml, clear glass, soil, SW-846, Method 9060, TOC, chemical analysis wst 4/24/90

2) 699-49-57B-157.5 D (90-3281)
1, 125ml, clear glass, soil, SW-846, Method 9060, TOC, chemical analysis

3) 699-49-57B-160; 1, 125ml, clear glass; soil; SW846, Method 9060, T.O.C.; chemical analysis
(90-3282)

4) 699-49-57B-161; 1, 125ml, clear glass; soil; SW846, Method 9060, T.O.C.; chemical analysis
(90-3283)

Chain of Possession

Relinquished by: <u>W.S. Thompson</u>	Received by: <u>M. Steele</u>	Date/Time: <u>4/24/90 1245</u>
Relinquished by: <u>M. Steele</u>	Received by: <u>Cusina & Bellafatto</u>	Date/Time: <u>4/24/90 2:40</u>
Relinquished by: <u>Cusina & Bellafatto</u>	Received by: <u>Gerald A. Ross</u>	Date/Time: <u>4/27/90 8:10</u>
Relinquished by: "	Received by: "	Date/Time: "



Westinghouse
Hanford Company

SAMPLE ANALYSIS REQUEST

PART I: FIELD SECTION

Collector W.S. Thompson

Date Sampled 4/24/90 Time 0830 hours

Company Contact W.S. Thompson; JW Roberts

Telephone (509) 373-3818 ⁰⁸³⁰ 1020/1130

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
1) 699-49-57B-157.5	1, 125 ml, clear glass	soil, SW846	Method 9060; TOC; chill on ice
2) 699-49-57B-157.5 D	1, 125 ml, clear glass	soil, SW846	Method 9060; TOC; chill on ice
3) 699-49-57B-160	1, 125 ml, clear glass	soil, SW846	Method 9060; TOC; chill on ice
4) 699-49-57B-161	1, 125 ml, clear glass	soil, SW846	Method 9060; T.O.C; chill on ice

Field Information** soil samples to be shipped to 325 PNL lab for TOC

^{WST} ~~SW86~~ SW846, Method 9060
_{4/24/90}

Special Handling and/or Storage None

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.

Westinhouse Hanford Company

CHAIN OF CUSTODY

Company Contact W.S. Thompson Telephone (509) 373-3818

Sample Collected by W.S. Thompson, J.W. Roberts Date 5-4-90 Time 1000, 1130

Sample Locations 699-48-50

Ice Chest No. RM #3 Field Logbook and Page No. WHC-N-287-2 #545k

Remarks Soil samples in 125 ml bottles, chilled on ice, sent to 325 PNL lab for TOC analysis

Bill of Lading No. NA Offsite Property No. NA

Method of Shipment handcarried in ASL sample van to 325 PNL lab in 300 area

Shipped to 325 Bldg., PNL (300 area)

Sample Identification

1) 699-48-50-176

1, 125 ml, clear glass, soil, SW-846, Method 9060 TOC Chemical analysis

2) 699-48-50-176.7

1, 125 ml, clear glass, soil, SW-846, Method 9060, TOC, Chemical analysis

Chain of Possession

Relinquished by: <u>J.W. Roberts</u>	Received by: <u>R. Z. Stoff</u>	Date/Time: <u>5-4-90 1209</u>
Relinquished by: <u>R. Z. Stoff</u>	Received by: <u>Deana Z. Bellagatto</u>	Date/Time: <u>5-4-90 2:26 p</u>
Relinquished by: <u>Deana Z. Bellagatto</u>	Received by: <u>S.V. Archer</u>	Date/Time: <u>5-14-90 / 1353</u>
Relinquished by:	Received by:	Date/Time:

Westinhouse Hanford
Company

CHAIN OF CUSTODY

Company Contact W.S. Thompson Telephone (509) 373-3818
 Sample Collected by W.S. Thompson, T.W. Roberts Date 5/3/90 Time 1415
 Sample Locations 699-48-50
 Ice Chest No. RM #3 Field Logbook and Page No. WMC-N-287-2, p.1-2
 Remarks Soil samples in 125ml bottles, on ice, sent to 325 PNL lab for analysis
of Total Organic Carbon (TOC)
 Bill of Lading No. N/A Offsite Property No. N/A
 Method of Shipment Hand carry on ASL sample van to 325 PNL lab, 325 Bldg., PNL
 Shipped to 325 Bldg., PNL

Sample Identification

- 1) 699-48-50-168-1
1, 125 ml, clear glass, soil, SW 846, Method 9060, TOC, chemical analysis
- 2) 699-48-50-168-2
1, 125 ml, clear glass, soil, SW 846, Method 9060, TOC, chemical analysis

Chain of Possession

Relinquished by: <u>James W. Roberts</u>	Received by: <u>R. J. Stoff</u>	Date/Time: <u>5-3-90 1451</u>
Relinquished by: <u>R. J. Stoff</u>	Received by: <u>Devin & Belliofatto</u>	Date/Time: <u>5-4-90 2:26 p</u>
Relinquished by: <u>Devin & Belliofatto</u>	Received by: <u>S. V. Archer</u>	Date/Time: <u>5-14-90 / 1355</u>
Relinquished by:	Received by:	Date/Time:

Westinhouse Hanford Company

CHAIN OF CUSTODY

Company Contact W.S. Thompson Telephone (509) 373-3818
 Sample Collected by W.S. Thompson Date 5/22/90 Time 1020
 Sample Locations 699-52-54 (200th operable unit groundwater borehole)
 Ice Chest No. RM# 7 poly cooler Field Logbook and Page No. W.S. 5/22/90 WHC-N-287-2
 Remarks Soil samples in 125 ml. bottles, on ice, sent to 325 PNL lab for analysis of TOTAL ORGANIC CARBON (TOC)
 Bill of Lading No. N/A Offsite Property No. N/A
 Method of Shipment hand carry in EFSG van to 325 lab
 Shipped to 325 Bldg., PNL

Sample Identification

1) 699-52-54-168.5
1.125 ml. amber w/ stopper glass, soil, SW-846, Method 9060, TOC, chemical analysis

Chain of Possession

Relinquished by: <u>Wendy S. Thompson</u> <u>Wendy S. Thompson</u>	Received by: <u>C.S. McClellan</u> <u>C. McClellan</u>	Date/Time: <u>5/22/90 13:45</u>
Relinquished by: <u>C.S. McClellan</u> <u>C. McClellan</u>	Received by: <u>D.V. Archer</u> <u>D.V. Archer</u>	Date/Time: <u>5-22-90 13:58 hrs</u>
Relinquished by: <u>D.V. Archer</u> <u>D.V. Archer</u>	Received by: <u>D.A. Ross</u> <u>D.A. Ross</u>	Date/Time: <u>5-30-90 1340</u>
Relinquished by:	Received by:	Date/Time:

SAMPLE RECEIVING/LOG-IN INFORMATION

Sample Log-In Information

Person Receiving Sample: Dale Archer Date 5-22-90
 Sample Log-In Number(s): 90-3728 *
 Client Sample Number(s): 699-52-54-168.5 *
 In-House Sample Number: _____ *
 Results Required By: 6/5/90 Client/Project: W.S. Thompson
 Work Package/Charge Code: _____ QA Plan: _____
 MA-70 Impact Level: TT EPA Analytical Level: _____
 Requested Analyses: TDC

Lab Technical Leader: Bob Stromatt
 Client Point of Contact: ^{DPO} W.S. Thompson Phone: 3-3818
 Sample Archive Requirements: N/A
 Hazardous Waste Disposal Issues: N/A
 Special Requirements: N/A

Sample Receiving Information

Condition of Shipping Container: good
 Chain-of-Custody Records Included? Yes X No _____
 Chain-of-Custody Requirements: yes
 Condition of Samples: good
 Discrepancies in Shipping Records/Samples? Yes _____ No X
 Sample Storage Location: Lab 301-A REFRIGERATOR
 Sample Storage Requirements: 4°C ± 2°C
 Sample Custodian: Dale Archer

* See back of form if more than one sample number per page

In accordance with PNL-ALO-010, Rev. 2, no internal
PNL Chain-of-Custody were required for these samples.



