

Supplemental Soil Sampling Results

Lockheed Martin Corporation Syracuse, New York

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 Table	e of Contents	i
1.	Introduction	1
2.	Sample Methodology	1
3.	Results	1
4.	References	2

TABLES

1. Supplemental Soil Sample Cadmium Concentrations

FIGURES

1. Soil Sample Locations

ATTACHMENTS

1. Data Validation Report

1. INTRODUCTION

This memorandum describes the results of a supplemental soil sampling program that was conducted to assist in development of the remedial design for the upper portion of the Bloody Brook site located immediately south of the New York State Thruway. This soil sampling was conducted in December 2007, and followed the Supplemental Soil Sampling Work Plan (ARCADIS BBL, 2007).

2. SAMPLE METHODOLOGY

A single 2-foot soil core was collected from each of five locations using a macrocore sampler. Samples were located using survey-grade GPS. The cores were photographed and visual observations were recorded in the field notes. Cores were segregated into two depth intervals: 0-6 inch and 6-24 inch. Individual samples were homogenized and placed in the appropriately-labeled container for shipment to the laboratory.

All samples were analyzed by TestAmerica in Amherst, NY for cadmium using SW-846 Method 6010B. ARCADIS validated the data in accordance with U.S. Environmental Protection Agency (USEPA, 1994) guidelines based on a review of the project quality control samples, holding times, and laboratory precision. A copy of the data validation report is included as Attachment 1.

3. RESULTS

On December 18 - 19, 2007 personnel from ARCADIS BBL collected soil samples from the five proposed locations in the area between the existing Bloody Brook channel and the former brook channel (Figure 1). A single 2-foot soil core was collected from each of the five locations, and the cores were processed as 0-6 inch and 6-24 inch samples. A field duplicate sample was retained from soil boring SSSWP-1 for the 0-6 inch interval.

The cadmium results for the soil samples are presented in Table 1. The data validation (Attachment 1) indicated that the overall data quality was within the specified guidelines, and no data issues were identified.

Cadmium was detected in eight of the ten samples, and concentrations were lowest in the subsurface (deeper than 6 inch) samples. Four of the soil sample locations (SSSWP-2 through SSWP-5) exhibited relatively low cadmium concentrations, with depth-weighted averages of less than 2 mg/kg and well below the NYSDEC ecological screening value of 4 mg/kg. Cadmium concentrations for the fifth location (SSSWP-1) were slightly higher, with a depth-weighted cadmium concentration of 21.6 mg/kg. This sample was located along the southeast portion of the target area (Figure 1). Historical data for nearby sample locations indicate much lower cadmium concentrations. For example, cadmium was non-detect in sample SB-53 for all intervals (collected down to a depth of 4 ft), and for sample SB-408 the cadmium

concentrations were 4.7 mg/kg (0 - 2 inches), 1.1 mg/kg (0-1 ft), and non-detect for remaining samples collected down to a depth of 8 ft. Overall, these data indicate that cadmium concentrations at most locations are well below the NYSDEC ecological screening value of 4 mg/kg.

4. REFERENCES

ARCADIS BBL, 2007. Supplemental Soil Sampling Work Plan.

Shaw Environmental, Inc. 2003. Phase IV Side Bank Soil Investigation Work Plan. March 2003 (Revised June 2003).

U.S. Environmental Protection Agency (USEPA). 1994. National Functional Guidelines for Inorganic Data Review. 9240.1-05-01. PB 94-963502. EPA 540/R-94/013. February 1994.

Tables

Table 1

Lockheed Martin Corporation Bloody Brook

Supplemental Soil Sample Cadmium Concentrations

	Sample In	Depth-Weighted	
Sample ID	(0-6)	(6-24)	Average
SSSWP-1	7.0 [10.8]	25.8	21.6
SSSWP-2	2.2	0.62 1	1.3
SSSWP-3	0.77	ND (0.05)	0.2
SSSWP-4	4.7	ND (0.04)	1.2
SSSWP-5	3.2	0.28	1.0

Notes:

