Appendices for NRU Additional Characterization Data Report

Final

October 2007

Appendix A

Location Coordinates for Sample Points and Wells

Sample ID	Northing (survey ft)	Easting (survey ft)	Elevation (ft)
Western Burning Ground			
WBGSB26A	3565975.87	10849229.45	2066.11
WBGSB27A	3565770.07	10849148.00	2055.78
WBGSB28A	3565696.52	10849122.07	2041.47
WBGSB29A	3565617.49	10849440.01	2067.64
WBGSB30A	3565578.23	10849530.33	2059.12
WBGSB31A	3565648.54	10849376.56	2060.73
WBGSB32A	3565587.92	10849357.73	2054.03
WBGSB33A	3565580.39	10849385.87	2058.72
WBGSB34A	3565584.69	10849316.12	2050.94
WBGSB35A	3565578.61	10849281.38	2050.04
WBGSB36A	3565608.77	10849208.88	2049.70
WBGSB37	3565654.89	10849183.58	2045.01
WBGSB38A	3565668.05	10849159.46	2043.56
WBGSB39A	3565693.33	10849089.13	2039.87
WBGSB40A	3565913.73	10849247.16	2058.01
WBGSB41A	3565674.18	10849183.29	2057.11
WBGSB42A	3565624.40	10849238.26	2054.23
WBGSB43	3565746.05	10849214.47	2077.30
WBGSB44	3565773.98	10849248.69	2064.35
WBGSB45	3565737.01	10849232.26	2073.67
WBGSB46	3565761.81	10849239.15	2072.63
WBGSB47	3565741.33	10849229.00	2073.71
WBGSB48	3565720.56	10849220.21	2060.06
WBGSB49	3565781.15	10849230.84	2056.14
WBGSB50	3565722.63	10849201.98	2054.33
WBGSB51	3565724.20	10849227.94	2061.80
WBGSB52	3565761.05	10849224.69	2060.67
WBGSB53A	3565604.74	10849283.69	2054.19
WBGSD16	3565669.74	10849107.23	2039.63
WBGSD17	3565559.97	10849268.15	2042.26
WBGSD18	3565543.38	10849272.23	2041.41
WBGSD19	3565524.80	10849290.09	2040.82
WBGSD20	3565528.12	10849313.97	2042.31
WBGSD21	3565530.67	10849323.06	2038.85
WBGSD22	3565539.25	10849339.83	2036.63
WBGSD23	3565568.37	10849247.79	2041.96
WBGSD24	3565552.15	10849250.35	2040.82
WBGSD25	3565559.67	10849232.05	2044.45
WBGSW16	3564604.03	10850142.25	2007.55
WBGSW17	3564639.69	10850197.60	2009.83
Building Debris Disposal Trench			
DTSB48	3565165.64	10854836.32	1964.88
DTSB49A	3565153.67	10854844.78	1967.72
DTSB50A	3565136.11	10854844.56	1961.24
DTSB51A	3565140.58	10854850.97	1965.99
DTSB52A	3565145.74	10854862.67	1961.56
DTSB53A	3565106.34	10854835.26	1962.73
DTSB54A	3565115.78	10854854.67	1961.34
DTSB55	3565120.50	10854861.54	1957.12
DTSB56A	3565125.78	10854872.78	1955.52
DTSB57A	3565134.07	10854891.04	1958.67

Sample ID	Northing (survey ft)	Easting (survey ft)	Elevation (ft)
DTSB58A	3565081.69	10854855.74	1952.13
DTSB59	3565093.33	10854876.77	1952.67
DTSB60A	3565104.11	10854894.69	1953.74
DTSB61A	3565115.75	10854910.60	1959.17
DTSB62A	3565045.46	10854870.66	1958.17
DTSB63A	3565053.10	10854885.12	1953.87
DTSB64A	3565060.21	10854903.41	1955.90
DTSB65A	3565068.24	10854919.69	1957.83
DTSB66A	3565013.54	10854875.59	1953.66
DTSB67	3565015.61	10854896.21	1956.51
DTSB68A	3565022.03	10854914.35	1952.98
DTSB69A	3565026.74	10854932.19	1952.09
DTSB70A	3565031.26	10854960.45	1951.10
DTSB71A	3564999.41	10854953.92	1960.49
DTSB72A	3564994.82	10854868.10	1953.89
DTSB73A	3564986.60	10854891.50	1950.05
DTSB74A	3564981.74	10854912.71	1952.40
DTSB75A	3564981.36	10854932.56	1950.80
DTSB76A	3564981.27	10854959.43	1955.96
DTSB77A	3564984.46	10854969.04	1951.83
DTSB78A	3564993.78	10854979.12	1960.73
DTSB79A	3564996.14	10854850.94	1954.60
DTSB80A	3564994.19	10854999.37	1957.96
DTSB81A	3565157.18	10854826.10	1965.35
DTSB82A	3565173.56	10854846.32	1966.80
DTSB83A	3565126.83	10854829.19	1965.90
DTSB84A	3565153.17	10854876.43	1963.88
DTSB85A	3565083.16	10854845.77	1957.06
DTSB86A	3565049.30	10854943.81	1949.68
DTSB87A	3565000.31	10854883.74	1953.77
DTSB88A	3565026.96	10854980.48	1954.22
DTSB89A	3565150.43	10854817.68	1966.59

Coordinates in NAD 1983, US State Plane (Virginia South)

Sample ID	Northing (m)	Easting (m)	Elevation (m)
Northern Burning Ground			
NBGSB28	4106754.88	529789.04	648.23
NBGSB31	4106777.84	529820.41	647.55
NBGSB29	4106781.00	529852.80	651.57
NBGSB23	4106793.54	529839.09	647.04
NBGSB33	4106787.00	529769.90	649.59
NBGSB22	4106793.00	529819.32	650.25
NBGSB20	4106800.33	529815.45	646.78
NBGSB27	4106808.00	529868.90	646.78
NBGSB21	4106804.29	529813.87	648.49
NBGSB24	4106806.12	529828.70	648.49
NBGSB26	4106821.38	529858.11	644.35
NBGSB30	4106811.00	529781.40	647.74
NBGSB25	4106816.00	529827.00	643.96
NBGSD04	4106821.59	529831.13	640.73
NBGSB32	4106821.56	529820.01	640.71
NBGSD02	4106821.56	529820.01	640.71
NBGSD03	4106822.00	529825.80	641.66

Coordinates in WGS 1984 UTM Zone 17 South

Appendix B

Monitoring Well Boring Logs

Appendix B

Boring Logs

Shaw Environmental, Inc.	BORING / WELL INSTALLATION LOG: MW- IAA MW 01 (Page 1 of 1)

DATE	:	DATE	: 5-23-07
DRILLING METHOD	:	DRILLING METHOD	: Air Rotary
BOREHOLE DIAM.	:	BOREHOLE DIAM.	: 6"
DRILLING COMPANY	: Bedford Drilling	GEOLOGIST	: Jones
DRILLER	: Michael		

Well: MW-
Elev.:

Depth in ft	DESCRIPTION	REMARKS
0	0 - 13 ft - light red/brown silty clay - med - stiff CL.	1715 - Setup to drill
2		1720 - Begin to drill.
4		17 45 - Stop for day.
6	13 - 34 ft - light brown silty clay - med stiff	
8		
10	Terminated @ bedrock	
12		
14		
16	15 ft of 10 slot screen	
18	8 bags of #2 sand	
20	3 bags of 3/8 hole plug	
22		
24		
26		
28		
30		
32		
34		
36		
38		
40		

Grout

Screen

Sump

10-12-2006 n:\cook\blanklog.bor

Shaw Environmental, Inc.

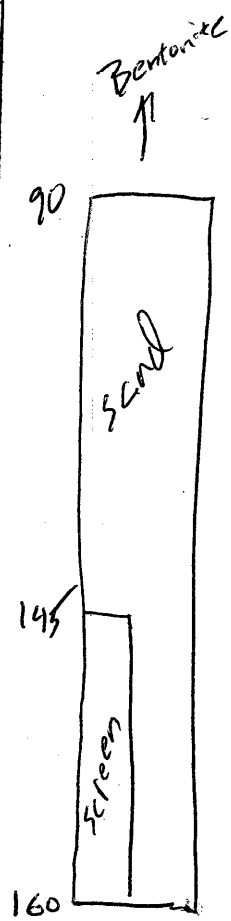
BORING / WELL INSTALLATION LOG: MW- IAA MW 02

(Page 1 of 1)

DATE	:	DATE	: 5-24-07
DRILLING METHOD	:	DRILLING METHOD	: HSA
BOREHOLE DIAM.	:	BOREHOLE DIAM.	: 6
DRILLING COMPANY	:	GEOLOGIST	: Jones
DRILLER	:		

Depth in ft

Well: MW-
Elev.:



Depth	Blows	Rec	PID	DESCRIPTION	REMARKS
5-7	7-7-9-13	24"	0	1-3" organic top 3-5" quartz rock 5-24" Orange/brown silty clay med stiff ML	
10-12	7-8-8-9	16"	0	Orange/brown silty clay med stiff ML	
15-17	4-4-7-7	9"	0	SAME as above	
20-22	5-5-5-6	13"	0	same as above with some silty layers.	
25-27	4-6-6-8	16"	0	same as above w/ layers.	
30-32	50/3			Refusal after 3" silty layer w/ water. 35 → Bedrock 160 - TD	

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Shaw Environmental, Inc.