Westinghouse
Hanford Company

OSM RCRA LEVEL C DATA ASSESSMENT

DATE	<u>02/08/91</u>	SAMPLES/MATRIX	<u>49-57B-157.5</u>	<u>48-50-176</u>
REVIEWED BY	<u>JA Lerch</u>	- all samples begin w/699 prefix	<u>49-57B-157.5D</u>	<u>48-50-176.7</u>
LABORATORY	<u>PNL-325</u>		<u>49-57B-160</u>	<u>48-50-168-1</u>
CASE #	<u>TPP 16772</u>		<u>49-57B-161</u>	<u>48-50-168-2</u>
SDG #	<u>Report 1; Rev 0</u> <u>TOC</u>		<u>50-53B-EB</u> <u>50-53B-155.7</u>	<u>52-54-168.5</u>

DATA ASSESSMENT SUMMARY - all soil

QUALITY CONTROL CHECK	ANALYSIS	TOC		
1. <u>Holding Time</u>		<u>0</u>		
2. <u>Matrix Spike</u>		<u>0</u>		
3. <u>Duplicate Analysis</u>		<u>X</u>		
4. <u>Blanks</u>		<u>0</u>		
5. <u>Calibration/Control Stds</u>		<u>0</u>		
6. <u>Other QC - see attachment</u>				
7. _____				
8. _____				
9. _____				
10. _____				

0 = data had no problems
X = data qualified due to minor problems
M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: no major problems - all results
acceptable w/qualification

NOTES: none

o Refer to the corresponding attachments for explanation of any problems.

RCRA LEVEL C QC

Name JA Lerch *jl* Date 02/08/91

QC Check: holding time

COMMENTS: 14 day requirement met for
all samples

ACTION: none

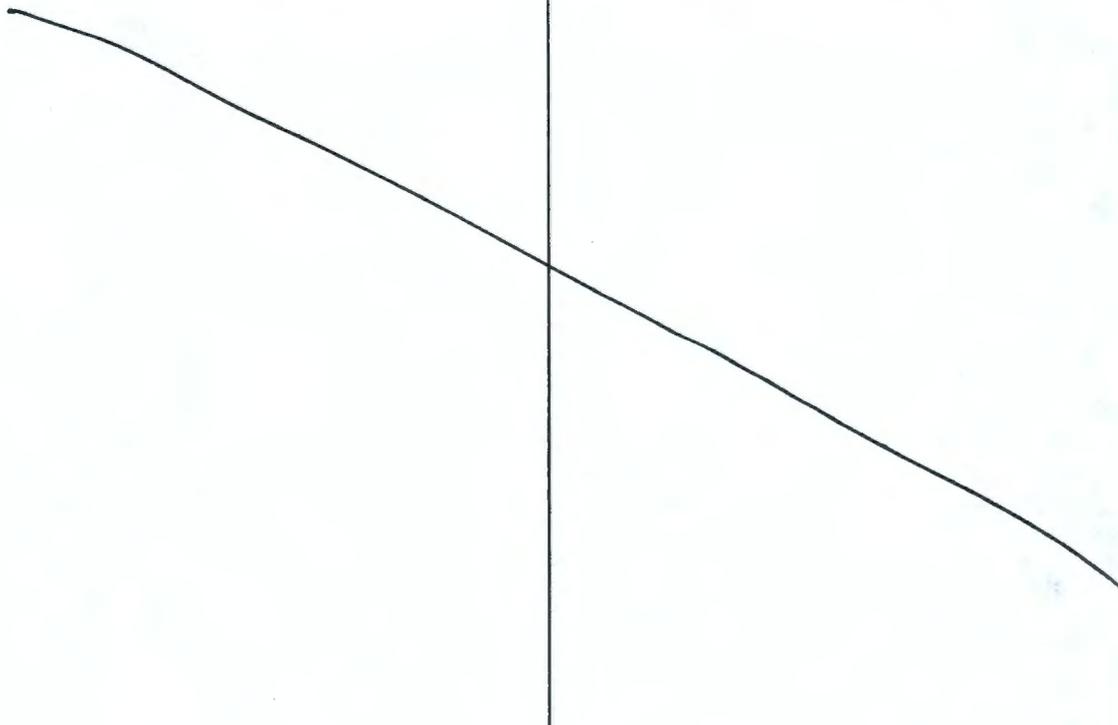
<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
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~~Table content is crossed out with a large diagonal line.~~