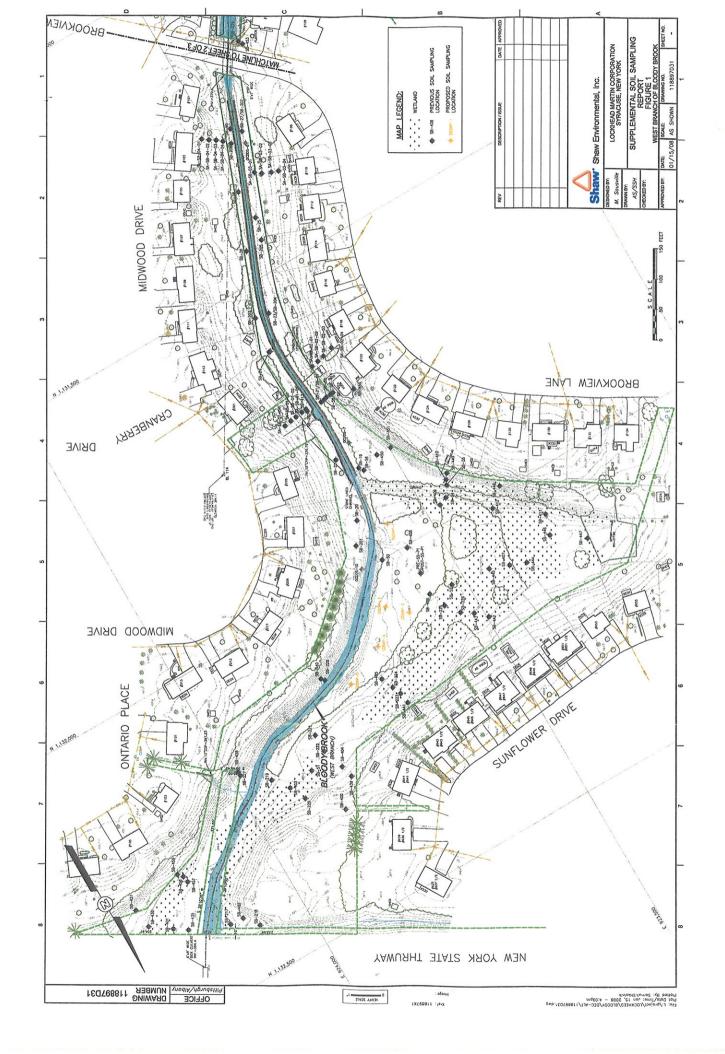
ND = Not detected (detection limit).

[] = Duplicate sample results.

Cadmium results are in mg/kg (dry weight).

1. The soil core from SSSWP-2 met refusal at 15 inches. This sample is from 6 - 15 inches.

Figures



Attachments

DATA REVIEW FOR LOCKHEED MARTIN – BLOODY BROOK PROJECT LIVERPOOL, NEW YORK

SDG #A07-E777

CADMIUM ANALYSES

Analyses performed by:

TestAmerica Laboratories, Inc. Amherst, New York

Review performed by:



Syracuse, New York Report #7774R

Summary

The following is an assessment of the data package for sample delivery group (SDG) #A07-E777 for sampling from the Lockheed Martin – Bloody Brook Project Site. Included with this assessment are the corrected sample results and the sample compliance report. Analyses were performed on the following samples:

Comula ID		*****	Sample		Analysis						
Sample ID	Lab ID	Matrix	Date	voc	SVOC	PCB	MET	MISC			
SB-1 (0-6")	A7E77701	Soil	12/19/2007				Х				
SB-1 (6-24")	A7E77702	Soil	12/19/2007				Х	 			
SB-2 (0-6")	A7E77703	Soil	12/19/2007				X	 			
SB-2 (6-15")	A7E77704	Soil	12/19/2007				Х				
SB-3 (0-6")	A7E77705	Soil	12/19/2007				×				
SB-3 (6-24")	A7E77706	Soil	12/19/2007				X				
SB-4 (0-6")	A7E77707	Soil	12/19/2007				Х				
SB-4 (6-24")	A7E77708	Soil	12/19/2007				X				
DUP-1	A7E77709	Soil	12/19/2007				X				
SB-5 (0-6")	A7E77710	Soil	12/19/2007				X				
SB-5 (6-24")	A7E77711	Soil	12/19/2007				X				
RB 20071219-1	A7E77712	Water	12/19/2007				X				

Notes:

- 1 Metals analyses include Cadmium only.
- 2 The matrix spike/matrix spiked duplicate (MS/MSD) was performed on sample location SB-3 (6-24").
- 3 Sample ID DUP-1 is the field duplicate of parent sample location SB-1 (0-6").