BORING / WELL INSTALLATION LOG: MW- IAA MW 03

(Page 1 of 1)

DATE :
DRILLING METHOD :
BOREHOLE DIAM. :
DRILLING COMPANY :
DRILLER :

DATE : 5/24/07
DRILLING METHOD :
BOREHOLE DIAM. :
GEOLOGIST :

Well: MW-
Elev.:

Depth in ft

Depth	PID	Blows	Rec	DESCRIPTION	REMARKS
5-7	0	4-13-10-13	24"	Light brown silty clay mod. stiff ML - w/ layers of rock	
10-12	0	5-6-6-8	24"	0-6" same as above 6-24" light red/brown silty clay mod stiff ML.	
15-17	0	4-6-8-8	24"	Same as above w/ layers of rock.	
20-22	0	5-5-7-7	24"	Same as above	
25-27	0	5-6-7-8	8"	Same as above, [redacted]	
30-32	0	4-3-4-4	15	Same as above, but layers of weathered rock, very moist.	
35-37	0	WR-4-4-4	15	Same as above, very moist.	
40-42	0	WR-4-3-4	16	Same as above, very moist.	
45-47	0	3-3-3-4	19	Same as above, becoming less stiff	

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Over

IAA MW 04

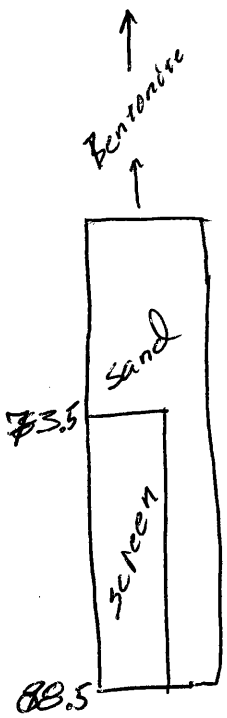
0 - 12 ft red/light brown silty clay.
Medium stiff

12 - 14 ft rock layer

14 - 32 ft layers of red/light brown silty clay and rock

32 - 78 ft competent rock / bedrock.

78 - 90 ft mud layer, unable to drill deeper to keep hole open.



Shaw Environmental, Inc.

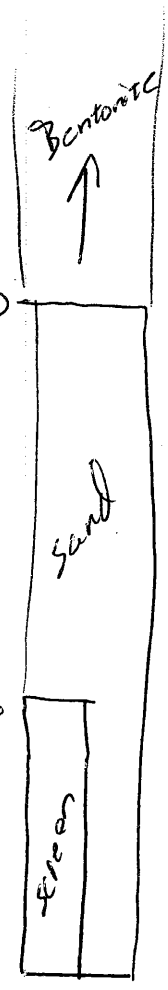
BORING / WELL INSTALLATION LOG: MW- BLA MW01

(Page 1 of 1)

DATE	:	DATE	: 5-31-07
DRILLING METHOD	: air rotary	DRILLING METHOD	: air rotary
BOREHOLE DIAM.	: 6"	BOREHOLE DIAM.	: 6"
DRILLING COMPANY	:	GEOLOGIST	: Jones
DRILLER	:		

Well: MW-
Elev.:

Depth in ft	DESCRIPTION	REMARKS
0	1-15 ft red light brown sandy silt, mod stiff	Dry ↓
15	15-16 ft rock layer	
16	16-31 ft layers of silty clay and rock, high moisture	- slightly moist
31	31-221 ft bedrock competent limestone/ dolomite	
40		



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Shaw Environmental, Inc.

BORING / WELL INSTALLATION LOG: MW- BLA-MW02

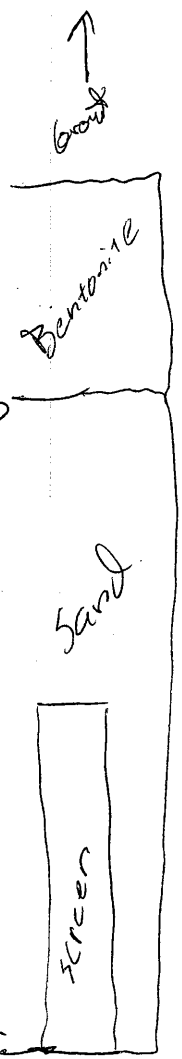
(Page 1 of 1)

DATE	:	DATE	: 5/30/07
DRILLING METHOD	:	DRILLING METHOD	: Air hammer
BOREHOLE DIAM.	:	BOREHOLE DIAM.	: 6"
DRILLING COMPANY	:	GEOLOGIST	: Jones
DRILLER	:		

Well: MW-
Elev.:

Depth in ft

0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40



DESCRIPTION	REMARKS
0-2 ft red light brown clay overburden. 2-137 ft bedrock 137-151 ft yellow white bedrock w/ water	*Renamed BLAMW02 to keep ~~consecutive~~ numerical order

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~~This is well of NBG-Relocated~~

*NBG-BO-01

~~NBGMW02~~

Shaw Environmental, Inc.	BORING / WELL INSTALLATION LOG: MW- (Page 1 of 1)

DATE :
DRILLING METHOD :
BOREHOLE DIAM. :
DRILLING COMPANY : Bedford
DRILLER :

DATE : 5-22-07
DRILLING METHOD : HSA/Air Hammer
BOREHOLE DIAM. : 6"
GEOLOGIST : Jones/

Well: MW-
Elev.:

*Renumbered because no well was ~~set~~ REMARKS

Depth in ft	DESCRIPTION
0	Depth PID Rec Blows
2	5-7 0 22" 5-8-11-17 — 5-8-11-17 5-7' silty clay, med. stiff light brown, dry. CL
4	
6	10-12 0 24" 5-7-9-13 — Ag 10-11 ft same as above. 11-12 ft yellowish brown very fine grain sand and silt. ML
8	
10	
12	
14	15-17 0 22" 5-8-12-15 — At 17 ft organic matter and ½" rock limestone
16	
18	15-17 ft silty clay, med stiff light brown CL w/ some small ½" rock
20	
22	20-22 0 18" 3-5-7-10 — Same as above some small rock and organics
24	
26	25-27 0 18" 5-6-9-10 — Same as above, damp.
28	
30	30-32 0 8" 5-7-8-11 — Same as above.
32	35-37 0 12" 7-9-9-11 — Same as above to a layer of silt
34	40-42 0 16" 8-10-11-10 — Same as above, but w/ layers of fine sand
36	45-47 0 24" 4-3-4-7 — Very moist, silty clay med stiff light brown CL
38	
40	

No Well installed

0

OVER

10-12-2006 n:\book\blanklog.bor

Shaw Environmental, Inc.	BORING / WELL INSTALLATION LOG: MW- NBG 01 (Page 1 of 1)

DATE	:	DATE	: 5-23-07
DRILLING METHOD	:	DRILLING METHOD	: Air rotary
BOREHOLE DIAM.	:	BOREHOLE DIAM.	: 6"
DRILLING COMPANY	:	GEOLOGIST	: parks
DRILLER	:		

Well: MW-
Elev.:

Depth in ft	DESCRIPTION	REMARKS
0	-0 to 50.5 ft (same as NBG-B0-01) mostly dense clay some minor silt stringers Competent bedrock 50.5 to 101'	
2		
4		
6		
8		
10		
12		
14		
16		
18		
20		
22		
24		
26		
28		
30		
32		
34		
36		
38		
40		

grout
75'
sand
86
screen
101

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Shaw Environmental, Inc.

BORING / WELL INSTALLATION LOG: MW- NBG MW 02

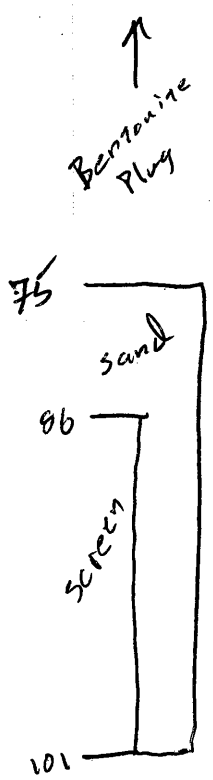
(Page 1 of 1)

DATE	:	DATE	: 5-24-07
DRILLING METHOD	:	DRILLING METHOD	: Air Rotary
BOREHOLE DIAM.	:	BOREHOLE DIAM.	: 6"
DRILLING COMPANY	:	GEOLOGIST	: Parker
DRILLER	:		

Well: MW-
Elev.:

Depth in ft

0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40



DESCRIPTION	REMARKS
0-42 ft red light brown silty clay, mod stiff 42-45 ft Competent rock 45-56 ft void 56-101 ft bedrock / competent rock * Hole want stay open past 101.	Development: 1000 ml / 7 scc

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Shaw Environmental, Inc.

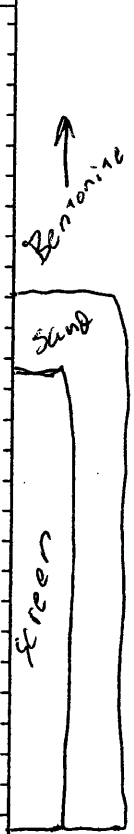
BORING / WELL INSTALLATION LOG: MW- 01 WBG

(Page 1 of 1)

DATE	:	DATE	: 5-30
DRILLING METHOD	:	DRILLING METHOD	: air rotary
BOREHOLE DIAM.	:	BOREHOLE DIAM.	: 6"
DRILLING COMPANY	:	GEOLOGIST	: Parker
DRILLER	:		

Well: MW-
Elev.:

Depth in ft: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40



DESCRIPTION	REMARKS
0-3 ft red light brown silty clay. 3-26.5 ft bedrock	

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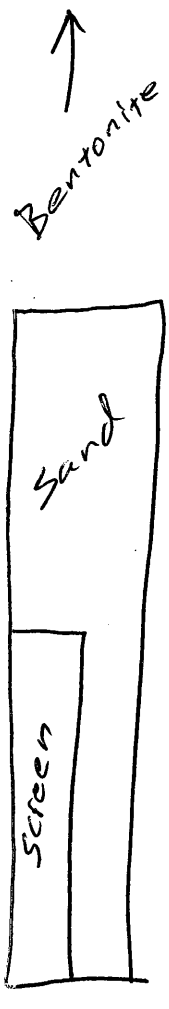
Shaw Environmental, Inc.	BORING / WELL INSTALLATION LOG: MW- WBG MW 02 (Page 1 of 1)

DATE	:	DATE	: 6-1-04
DRILLING METHOD	:	DRILLING METHOD	: Air Rotary
BOREHOLE DIAM.	:	BOREHOLE DIAM.	: 6"
DRILLING COMPANY	:	GEOLOGIST	: Jones
DRILLER	:		

Well: MW-
Elev.:

Depth in ft	DESCRIPTION	REMARKS
0	0-12 ft rock and clay layers or fill.	
2		
4		
6	12-50 ft competent rock.	
8		
10	No water to 50 ft	
12		
14	Monday	
16	Water in hole	
18		
20		
22		
24		
26		
28		
30		
32		
34		
36		
38		
40		



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Shaw Environmental, Inc.	BORING / WELL INSTALLATION LOG: MW-03 (WRG) (Page 1 of 1)

DATE	:	DATE	: 6-1-07
DRILLING METHOD	:	DRILLING METHOD	: Air Rotary
BOREHOLE DIAM.	:	BOREHOLE DIAM.	: 6"
DRILLING COMPANY	:	GEOLOGIST	: Jones
DRILLER	:		

Well: MW-
Elev.:

Depth in ft	DESCRIPTION	REMARKS
0	0-10 ft red light brown silty clay	
10	10-50 ft competent rock / bedrock	
12	No water to 50 ft	
14	Monday water in hole	

9 Bentonite

29 Sand

34.5 Screen

49.5

10-12-2006 n:\cook\blanklog.bor

Appendix C

Geophysical Investigation Report

DRAFT GEOPHYSICAL INVESTIGATION REPORT
Radford Army Ammunition Plant
Radford, Virginia

Western Burning Ground - Project No. 829870-10030000

Draft — June 10, 2007

Prepared for:

Shaw Environmental and Infrastructure, Inc.