RCRA LEVEL C QC

Name JA Lerch *JL* Date 02/08/91QC Check: Dাত্রী SpikeCOMMENTS: spike & spike duplicate 70R acceptable- no MS or MSD required by SOW or procedureACTION: none

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
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RCRA LEVEL C QC

Name JA Lerch Date 02/08/90QC Check: Duplicate AnalysisCOMMENTS: all samples run in duplicate, some RPD's high (>15%)ACTION: qualify associated results as per OSM guidelines

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
699-49-57B-157.5	TOC	J			
699-49-57B-157.5D	↓	↓			
699-49-57B-160	↓	↓			
699-50-53B-EB	↓	↓			
699-50-53B-155.7	↓	↓			

RCRA LEVEL C QC

Name JA Lerch *JL* Date 02/08/91QC Check: Blanks

COMMENTS: daily blanks are used to set quantitation
limits (see CASE NARRATIVE)
evaluation of contamination cannot
be made, - all results sig > than
any blank values

ACTION: _____

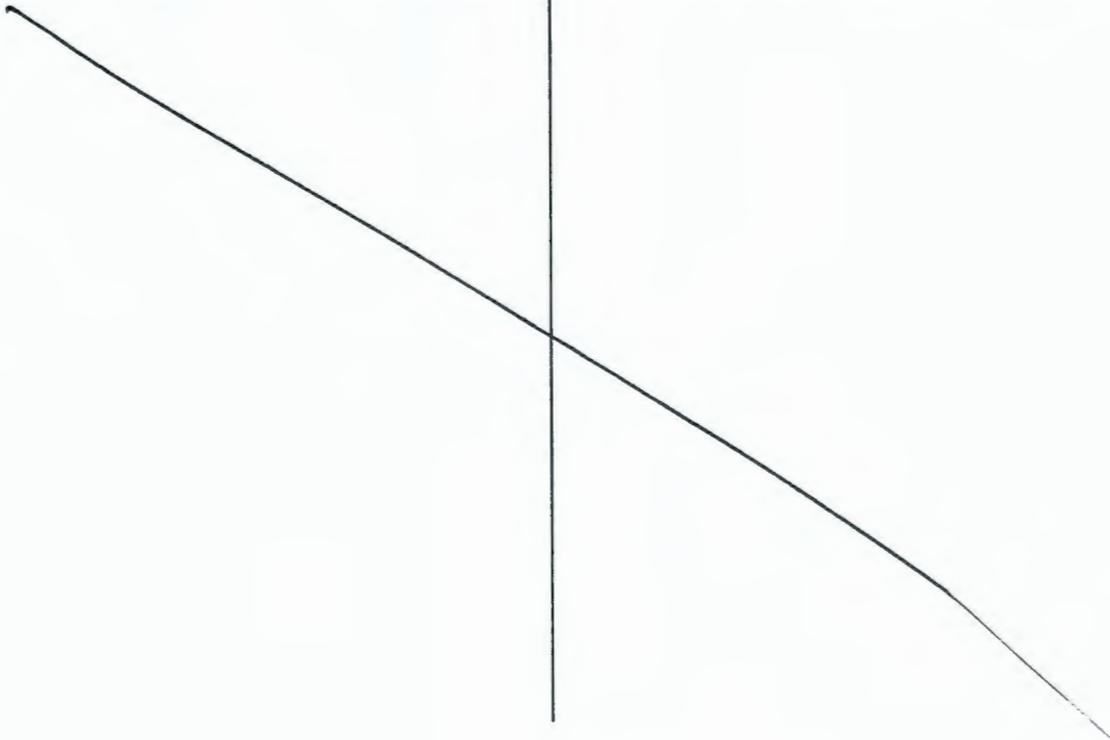
none

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>

RCRA LEVEL C QC

Name JA Lerch *JL* Date 02/08/91QC Check: calibration/control StdCOMMENTS: glucose std used for calibration;
recoveries acceptableACTION: none

<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>	<u>sample #</u>	<u>constituent</u>	<u>value/qual</u>
-----------------	--------------------	-------------------	-----------------	--------------------	-------------------



RCRA LEVEL C QC

Name J A Lerch *JL* Date 02/08/91

QC Check: Other QC

COMMENTS: Table 2: ug C in sample = result -
blank value; sample values
may be biased low