METALS ANALYSES

Introduction

Analyses were performed according to United States Environmental Protection Agency (USEPA) SW-846 Method 6010B. Data were reviewed in accordance with USEPA National Functional Guidelines of October 1994.

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and that it was already subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with the USEPA National Functional Guidelines:

Concentration (C) Qualifiers

- U The analyte was analyzed for but not detected. The associated value is the analyte instrument detection limit.
- B The reported value was obtained from a reading less than the contract-required detection limit (CRDL), but greater than or equal to the instrument detection limit (IDL).

Quantitation (Q) Qualifiers

- E The reported value is estimated due to the presence of interference.
- N Spiked sample recovery is not within control limits.
- Duplicate analysis is not within control limits.

Validation Qualifiers

- J The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
- UJ The analyte was not detected above the reported sample detection limit. However, the reported limit is approximate and may or may not represent the actual limit of detection.
- R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Data Assessment

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
SW-846 6010B	Water	180 days from collection to analysis	Cooled @ 4 °C; preserved to a pH of less than 2.
	Soil	180 days from collection to analysis	Cooled @ 4 °C.

All samples were analyzed within the specified holding times.

2. Blank Contamination

Quality assurance (QA) blanks (i.e., method or rinse blanks), are prepared to identify any contamination that may have been introduced into the samples during sample preparation or field activity. Method blanks (including initial and continuing calibration blanks, and preparation blanks) measure laboratory contamination. Rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected analyte in an associated blank is calculated for QA blanks containing concentrations greater than the IDL. The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

All analytes associated with the QA blanks exhibited a concentration less than the IDL.

3. Calibration

Satisfactory instrument calibration is established to provide that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument's continuing performance is satisfactory.

3.1 Initial Calibration and Continuing Calibration

The correct number and type of standards were analyzed. The correlation coefficient of the initial calibration was greater than 0.995 for all non-ICP analytes and all initial calibration verification standard recoveries were within control limits.

All continuing calibration verification standard recoveries were within the control limit.

3.2 CRDL Check Standard

The CRDL check standard serves to verify the linearity of calibration of the analysis at the CRDL. The CRDL standard is not required for the analysis of aluminum (Al), barium (Ba), calcium (Ca), iron (Fe), magnesium (Mg), sodium (Na), and potassium (K). The criteria used to evaluate the CRDL standard analysis are presented below in the CRDL standards evaluation table.

The CRDL standard exhibited recoveries within the control limits.

3.3 ICP Interference Control Sample (ICS)

The ICS verifies the laboratories interelement and background correction factors.

All ICS exhibited recoveries within the control limits.

4. Matrix Spike (MS)/Matrix Spike Duplicate(MSD)/Laboratory Duplicate Analysis

MS/MSD and laboratory duplicate data are used to assess the precision and accuracy of the analytical method.

4.1 MS/MSD Analysis

All metal analytes must exhibit a percent recovery within the established acceptance limits of 75% to 125%. The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the analyte's concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater. In instance where this is true, the data will not be qualified even if the percent recovery does not meet the control limits and the laboratory qualifier "N" will be removed.

The MS/MSD exhibited acceptable recoveries.

4.2 Laboratory Duplicate Analysis

The laboratory duplicate relative percent difference (RPD) criterion is applied when parent and duplicate sample concentrations are greater than or equal to 5 times the CRDL. A control limit of 20% for water matrices and 35% for soil matrices is applied when the criteria above is true. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the CRDL, a control limit of one times the CRDL is applied for water matrices and two times the CRDL for soil matrices.

A MS/MSD RPD was performed in place of the laboratory duplicate. The RPD between MS/MSD recoveries exhibited acceptable results.