Prepared by:

Shaw Environmental, Inc.
100 Technology Center Drive
Stoughton, MA 02072

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Figure 6. WBG - Electrical Resistivity Profile Locations

Figure 7. WBG - Electrical Resistivity Profile Data

Figure 8. WBG – Interpreted Depth To bedrock Surface

1.0 Introduction

This report presents the results of a geophysical investigation conducted by Shaw Environmental, Inc. (Shaw) at the Radford Army Ammunition Plant (RAAP), Radford, VA, which is located about forty five miles west of Roanoke, VA. The data collection was performed from April 23 through 26, 2007. The geophysical methods used at this facility were frequency domain electromagnetic induction and electrical resistivity. The aggregate coverage for this investigation, at two separate sites, was approximately 7.5 acres.

1.1 Objectives

The objectives of this investigation were to determine the the presence, trend, and pattern of vertical bedrock fractures below the Western Burning Ground (WBG).

1.2 Site Description

The WBG is located in an isolated region, the New River Unit (NRU), approximately 7 miles from the Main Plant. The area of interest for the geophysical investigation is situated between an artificial pond and a former burning ground once utilized for burning "off-spec" product from the RAAP. The soils from the burning ground had previously been excavated down to bedrock and removed. The extent of this removal action is indicated on the site maps (Work Plan Addendum 19). The subsurface geology at this location was assumed to be similar to SWMU 43, that is, silty sands and sandy silts overlying limestone bedrock, though at a shallower depth. While the base maps for the main (operational) areas of RAAP have been updated to the NAD83 coordinate system, the existing base maps for this inactive area are in the older NAD27 coordinate system

During the course of environmental cleanup work it was determined that near-surface sediments in a localized section of the pond had become contaminated and a geophysical survey was recommended to assess whether bedrock features such as vertical fractures were present which could act as preferred migration pathways.
The survey area is located above the pond at the top of a fairly steep embankment that appears to be composed of a combination of boulders and rip-rap. The area is generally rectangular-shaped and approximately 275 feet by 180 feet. Approximately one half of the site is open ground (next to the pond) and the other half is wooded. Probable bedrock crops out at several locations.

2.0 Technology and Approach

This section presents the theoretical background and rationale for using frequency domain electromagnetic induction and electrical resistivity methods.

2.1 Frequency Domain Electromagnetics

Frequency Domain Electromagnetic Induction (FDEM) was used to assess the location of the buried non-metallic and metallic materials. The Geonics, Ltd. EM31 MK2 terrain Conductivity Meter (EM31), which is commonly used to explore for buried metallic and non-metallic debris to depths ranging to 18 feet under favorable conditions, was utilized for this project. The EM31 is used to locate and delineate many subsurface features including underground storage tanks, groundwater contaminant plumes, oil brine pits, landfill boundaries, metallic bodies, and pits and/or trenches containing metallic and nonmetallic debris.

FDEM instrumentation consists of a transmitter coil and a receiver coil. An alternating current is applied to the transmitter coil, causing the coil to radiate a primary EM field, which generates eddy currents in conductive subsurface materials. These eddy currents have associated secondary magnetic fields whose strength and phase shift (relative to the primary field) are dependent on the conductivity of the medium. The combined effect of the primary and secondary fields is measured by the receiver coil. Both in-phase and 90 degrees out-of-phase (quadrature) components are measured. The quadrature component, also referred to as terrain conductivity, is representative of the conductivity of subsurface materials in milli-Siemens/meter (mS/m). The in-phase component is measured in parts per thousand (ppt), also referred to as current density, and its value is generally representative of the presence or absence of accumulations of buried metallic debris.

The EM31 consists of a data logger and 13-foot boom that is carried at the hip of operator. The data logger is connected by a cable that is attached directly to the EM31 and controls and records data from the instrument. EM31 survey data are typically presented as plan-view contour maps of both terrain conductivity and the in-phase component. The maps are color-contoured to aid in interpretation of subtle anomalies.

2.2 Electrical Resistivity

For acquisition of continuous 2D resistivity profile data, Shaw used an AGI 8-channel Super Sting R8 Resistivity System (Super Sting). Based on initial modeling tests for maximum horizontal and vertical range, each base profile line consisted of 56 electrodes spaced at 5 feet. The Super Sting was equipped with a 56-electrode switching box, which is controlled by the uploaded command program. Acquisition parameters were set at 2 cycles per reading, 1000 milliamp output, and a 2% maximum noise threshold level.

All resistivity methods employ an artificial source of current that is introduced into the ground through a pair of electrodes. The potential difference is measured in milli-Volts (mV) between two other electrodes in the vicinity of the current flow. Apparent resistivity in ohm-meters (ohm-m) of the subsurface can be calculated with the ratio of the measured potential difference to the input current multiplying a geometric factor (specific to the array being used and the electrode spacing).

There are three basic modes of operation for resistivity methods: sounding, profiling and sounding-profiling. In sounding, the distance between the current electrodes or the

distance between the current and potential dipoles is expanded in a regular manner between readings, which yields apparent resistivity as a function of depth. In profiling, the electrode spacing is fixed at a distance dependent on the desired depth of exploration and measurements are taken at successive intervals along a profile line to detect lateral anomalies. When both lateral and vertical information is desired, efficiency is increased by using a combination or sounding and profiling.

During resistivity surveys, there are five arrays commonly used: Wenner, Schlumberger, pole-dipole, dipole-dipole and gradient. The measured quantity in resistivity work is apparent resistivity. If the Earth were uniform, apparent resistivity would represent true Earth resistivity. For the real-Earth model, apparent resistivity is taken to be the bulk or average resistivity of all soils and rock influencing the flow of current.

For each type of array, resistivity data can be processed with different commercial forward modeling and inversion programs. The measured apparent resistivity data are generally presented as 2-dimensional profiles. Environmental applications include mapping overburden depths, stratigraphy, faults, fractures, rock units, saltwater intrusion, contaminant plumes, waste dumps and voids.

2.3 GPS

Horizontal positioning control was attained by use of a Trimble AG114 Global Positioning System (GPS). The AG114 is a differential GPS instrument with sub-meter accuracy. The GPS receiver was linked directly to the logger for EM31 data acquisition at both sites, and was used in stand-alone mode to acquire coordinates of electrical resistivity profiles and pertinent site features.

3.0 Geophysical Survey Procedures

3.1 Frequency Domain Electromagnetic Survey

Frequency-domain electromagnetic data were collected with the EM31. Coordinates of each reading were acquired as latitude and longitude, and were later translated to NAD83 and NAD27, Virginia South Zone, US Survey feet coordinates for WBG, consistent with the site base maps. Additional data were collected to ensure that the instrument was functioning correctly and that instrument drift was within acceptable limits.

<u>WBG</u>

The EM31/GPS survey was performed in all the open areas to assist in the interpretation of the resistivity data. The survey was not extended into the heavily wooded areas where the overhead canopy would have obstructed the GPS measurements. As with the SWMU 43 site, the instrument recorded data at five readings per second. Survey line locations and spacings were selected to take the best advantage of the terrain while providing adequate coverage.

3.2 Resistivity Surveys

WBG

The plan for data collection at this location required a number of profiles oriented along the trend of the pond, WNW-ESE plus one NE-SW cross tie line, and centered around the area exhibiting contamination. The lines, WBG-1 to 5, were spaced from the top of the embankment toward the burning ground itself, which is a well defined area surrounded by low berms. The resistivity survey parameters were selected to best characterize the assumed fill area: an electrode spacing of 5 feet, yielding lines 275 feet in length, and a dipole-dipole array were chosen. Survey planning software indicated that the depth and lateral data points of the arrays would be sufficient to image bedrock conditions at the site.

4.0 Geophysical Data Processing

4.1 EM31 Data Processing

The EM31 data were downloaded and reviewed using the manufacturer's software. The data were leveled by removing instrument drift and presented as plan maps using Geosoft's Oasis Montaj software.

4.2 Resistivity Inversion Processing

For QC purposes, the data was pre-processed in the field using the AGI EarthImager 2D software, and all files were backed up and saved for later in-house processing.
The final inversion models derived from the EarthImager 2D software resulted in the generation of 2D resistivity image sections. The data processing involves several critical steps.

1. Initial inversion and processing parameters settings were set to include all recorded data points, and the minimum-maximum apparent resistivity range was set at 1 ohm-m to 10,000 ohm-m, respectively. The maximum noise threshold was set at 2%.
2. The EarthImager 2D inversion software read the raw file and the processor performed a data point noise analysis, and an edit routine removed noisy data.
3. Initial inversion processing was performed to analyze and compare the measured pseudo-apparent resistivity section and calculated pseudo-apparent resistivity section. A close fit between the two sections was indicative of a good inversion solution. Additionally, the total RMS error was evaluated. The ideal RMS and L2 Norm, which are qualitative measure of the inversion model fit, should be about 5%. Values in excess of 20% RMS are indications of poor model convergence of the inversion solution With the exception of

Profile WBG3, the average RMS value was 7.6%, indicating a good inversion model fit. See notes concerning WBG3 under Results and Interpretation.