ACTION: none

sample # constituent value/qual | sample # constituent value/qual

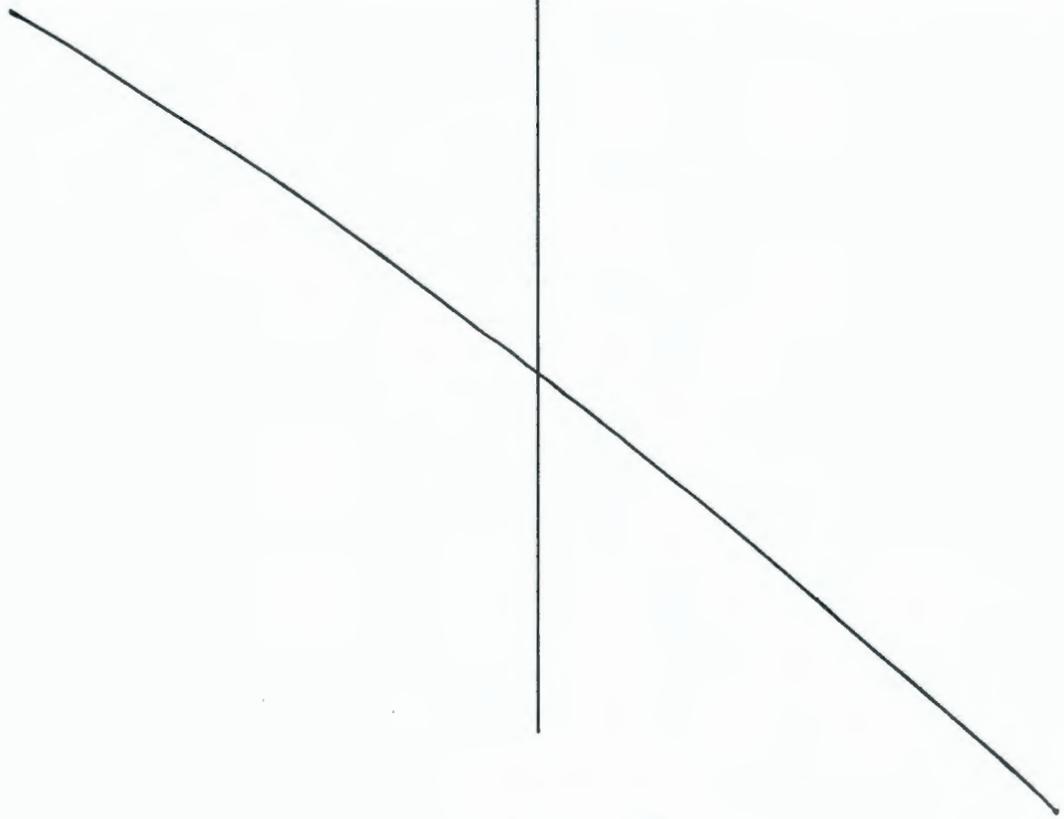


Table 2: 200-BP-1 Total Organic Carbon Analysis Data

WHC Sample ID#	PNL-ALO #	Sample wt. g	ug C Blank (Pt Boat in Ladle)	ug C Result	ug C in Sample	ug C/g Sample	% std dev of Dups	Date Sampled	Date Analyzed	Glucose Spike g	ug C Spike g	ug C (Spike) Sample + Blank) Observed	% Spike Recovery
699-49-57B-157.5	90-3280	0.18792	4.75	37.29	32.54	173 J	26%	4/24/90	4/27/90				
"	"	0.19745	4.75	28.45	23.7	120		4/24/90	4/27/90				
699-49-57B-157.5D	90-3281	0.25495	4.75	29.06	24.31	95 J	39%	4/24/90	4/27/90				
"	"	0.31045	4.75	21.47	16.72	54		4/24/90	4/27/90				
699-49-57B-160	90-3282	0.27366	4.75	23.53	18.78	69 J	19%	4/24/90	4/27/90				
"	"	0.27637	4.75	19.3	14.55	53		4/24/90	4/27/90				
699-49-57B-161	90-3283	0.27576	3.16	34.41	31.25	113	1%	4/24/90	4/30/90				
"	"	0.34931	3.16	42.35	39.19	112		4/24/90	4/30/90				
699-50-53B-EB	90-3314	0.18475	2.92	20.23	17.31	94 J	34%	4/25/90	5/01/90				
"	"	0.24803	2.92	17.13	14.21	57		4/25/90	5/01/90				
699-50-53B-155.7	90-3315	0.29305	2.92	15.63	12.71	43 J	53%	4/25/90	5/01/90				
"	"	0.3047	2.92	31.92	29.05	95		4/25/90	5/01/90				