5. Field Duplicate Analysis

Field duplicate analysis is used to assess the precision and accuracy of the field sampling procedures and analytical method. A control limit of 50% for water matrices and 100% for soil matrices is applied to the RPD between the parent sample and the field duplicate.

Results for duplicate samples are summarized in the following table.

Sample ID/Duplicate ID	Analyte	Sample Result	Duplicate Result	RPD
SB-1 (0-6")/DUP-1	Cadmium	7.0	10.8	42.7%

ND = Not detected.

AC = The field duplicate RPD is acceptable when the RPD between parent sample and field duplicate sample is less than two times the RL and where the parent sample and/or duplicate concentration is less than five times the RL.

The calculated RPDs between the parent sample and field duplicate were acceptable.

6. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences.

The LCS analysis exhibited recoveries within the control limits.

7. Serial Dilution

The serial dilution analysis is used to assess if a significant physical or chemical interference exists due to sample matrix. Analytes exhibiting concentrations greater than 50 times the MDL in the undiluted sample are evaluated to determine if matrix interference exists. These analytes are required to have less than a 10% difference (%D) between sample results from the undiluted (parent) sample and results associated with the same sample analyzed with a five-fold dilution.

A serial dilution was not performed on sample locations within this SDG.

8. Furnace Analysis QC

No furnace analyses were performed on the samples.

9. Method of Standard Additions (MSA)

No samples were analyzed following the method of standard additions.

10. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

CORRECTED SAMPLE ANALYSIS DATA SHEETS

INORGANIC ANALYSIS DATA PACKAGE

Client: Blasland Bouck & Lee, Inc.

SDG No.:

A07-E777

Method Type:

Sample ID: A7E77709

Client ID: DUP-1

Matrix:

SOIL

Date Received:

12/20/2007

Date Collected:

12/19/2007 Level:

LOW

% Solids: 80

Sample Wt/Vol:

0.5

Final Vol:

50.0

Prep Batch ID:

A7B20314

Prep Date:

12/21/2007

					Analytical							
Analyte	Concentration Units	C	Qual	MDL	RL	Dil	Date	Time	Instrument	Run	M	
Cadmium	10.8 mg/Kg			0.05	0.25	1	12/21/2007	16:15	SUPERTRACE2	A12210W	P	

INORGANIC ANALYSIS DATA PACKAGE

Client:

Blasland Bouck & Lee, Inc.

SDG No.:

A07-E777

Method Type:

Sample ID: A7E77712

Client ID: RB 20071219-1

Matrix: V

WATER

Date Received:

12/20/2007

Date Collected:

12/19/2007 Level:

LOW

% Solids:

Sample Wt/Vol:

50.0

Final Vol:

50.0

Prep Batch ID:

A7B20315

Prep Date:

12/21/2007

						Analytical							
Analyte	C	oncentration U		Qual	MDL	RL	Dil	Date	Time	Instrument	Run	M	
Cadmium	<	0.36 u	g/L U		0.36	1.0	1	12/21/2007	18:21	SUPERTRACE	112210W	P	

INORGANIC ANALYSIS DATA PACKAGE

Client:

Blasland Bouck & Lee, Inc.

SDG No.:

A07-E777

Method Type:

Sample ID: A7E77701

Client ID: SB-1 (0-6")

Matrix: SOIL

Date Received:

12/20/2007

Date Collected:

12/19/2007

Level:

LOW

% Solids: 79

Sample Wt/Vol:

C Quai

0.5

MDL

0.05

Final Vol:

Dil

50.0

Prep Batch ID:

A7B20314

Concentration Units

7.0 mg/Kg

Prep Date:

RL

0.24

12/21/2007

Analytical Date Time Instrument Run M 12/21/2007 14:55 SUPERTRACE2 A12210W

Comments:

Analyte

Cadmium

INORGANIC ANALYSIS DATA PACKAGE

Client: Blasland Bouck & Lee, Inc.