4. Although the initial inversion was set for 8 iterations, analysis of convergence solutions may indicate "best fit" solutions with fewer iterations. The processor selects the best resistivity image model based on the least number of iterations required to achieve the lowest RMS error. Excessive inversion processing can introduce artificial features that are not real, therefore, the least number of inversion iterations required to achieve the "best fit" model solution is selected for final processing and interpretation.

5.0 Results and Interpretation

WBG

The central portion of the survey area was inaccessible to the EM31 due to the presence of heavy woods.

The EM31 in-phase and quadrature phase data are shown on Figures 4 and 5 respectively. Both maps show a general lack of conductive/metallic material within the extent of the former burning ground (likely due to the soil removal) and a zone of higher values located immediately west of the burning ground where concentrations of metal and other conductive materials may be present.

The in-phase values are lower, but remain slightly elevated through the burning ground itself, and in scattered locations through the remainder of the surveyed area. Higher values of quadrature phase response are not present in the burning ground, but appear to extend southeast toward the pond.

Locations of the resistivity profiles are shown on Figure 6. The resistivity profile plots shown in Figure 7 represent 2D inversion image sections that indicate the relative distribution of vertical and horizontal apparent resistivity (scale in meters). As mentioned above, although the RMS value for WBG3 was higher than the average of the other profiles (32.4%), visual comparison of the observed and modeled pseudo-apparent resistivity sections, as well as comparison between WBG3 and adjacent profiles suggests a relatively good representation of conditions. The color range represents the minimum-maximum apparent resistivity values measured along the profile, and is numerically presented in Ohm-m. Given the geologic setting, the types of rock and soil, moisture content, the predicted range of apparent resistivity values should fall between 100 ohm-m and 5000 ohm-m. In general, we observe three distinct sub-ranges of apparent resistivity. The lower resistivity range between 5 and 120 ohm-m, a middle range between 150 and 900 ohm-m, and a high distribution range between 1000 ohm-m to 10000 ohm-m.

All six profiles show relatively conductive materials at the surface (moister and/or finer soils such as loam, clay, silt) interbedded with and overlying more resistive materials

(dryer and/or coarser, such as sand and gravel, boulders). The conductive surface layer is generally consistent to depths of 15 feet or so, but is interrupted by zones of more resistive materials, suggesting that the area was disturbed in the past.

Underlying the soils is highly resistive material, most likely representing limestone bedrock. The rock surface is generally undulating and exhibits numerous irregularities suggesting possible channels, cavities, or other solution features. Possible cavities are present at depth as well, particularly on Profiles WBG-1 and WBG-4.

Depths to the top of the interpreted bedrock surface were tabulated at each electrode location and contoured to provide the map of Figure 8. Inspection of Figure 8 reveals the following observations.

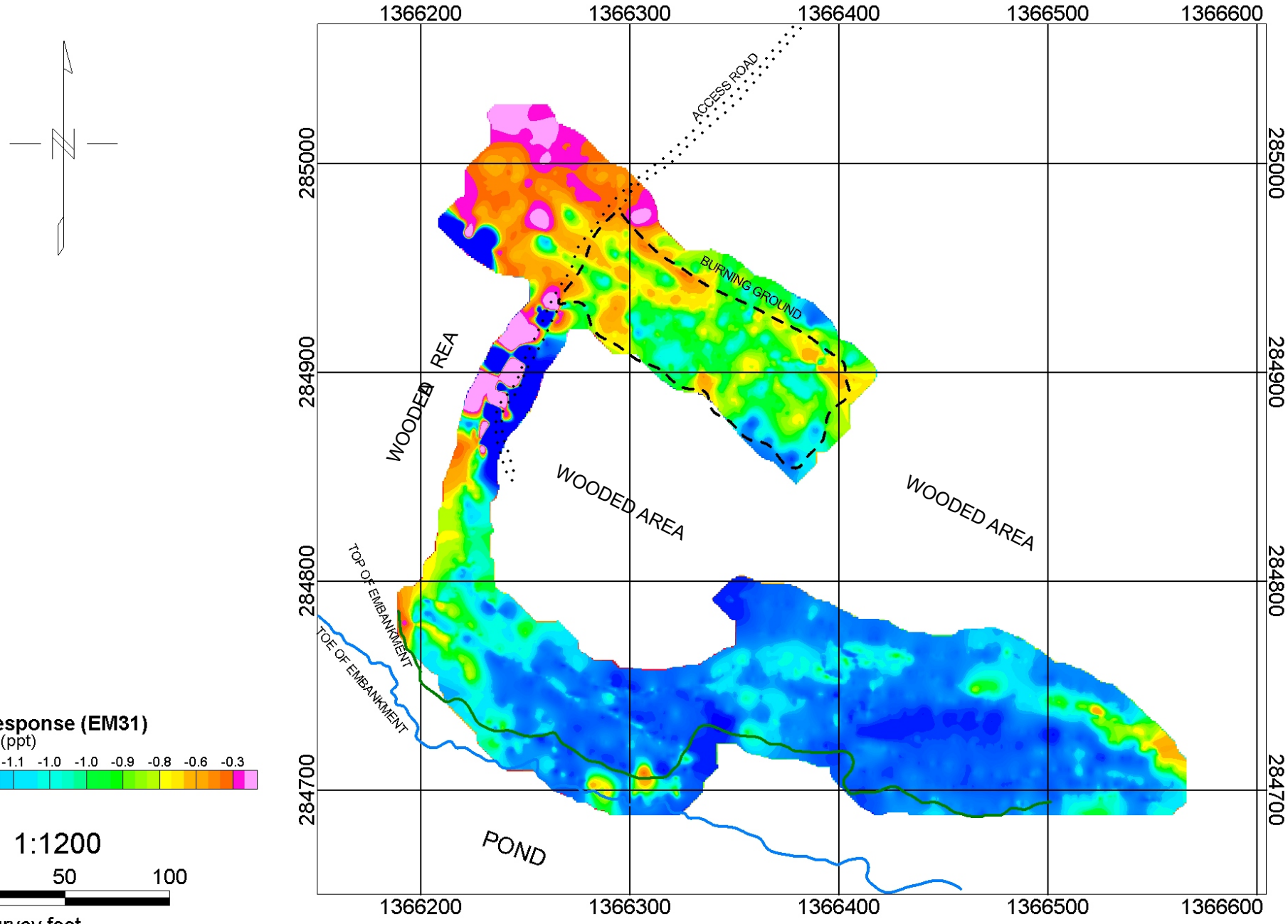
- Numerous small peaks and depressions are seen in the bedrock surface, corresponding to the irregularities noted above.

- Shallowest bedrock is found in the area of the burning ground, with interpreted depths of 5 to 10 feet. The rock surface generally deepens in the direction of the pond; however the deepest point within the survey area is seen near the intersection of Profiles WBG-2 and WBG-5, reaching depths in excess of 34 feet.

- Two low areas with the appearance of channels extend from the deepest area toward the pond, one appearing to terminate near the zone of contaminated sediments.

- Although Figure 8 illustrates interpreted bedrock depth and not elevation, the ground surface at the site also slopes generally downward toward the pond and would tend to accentuate flow from the burning ground toward the pond.

- Vertical conductivity anomalies connecting the resistivity profiles and potentially associated with bedrock fracture zones were not observed.



In-phase Response (EM31)
(ppt)

-1.5 -1.3 -1.3 -1.2 -1.2 -1.2 -1.1 -1.0 -1.0 -0.9 -0.8 -0.6 -0.3

Scale 1:1200

50 0 50 100

US survey foot

NAD27 / Virginia CS27 South zone

prepared by Shaw® Environmental & Infrastructure Geophysics and Mapping Group

Figure 4
RAAP
EM31 Terrain Conductivity Survey

Western Burning Ground - In-Phase Response (ppt)