Spike													
699-49-57B-157.5D	90-3281	0.14141	4.8	-	(10.55)	-		4/24/90	5/03/90	0.0030	(1228)	1090.7	87.56
Spike Duplicate													
699-49-57B-157.5D	"	0.15612	4.8	-	(11.65)	-		4/24/90	5/03/90	0.0040	(1608)	1455.39	88.84
6699-48-50-168-1	90-3462	0.2176	4.67	43.02	38.35	176	15%	5/03/90	5/15/90				
"	"	0.26443	4.67	42.03	37.36	141		5/03/90	5/15/90				
699-48-50-176	90-3460	0.2063	12.48	43.29	30.81	149 *	1%	5/04/90	5/16/90				
"	"	0.2602	12.48	50.84	38.36	147 *		5/04/90	5/16/90				
699-48-50-168-2	90-3463	0.3129	4.67	45.72	41.05	131	8%	5/03/90	5/15/90				
"	"	0.30397	4.67	49.18	44.51	146		5/03/90	5/15/90				
699-48-50-176.7	90-3461	0.1986	12.48	56.34	43.86	221 *	1%	5/04/90	5/16/90				
"	"	0.1997	12.48	55.99	43.51	218 *		5/04/90	5/16/90				
699-52-54-168.5	90-3728	0.12935	4.42	40.65	36.23	280	10%	5/22/90	5/30/90				
"	"	0.11188	4.42	42.41	37.99	340		5/22/90	5/30/90				
"	"	0.1258	4.42	38.86	34.44	274		5/22/90	5/30/90				
"	"	0.12742	4.42	43.24	38.82	305		5/22/90	5/30/90				

JZ
02/08/90

* Results may be low due to uncertainty in blank value. Based on an average blank value of 5 ug C, the reported sample values may be ~20% low.

699-49-57B-157.5D