SDG No.:

A07-E777

Method Type:

Sample ID: A7E77702

Client ID: SB-1 (6-24")

Matrix: SOIL

Date Received:

12/20/2007

Date Collected:

12/19/2007 Level:

LOW

% Solids: 83

Sample Wt/Vol:

0.5

Final Vol:

50.0

Prep Batch ID:

A7B20314

Prep Date:

12/21/2007

					Analytical						
Analyte	Concentration Units	C	Qual	MDL	RL	Dil	Date	Time	Instrument	Run	M
Cadmium	25.8 mg/Kg			0.05	0.24	1	12/21/2007	15:00	SUPERTRACE2	A12210W	P

-1-INORGANIC ANALYSIS DATA PACKAGE

Client:

Blasland Bouck & Lee, Inc.

SDG No.:

A07-E777

Method Type:

Sample ID: A7E77703

Client ID: SB-2 (0-6")

Matrix: SOIL

Date Received:

12/20/2007

Date Collected:

12/19/2007 Level: LOW

% Solids: 83

Sample Wt/Vol:

0.5

Final Vol:

50.0

Prep Batch ID:

A7B20314

Prep Date:

12/21/2007

,			Analytical								
Analyte	Concentration Units	C	Qual	MDL	RL ·	Dil	Date	Time	Instrument	Run	M
Cadmium	2.2 mg/Kg			0.05	0.23	1	12/21/2007	15:05	SUPERTRACE2	A12210W	P

-1-INORGANIC ANALYSIS DATA PACKAGE

Client: Blasland Bouck & Lee, Inc.

SDG No.:

A07-E777

Method Type:

Sample ID: A7E77704

Client ID: SB-2 (6-15")

Matrix: SOIL Date Received:

12/20/2007

Date Collected:

12/19/2007 Level: LOW

% Solids: 86

Sample Wt/Vol:

0.5

Final Vol:

50.0

Prep Batch ID:

A7B20314

Prep Date:

12/21/2007

				Analytical						
Analyte	Concentration Units	C Quai	MDL	RŁ	Dil	Date	Time	Instrument	Run	M
Cadmium	0.62 mg/Kg		0.05	0.23	1	12/21/2007	15:13	SUPERTRACE2	A12210W	P

-1-INORGANIC ANALYSIS DATA PACKAGE

Client: Blasland Bouck & Lee, Inc.

SDG No.:

A07-E777

Method Type:

Sample ID: A7E77705

Client ID: SB-3 (0-6")

Matrix: SOIL

Date Received:

12/20/2007

Date Collected:

12/19/2007

Level:

LOW

% Solids: 83

Sample Wt/Vol:

0.5

Final Vol:

50.0

Prep Batch ID:

A7B20314

Prep Date:

12/21/2007

			·	Analytical						
Analyte	Concentration Units	C Qual	MDL	RL	Dil	Date	Time	Instrument	Run	M
Cadmium	0.77 mg/Kg		0.05	0.24	1	12/21/2007	15:18	SUPERTRACE2	A12210W	P

INORGANIC ANALYSIS DATA PACKAGE

Client: Blasland Bouck & Lee, Inc.

SDG No.:

A07-E777

Method Type:

Sample ID: A7E77706

Client ID: SB-3 (6-24")

Matrix: SOIL

Date Received:

12/20/2007

Date Collected:

12/19/2007 Level:

LOW

% Solids: 81

Sample Wt/Vol:

0.5

Final Vol:

50.0

Prep Batch ID:

A7B20314

Prep Date:

12/21/2007

V	· · · · · · · · · · · · · · · · · · ·		Analytical									
Analyte		Concentration Units	C	Qual	MDL	RL	Dil	Date	Time	Instrument	Run	M
Cadmium	<	0.05 mg/Kg	U		0.05	0.25	1	12/21/2007	15:23	SUPERTRACE2	A12210W	P

INORGANIC ANALYSIS DATA PACKAGE

Client: Blasland Bouck & Lee, Inc.

SDG No.:

A07-E777

Method Type:

Sample ID: A7E77707

Client ID: SB-4 (0-6")

Matrix: SOIL

Date Received:

12/20/2007

Date Collected:

12/19/2007

Level:

LOW

% Solids: 81

Sample Wt/Vol:

C Qual

0.5

MDL

0.05

Final Vol:

50.0

Prep Batch ID:

A7B20314

Concentration Units

4.7 mg/Kg

Prep Date:

RL

0.25

12/21/2007

Analytical Dil Date Time Instrument Run M 12/21/2007 16:04 SUPERTRACE2 A12210W

Comments:

Analyte

Cadmium

-1-INORGANIC ANALYSIS DATA PACKAGE

Client: Blasland Bouck & Lee, Inc.