survey date: April 24, 2007
DRAFT

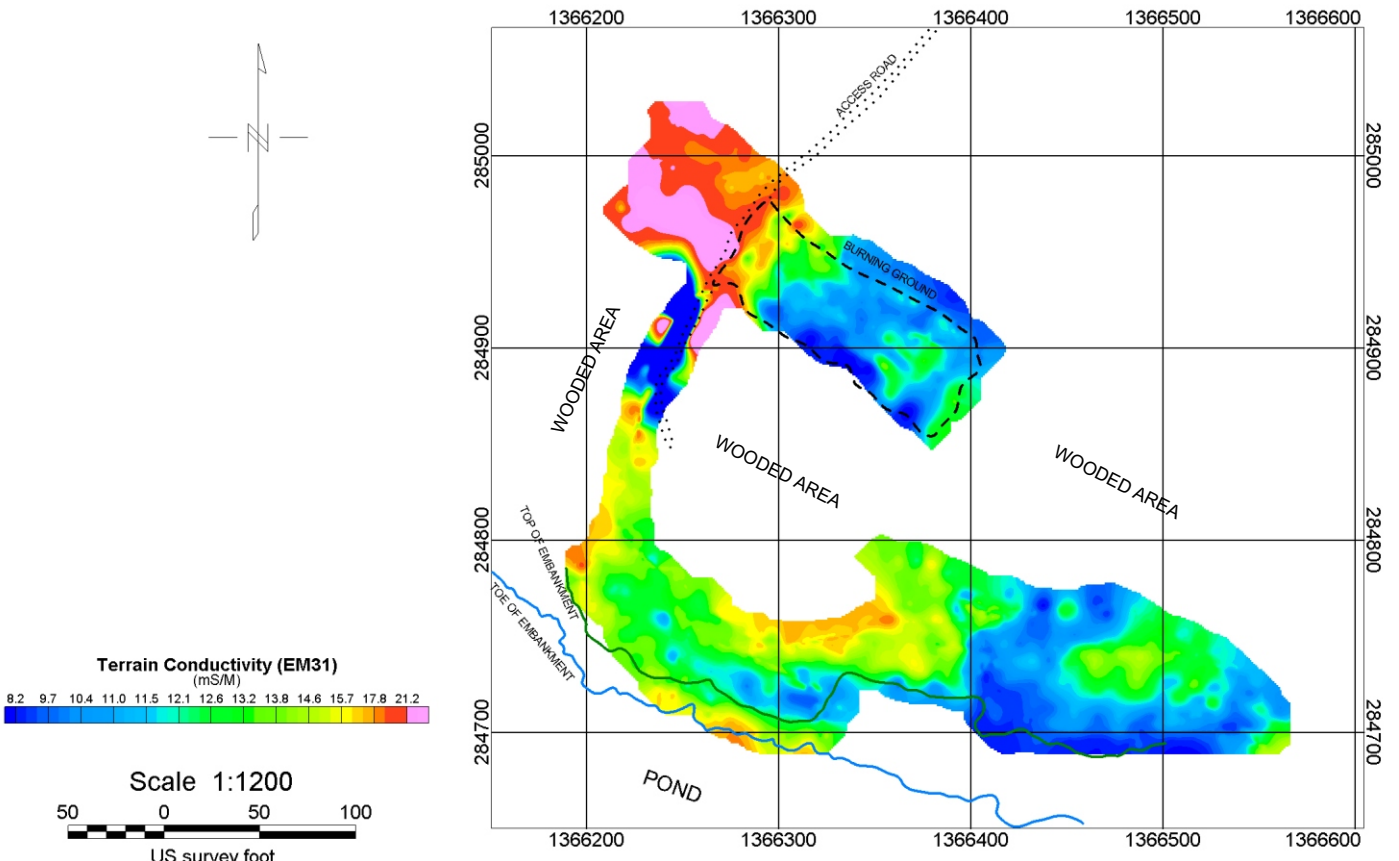


Figure 5

RAAP

EM31 Terrain Conductivity Survey

Western Burning Ground - Quadrature Phase (ms/M)

survey date: April 24, 2007

DRAFT

prepared by Shaw® Environmental & Infrastructure Geophysics and Mapping Group

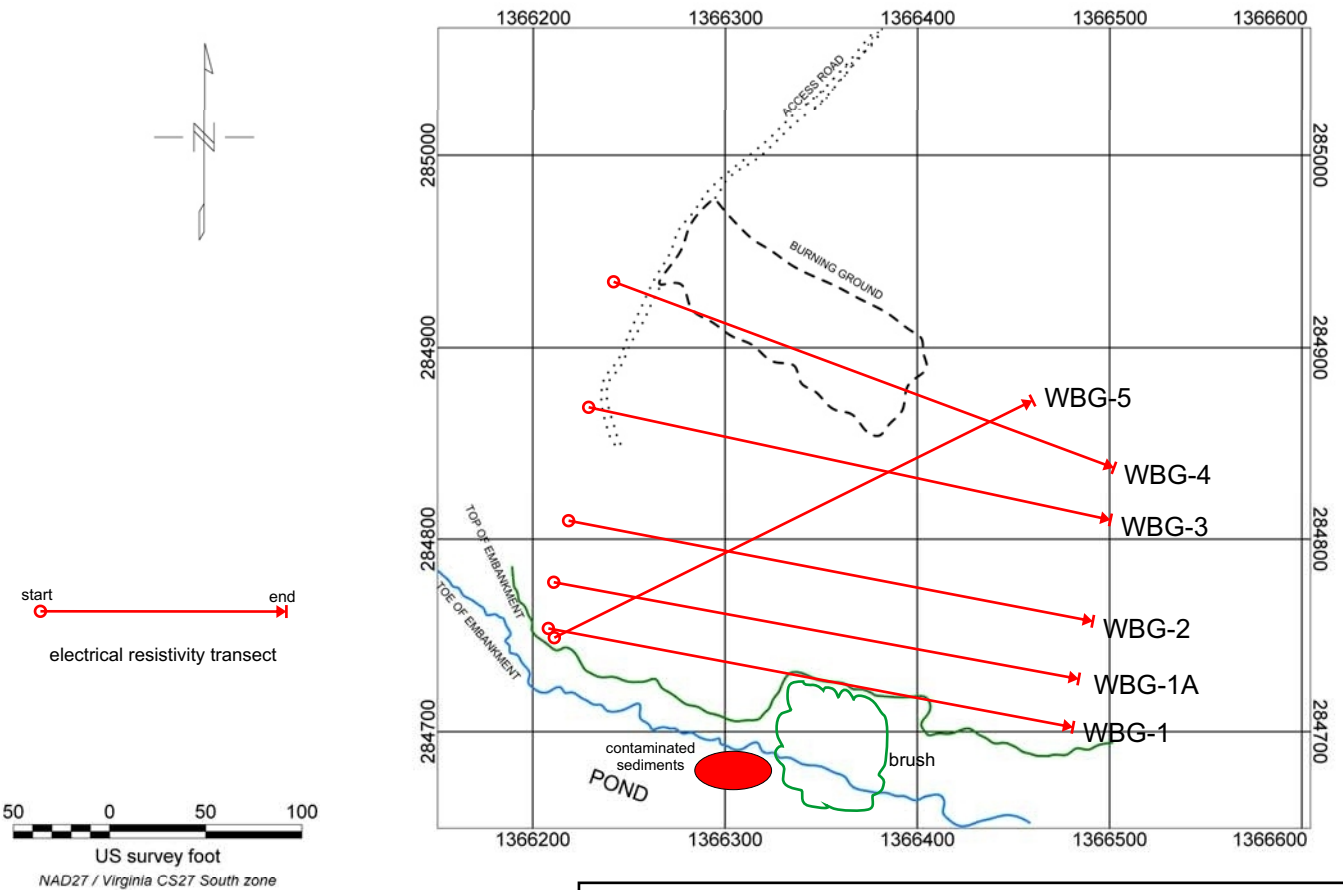


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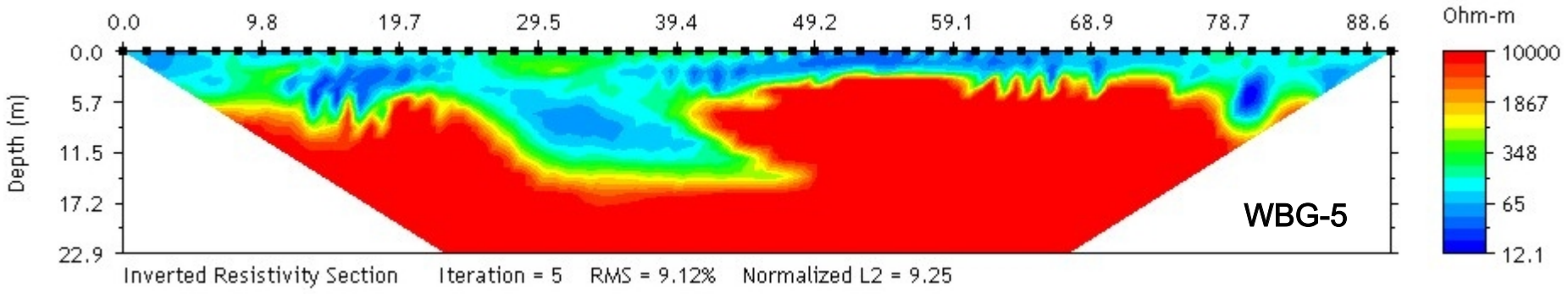
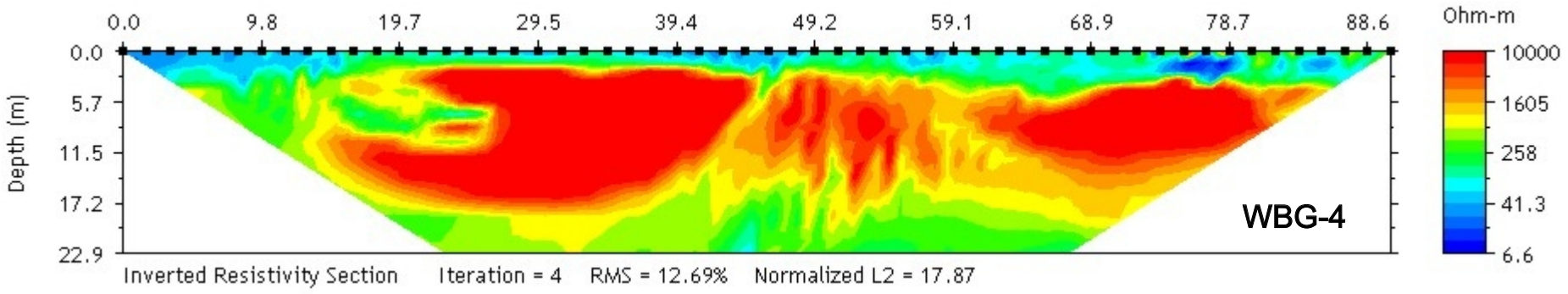
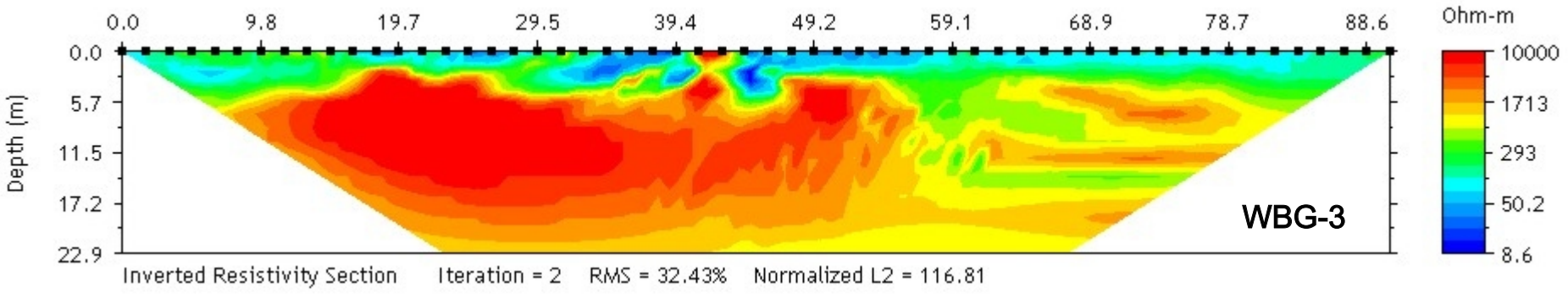
Figure 6
RAAP
Electrical Resistivity Survey