SDG No.:

A07-E777

Method Type:

Sample ID: A7E77708

Client ID: SB-4 (6-24")

Matrix: SOIL

Date Received:

12/20/2007

Date Collected:

12/19/2007 Level: LOW

% Solids: 85

Sample Wt/Vol:

0.5

Final Vol:

50.0

Prep Batch ID:

A7B20314

Prep Date:

12/21/2007

								Analyt				
Analyte		Concentration Units	C	Qual	MDL	RL	Dil	Date	Time	Instrument	Run	M
Cadmium	<	0.04 mg/Kg	U		0.04	0.22	1	12/21/2007	16:09	SUPERTRACE2	A12210W	P

-1-INORGANIC ANALYSIS DATA PACKAGE

Client: Blasland Bouck & Lee, Inc.

SDG No.:

A07-E777

Method Type:

Sample ID: A7E77710

Client ID: SB-5 (0-6")

Matrix: SOIL

Date Received:

12/20/2007

Date Collected:

12/19/2007 Level:

LOW

% Solids: 82

Sample Wt/Vol:

0.5

Final Vol:

50.0

Prep Batch ID:

A7B20314

Prep Date:

12/21/2007

			Analytical								
Analyte	Concentration Units	C (Qual	MDL	RL	Dil	Date	Time	Instrument	Run	M
Cadmium	3.2 mg/Kg			0.05	0.23	1	12/21/2007	16:20	SUPERTRACE2	A12210W	P

-1-**INORGANIC ANALYSIS DATA PACKAGE**

Client: Blasland Bouck & Lee, Inc.

SDG No.:

A07-E777

Method Type:

Sample ID: A7E77711

Client ID: SB-5 (6-24")

Matrix: SOIL

Date Received:

12/20/2007

Date Collected:

12/19/2007

Level:

LOW

% Solids: 88

Sample Wt/Vol:

0.5

Final Vol:

50.0

Prep Batch ID:

A7B20314

Prep Date:

12/21/2007

				Analytical								
Analyte	Concentration Units	C	Quai	MDL	RL	Dil	Date	Time	Instrument	Run	M	
Cadmium	0.28 mg/Kg			0.05	0.24	1	12/21/2007	16:26	SUPERTRACE2	A12210W	P	

SAMPLE COMPLIANCE REPORT

SAMPLE COMPLIANCE REPORT

Noncompliance													
	MISC	ţ	;	1	· ŧ	1	ţ	2. 6	1	;	ŧ	;	
	MET	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Compliancy	PCB/PEST/ HERB	, ,	1		:	Į	,	ı	. 1	:	1	1	1
	SVOC	;	}	ł	1	1	L ?	;	ł	1		1	1
	VOC	;	;	!	1	;	1	***	-	1	ŀ	1	1
	Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Water
	Sample ID	SB-1 (0-6")	SB-1 (6-24")	SB-2 (0-6")	SB-2 (6-15")	SB-3 (0-6")	SB-3 (6-24")	SB-4 (0-6")	SB-4 (6-24")	DUP-1	SB-5 (0-6")	SB-5 (6-24")	RB 20071219-1
	Protocol	SW-846	SW-846	SW-846	SW-846	SW-846	SW-846	SW-846	SW-846	SW-846	SW-846	SW-846	SW-846
	Sampling Date	12/19/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007	12/19/2007
Cample	Sample Delivery Group	A7E7701	A7E7702	A7E7703	A7E7704	A7E7705	A7E7706	A7E7707	A7E7708	A7E7709	A7E7710	A7E7711	A7E7712

Samples which are compliant with no added validation qualifiers are listed as "yes". Samples which are non-compliant or which have added qualifiers are listed as "no". A "no" designation does not necessarily indicate that the data have been rejected or are otherwise unusable.