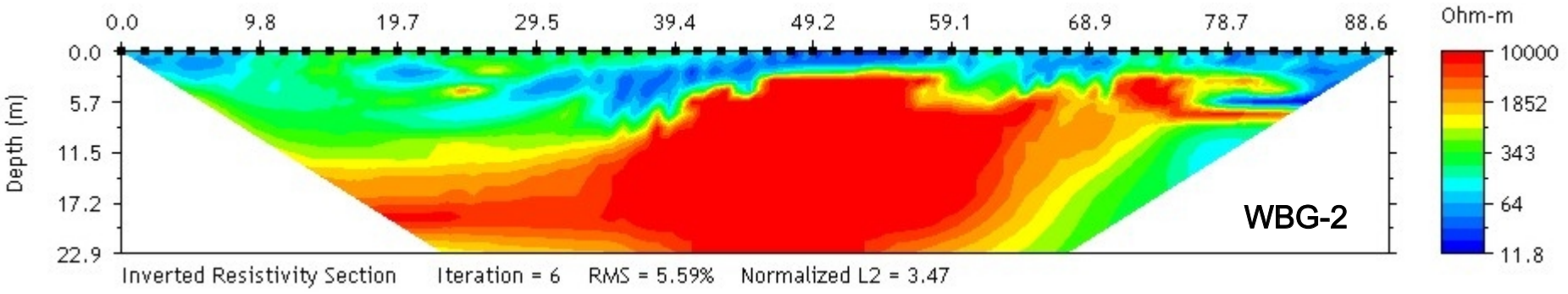
Western Burning Ground - Electrical Resistivity Transect Locations

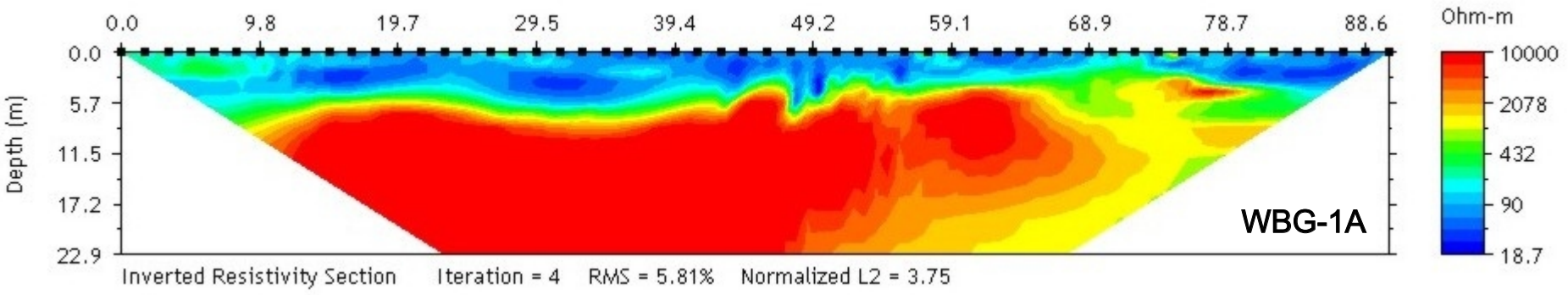
survey date: April 25 - 26, 2007
DRAFT

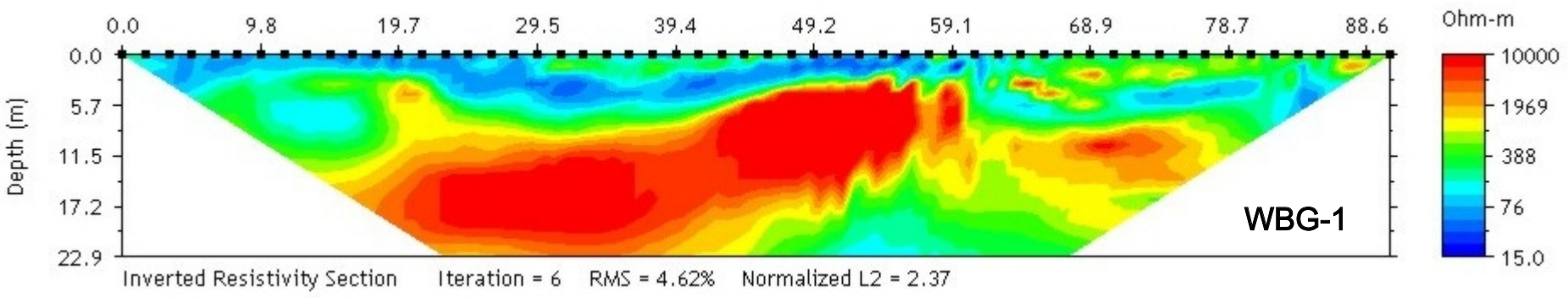










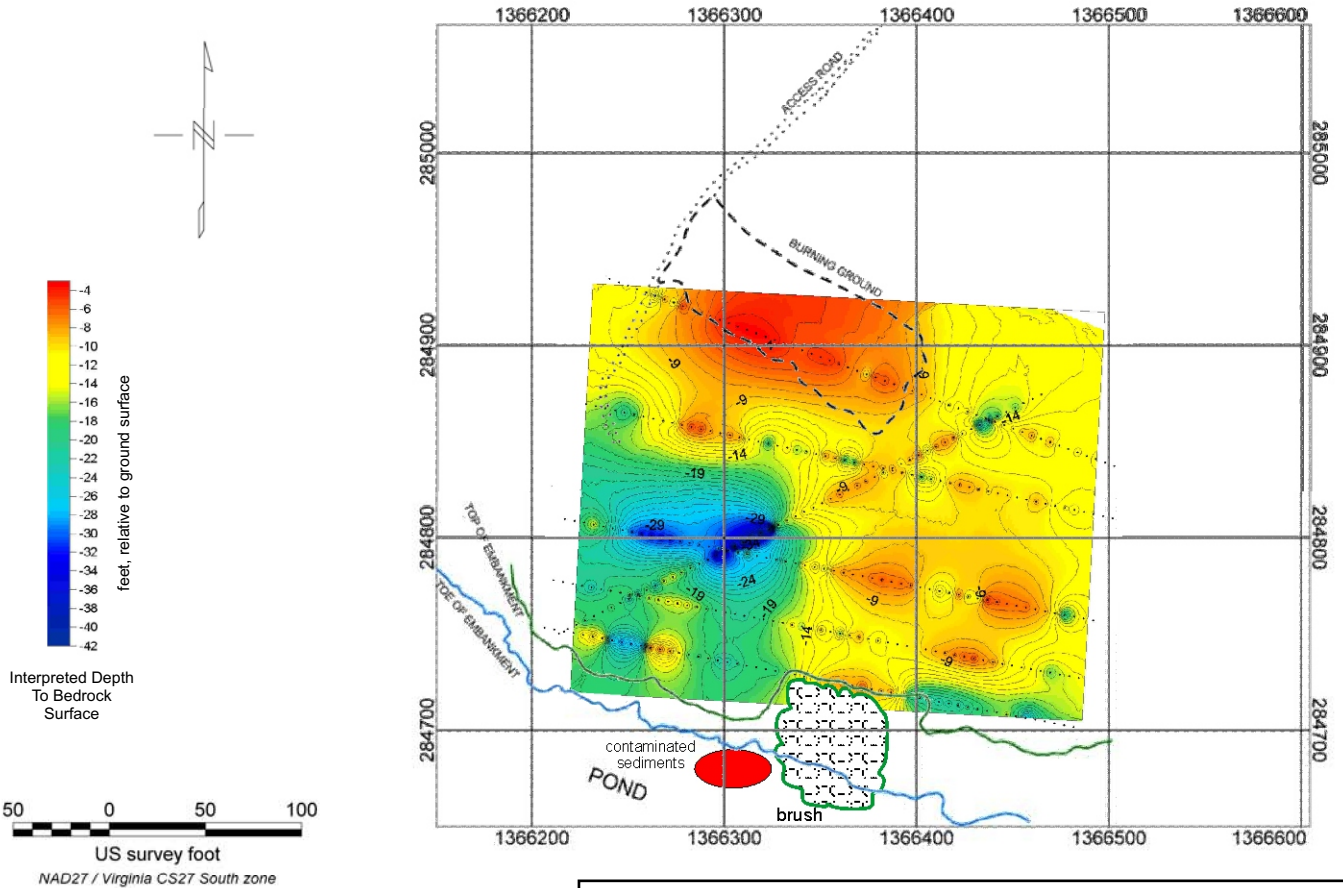


PREPARED BY Shaw® ENVIRONMENTAL & INFRASTRUCTURE GEOPHYSICS GROUP

Figure 7
RAAP
Electrical Resistivity **Survey**

Western Burning Ground - Resistivity Profiles

survey date: April 25 - 26, 2007
DRAFT



prepared by Shaw Environmental & Infrastructure Geophysics and Mapping Group

Figure 8

RAAP

Electrical Resistivity Survey

Western Burning Ground - Interpreted Depth To Bedrock Surface

survey date: April 25 - 26, 2007

DRAFT

Appendix D

Data Validation Reports

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – PAHs
GPL Laboratories, Inc., SDG 407075

DATE: August 25, 2004

The purpose of this memorandum is to present the data validation report for the samples collected for the New River WI at the RFAAP on July 13, 2004. Samples were analyzed for polynuclear aromatic hydrocarbons (PAHs) using USEPA SW846 Methods 3550B/8270C low level. A total of thirty-five soil samples were validated including diluted samples. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
DTSB48A	407075-001	DTSB59A	407075-013
DTSB48A	407075-001DL	DTSB59A	407075-013DL
TMSB48A	407075-002	TMSB59A	407075-014
TMSB48A	407075-002DL	TMSB59A	407075-014DL
DTSB50A	407075-004	DTSB60A	407075-015
DTSB50A	407075-004DL	DTSB62A	407075-017
DTSB51A	407075-005	DTSB63A	407075-018
DTSB51A	407075-005DL	DTSB63A	407075-018DL
DTSB52A	407075-006DL	DTSB64A	407075-019
DTSB52A	407075-006DL2	DTSB64A	407075-019DL
DTSB54A	407075-008	DTSB65A	407075-020
DTSB55A	407075-009DL	DTSB66A	407075-021
DTSB55A	407075-009DL2	DTSB67A	407075-022DL
DTSB56A	407075-010	DTSB67A	407075-022DL2
DTSB56A	407075-010DL	DTSB68A	407075-023
DTSB57A	407075-011	DTSB68A	407075-023DL
DTSB58A	407075-012	DTSB69A	407075-024
DTSB58A	407075-012DL		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements*, method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times
	X	Instrument Performance Check
X		Initial Calibration
X		Continuing Calibration
	X	Blank Analysis
X		Surrogate Spikes
X		Internal Standards
X		Laboratory Control Standard
X		Matrix Spike/Spike Duplicate
X		Field Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications, except for the following. For where the sample concentrations exceeded the calibration range (“E” lab flag), the data was qualified “R” rejected. The diluted sample should be used for this case. This was the case for most of the samples.

_____ _____

Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
POLYNUCLEAR AROMATIC HYDROCARBONS REVIEW
SDG 407075

I-Holding Times
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For polynuclear aromatic hydrocarbons (PAHs) soil samples cooled @ 4°C ± 2°C; the maximum holding time is the maximum holding time is 14 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For samples collected on 07/13/04, coolers were received by the laboratory at 3.0°C and 3.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The soil samples were collected on 07/13/04, extracted on 07/14/04, 07/16/04, and 07/21/04, and analyzed for PAHs on 07/14/04, 07/15/04, 07/16/04, 07/19/04, 07/21/04, and 07/22/04. The actual extraction and analysis dates for each sample may be found on the attached form 1s to this report. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check
GC/MS instrument performance checks are performed to ensure mass resolution, identification and, to some degree, sensitivity. The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, decafluorotriphenylphosphine (DFTPP), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for PAH compounds by GC/MS low level. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.99. The minimum relative response factor (RRF) criteria must be ≥ 0.05. Initial calibration percent relative standard deviation (%RSD) must be ≤ 15% on the average for all compounds (< 30% for CCCs). All detects are qualified as estimated “J” for where there were exceeding %RSDs, and all non-detects are qualified as estimated “UJ” for where there were grossly exceeding recoveries, unless determined to be unusable “R”. Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated “J” and non-detects are rejected “R”.

- Initial calibration for the PAHs by USEPA SW-846 8270C low level was performed on 07/14/04 on instrument GC/MS-P. All RRFs were ≥ 0.05. Target compounds naphthalene (16.4%), acenaphthylene (16.7%), phenanthrene (16.5%), indeno(1,2,3-cd)pyrene (16.4%), and dibenz(a,h)anthracene (26.0%) were outside criteria. Naphthalene, acenaphthylene, phenanthrene, indeno(1,2,3-cd)pyrene, and dibenz(a,h)anthracene were qualified "J" for detects and no qualifier for non-detects based upon these outliers. Samples DTSB48A (407075-001), DTSB48A (407075-001DL), TMSB48A (407075-002), TMSB48A (407075-002DL), DTSB51A (407075-005), DTSB54A (407075-008), DTSB55A (407075-009DL), DTSB56A (407075-010), DTSB56A (407075-010DL), DTSB58A (407075-012), DTSB58A (407075-012DL), DTSB59A (407075-013), DTSB59A (407075-013DL), TMSB59A (407075-014), DTSB60A (407075-015), DTSB62A (407075-017), DTSB63A (407075-018), DTSB63A (407075-018DL), DTSB66A (407075-021), DTSB67A (407075-022DL), DTSB68A (407075-023), DTSB68A (407075-023DL), DTSB51A (407075-005DL), DTSB55A (407075-009DL2), TMSB59A (407075-014DL), and DTSB67A (407075-022DL2) apply to this initial calibration.

- Initial calibration for the PAHs by USEPA SW-846 8270C low level was performed on 07/19/04 on instrument GC/MS-P. All RRFs were ≥ 0.05. All criteria were met. No qualifiers were applied. Samples DTSB50A (407075-004), DTSB50A (407075-004DL), DTSB52A (407075-006DL), DTSB52A (407075-006DL2), DTSB57A (407075-011), DTSB65A (407075-020), DTSB69A (407075-024), DTSB64A (407075-019), and DTSB64A (407075-019DL) apply to this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Continuing calibration standards containing both target and surrogates compounds are analyzed at the beginning of each 12-hour analysis period following the analysis of the instrument performance check and prior to the analysis of blanks and samples. The minimum relative response factors (RRF) for semivolatile target compounds and surrogates must be ≥ 0.05. The percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within ± 20% for all target compounds. Grossly exceeding is defined where %D>40%. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For continuing calibration for the PAHs by USEPA SW-846 8270C low level performed on 07/14/04 @15:58 on instrument GC/MS-P, all target compounds were within criteria. No qualifiers were applied. Samples DTSB54A (407075-008), DTSB58A (407075-012), DTSB60A (407075-015), DTSB62A (407075-017), DTSB66A (407075-021), DTSB63A (407075-018), DTSB68A (407075-023), DTSB67A (407075-022DL), DTSB56A (407075-010), DTSB48A (407075-001), TMSB48A (407075-002), DTSB51A (407075-005), DTSB59A (407075-013), TMSB59A (407075-014), and DTSB55A (407075-009DL) apply to this continuing calibration.

- For continuing calibration for the PAHs by USEPA SW-846 8270C low level performed on 07/15/04 @11:23 on instrument GC/MS-P, benzo(g,h,i)perylene (23.1%) was outside criteria limits. For associated samples, all detects were qualified "J" and non-detects no qualifier based upon this outlier. Samples DTSB48A (407075-001DL), TMSB48A (407075-002DL), DTSB56A (407075-010DL), DTSB58A (407075-012DL), DTSB59A (407075-013DL), DTSB63A (407075-018DL), and DTSB68A (407075-023DL) apply to this continuing calibration.

- For continuing calibration for the PAHs by USEPA SW-846 8270C low level performed on 07/16/04 @10:44 on instrument GC/MS-P, indeno(1,2,3-cd)pyrene (21.0%) and benzo(g,h,i)perylene (28.1%) were outside criteria limits. For associated samples, all detects were qualified "J" and non-detects no qualifier based upon these outliers. Samples DTSB51A (407075-005DL), DTSB55A (407075-009DL2), TMSB59A (407075-014DL), and DTSB67A (407075-022DL2) apply to this continuing calibration.

- For continuing calibration for the PAHs by USEPA SW-846 8270C low level performed on 07/19/04 @13:27 on instrument GC/MS-P, all target compounds were within criteria. No qualifiers were applied. Samples DTSB50A (407075-004), DTSB50A (407075-004DL), DTSB52A (407075-006DL), DTSB52A (407075-006DL2), DTSB57A (407075-011), DTSB65A (407075-020), and DTSB69A (407075-024) apply to this continuing calibration.

- For continuing calibration for the PAHs by USEPA SW-846 8270C low level performed on 07/21/04 @16:05 on instrument GC/MS-P, all target compounds were within criteria. No qualifiers were applied. Sample DTSB64A (407075-019) applies to this continuing calibration.

- For continuing calibration for the PAHs by USEPA SW-846 8270C low level performed on 07/22/04 @16:53 on instrument GC/MS-P, all target compounds were within criteria. No qualifiers were applied. Sample DTSB64A (407075-019DL) applies to this continuing calibration.

V-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. A method blank analysis must be performed after the calibration standards and once every 12-hour time period beginning with the injection of DFTPP. No contaminants should be detected in any of the associated blanks > the MDL. USACE Shell criteria specifies all concentrations should be less than one-half MRL (<MRL for common laboratory contaminants phthalate esters). Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤ 10 times (10x) the maximum amount in any blank for the common laboratory contaminants phthalate esters, or 5 times (5X) the maximum amount for other semivolatile target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one, 100% solids, and were converted to soil values (soil conversion factor = 33). Rinse blanks 071304R1 (407077-001) and 071304R2 (407077-002) apply to the surface soil samples ("A" fraction samples) and was analyzed in SDG 0407077. Rinse blank 072004R2 (407140-001) applies to the subsurface soil samples ("B" fraction samples) and was analyzed in SDG 0407140.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/kg	Action Level µg/kg	B qualified samples
07/14/04	BLK67694	All compounds < MRL	NA	NA	None
07/19/04	BLK67751	All compounds < MRL	NA	NA	None
07/21/04	BLK67842	All compounds < MRL	NA	NA	None
07/20/04	071304R1	All compounds < MRL	NA	NA	None
07/20/04	071304R2	All compounds < MRL	NA	NA	None
07/26/04	072004R2	All compounds < MRL	NA	NA	None

VI-Surrogate Spikes
Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Surrogate spikes are added to all samples and blanks to measure their recovery in sample and blank matrices. The percent recoveries (%Rs) must be within the specified control limits.

Criteria: Nitrobenzene-d5 (29-140%) – S1 (USACE Shell Criteria: 45-135%)
2-Fluorobiphenyl (31-125%) – S2 (USACE Shell Criteria: 45-135%)
Terphenyl – d14 (26-160%) – S3 (USACE Shell Criteria: 45-135%)

- For sample DTSB58A (407075-012), surrogates nitrobenzene-d5 (43%), 2-Fluorobiphenyl (33%), and Terphenyl – d14 (39%) were below USACE criteria and within lab criteria. All detects were qualified bias low "L" for detects and "UL" for non-detects based upon these outliers.

- For sample DTSB58A (407075-012DL), surrogates nitrobenzene-d5 (40%), 2-Fluorobiphenyl (31%), and Terphenyl – d14 (38%) were below USACE criteria and within lab criteria. Since the surrogates were diluted out for this sample, no qualifiers were applied based upon these outliers.

- For sample DTSB55A (407075-009DL2), surrogates nitrobenzene-d5 (0%), 2-Fluorobiphenyl (0%), and Terphenyl – d14 (0%) did not recover. Since the surrogates were diluted out for this sample, no qualifiers were applied based upon these outliers.

- For sample DTSB67A (407075-022DL2), surrogates nitrobenzene-d5 (0%), 2-Fluorobiphenyl (0%), and Terphenyl – d14 (0%) did not recover. Since the surrogates were diluted out for this sample, no qualifiers were applied based upon these outliers.

- For all other samples, all criteria were met. No qualifiers were applied.

VII-Internal Standards
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Internal standard area counts for samples and blanks must not vary by more than a factor of two (- 50% to + 100%) from the associated calibration standard. The retention time of the internal standards in samples and blanks must not vary by more than ± 30 seconds from the retention time of the associated calibration standard.

- For sample DTSB48A (407075-001), internal standard chrysene-d12 was below criteria limits. All associated compounds were qualified "J" for detects and "UJ" for non-detects based upon this outlier.

- For sample DTSB51A (407075-005), internal standards chrysene-d12 and phenanthrene-d10 were below criteria limits. All associated compounds were qualified "J" for detects and "UJ" for non-detects based upon this outlier.

- For sample DTSB55A (407075-009DL), internal standards chrysene-d12, 1,4-dichlorobenzene-d4, and phenanthrene-d10 were below criteria limits. All associated compounds were qualified "J" for detects and "UJ" for non-detects based upon this outlier.

- For sample DTSB59A (407075-013), internal standards chrysene-d12 and 1,4-dichlorobenzene-d4 were below criteria limits. All associated compounds were qualified "J" for detects and "UJ" for non-detects based upon this outlier.

- For sample TMSB48A (407075-002), internal standards chrysene-d12 and phenanthrene-d10 were below criteria limits. All associated compounds were qualified “J” for detects and “UJ” for non-detects based upon this outlier.

- For sample TMSB59A (407075-014), internal standards chrysene-d12, 1,4-dichlorobenzene-d4, and phenanthrene-d10 were below criteria limits. All associated compounds were qualified “J” for detects and “UJ” for non-detects based upon this outlier.

- For all other samples, all criteria were met. No qualifiers were applied.

VIII-Laboratory Control Samples

Laboratory control samples (LCS) are used to monitor laboratory accuracy by calculating the percent recoveries of the spiked compounds. All LCS percent recoveries must be within the specified control limits. USACE Shell limits for PAHs by 8270C low level are 45-135% (25-150% for sporadic marginal failures (SMF)).

- Sample BKS67694 was used as the LCS for PAHs by USEPA SW-846 8270C low level analyzed 07/14/04. Dibenz(a,h)anthracene (147%) was outside criteria limits. All detects were qualified bias high “K” and non-detects no qualifier based upon this outlier. Samples DTSB48A (407075-001), DTSB48A (407075-001DL), TMSB48A (407075-002), TMSB48A (407075-002DL), DTSB51A (407075-005), DTSB54A (407075-008), DTSB55A (407075-009DL), DTSB56A (407075-010), DTSB56A (407075-010DL), DTSB58A (407075-012), DTSB58A (407075-012DL), DTSB59A (407075-013), DTSB59A (407075-013DL), TMSB59A (407075-014), DTSB60A (407075-015), DTSB62A (407075-017), DTSB63A (407075-018), DTSB63A (407075-018DL), DTSB66A (407075-021), DTSB67A (407075-022DL), DTSB68A (407075-023), DTSB68A (407075-023DL), DTSB51A (407075-005DL), DTSB55A (407075-009DL2), TMSB59A (407075-014DL), and DTSB67A (407075-022DL2) apply to this LCS.

- Sample BKS67751 was used as the LCS for PAHs by USEPA SW-846 8270C low level analyzed 07/19/04. All criteria were met. No qualifiers were applied. Samples DTSB50A (407075-004), DTSB50A (407075-004DL), DTSB52A (407075-006DL), DTSB52A (407075-006DL2), DTSB57A (407075-011), DTSB65A (407075-020), and DTSB69A (407075-024) apply to this LCS.

- Sample BKS67842 was used as the LCS for PAHs by USEPA SW-846 8270C low level analyzed 07/21/04. All criteria were met. No qualifiers were applied. Samples DTSB64A (407075-019) and DTSB64A (407075-019DL) apply to this LCS.

IX-Matrix Spike/Matrix Spike Duplicate

Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. USACE Shell limits are 45-135%; RPD ≤ 60% (15-150%; RPD ≤ 60% for sporadic marginal failures (SMF)).

- Sample DTSB63A (407075-018) was used for the MS/MSD analysis for PAHs. Compounds acenaphthene (165%, RPD=56%), anthracene (172%, RPD=69%), benzo(a)anthracene (456%, 128%; RPD=112%), benzo(a)pyrene (353%, RPD=101%), benzo(b)fluoranthene (426%, RPD=110%), benzo(g,h,i)perylene (281%, RPD=106%), benzo(k)fluoroanthene (153%, RPD=42%), chrysene (307%, RPD=92%), dibenz(a,h)anthracene (156%, RPD=46%), fluoranthene (242%, RPD=125%), fluorene (169%, RPD=46%), indeno(1,2,3-cd)pyrene (263%, RPD=97%), phenanthrene (202%, 53%, RPD=117%), and pyrene (274%, RPD=115%) were outside USACE and/or lab criteria. The high recoveries were due to large amount of organic compounds detected in the spiked sample. All detects were qualified "J" estimated for the spiked sample and non-detects no qualifier for the noted compounds based upon these outliers.

- Sample DTSB76A (407076-009) was used for the MS/MSD analysis for PAHs. The spiked sample was reported in SDG 407076. Compounds acenaphthene (410%, 445%), anthracene (265%, 350%), benzo(a)anthracene (555%, 555%), benzo(a)pyrene (830%, 880%), benzo(b)fluoranthene (890%, 990%), benzo(g,h,i)perylene (595%, 445%), benzo(k)fluoroanthene (265%, 410%; RPD=43%), chrysene (370%, 420%), dibenz(a,h)anthracene (265%, 200%), fluoranthene (310%, 410%), fluorene (365%, 415%), indeno(1,2,3-cd)pyrene (595%, 495%), naphthalene (190%, 170%), phenanthrene (345%, 345%), and pyrene (215%, 265%) were outside USACE and/or lab criteria. The high recoveries were due to large amount of organic compounds detected in the spiked sample. All detects were qualified "J" estimated for the spiked sample and non-detects no qualifier for the noted compounds based upon these outliers.

- Sample DTSB80A (407137-015) was used for the MS/MSD analysis for PAHs. The spiked sample was reported in SDG 407137. Compounds benzo(a)anthracene (148%, 158%), benzo(a)pyrene (143%, 153%), benzo(b)fluoranthene (155%, 170%), benzo(k)fluoroanthene (141%, 141%), chrysene (133%, 148%), dibenz(a,h)anthracene (125%), fluoranthene (210%, 225%), indeno(1,2,3-cd)pyrene (132%, 127%), phenanthrene (159%, 174%), and pyrene (153%, 173%) were outside USACE and/or lab criteria. The high recoveries were due to large amount of organic compounds detected in the spiked sample. All detects were qualified "J" estimated for the spiked sample and non-detects no qualifier for the noted compounds based upon these outliers.

X-Field Duplicate Sample Analysis

Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the soil samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field soil sample duplicate pair DTSB48A (407075-001) and TMSB48A (407075-002) was collected. The field duplicate evaluation is noted in **Table 3**. For where the duplicate pair was diluted due to high compound concentrations, was used in this assessment. If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. All criteria were met. No qualifiers were applied.

Table 3 Field Duplicate Analysis Summary DTSB48A (407075-001) and TMSB48A (407075-002)

Sample ID	Dilution	Compound	Original Result (µg/kg)	Duplicate Result (µg/kg)	%RPD	Qualifier
DTSB48A	1	2-Methylnaphthalene	92	61	40.5	None
DTSB48A	1	Acenaphthylene	150	120	22.2	None
DTSB48A	40	Acenaphthene	730	750	2.7	None
DTSB48A	40	Anthracene	1600	1700	6.1	None
DTSB48A	40	Benzo(a)anthracene	3700	3200	14.5	None
DTSB48A	40	Benzo(a)pyrene	2800	2600	7.4	None
DTSB48A	40	Benzo(b)fluoranthene	4700	4300	8.9	None
DTSB48A	40	Benzo(g,h,i)perylene	1500	1300	14.3	None
DTSB48A	40	Benzo(k)fluoranthene	1600	1600	0.0	None
DTSB48A	40	Chrysene	3400	3300	3.0	None
DTSB48A	40	Dibenz(a,h)Anthracene	550	430	24.5	None
DTSB48A	40	Fluoranthene	9900	9000	9.5	None
DTSB48A	40	Fluorene	690	690	0.0	None
DTSB48A	40	Indeno(1,2,3-c,d)Pyrene	1400	1200	15.4	None
DTSB48A	40	Naphthalene	400	320 U	NA	None
DTSB48A	40	Phenanthrene	7400	7200	2.7	None
DTSB48A	40	Pyrene	7600	7200	5.4	None

U = Analyte non-detect as <MRL.
NA = Not Applicable.

- Field soil sample duplicate pair DTSB59A (407075-013) and TMSB59A (407075-014) was collected. The field duplicate evaluation is noted in **Table 4**. For where the duplicate pair was diluted due to high compound concentrations, was used in this assessment. If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. Acenaphthene was outside criteria. The duplicate pair was qualified estimated "J" based upon this outlier.

Table 4 Field Duplicate Analysis Summary DTSB59A (407075-013) and TMSB59A (407075-014)

Sample ID	Dilution	Compound	Original Result (µg/kg)	Duplicate Result (µg/kg)	%RPD	Qualifier
DTSB59A	1	2-Methylnaphthalene	54	58	7.1	None
DTSB59A	1	Acenaphthylene	99	130	27.1	None
DTSB59A	1	Dibenz(a,h)Anthracene	370	410	10.3	None
DTSB59A	1	Naphthalene	150	140	6.9	None
DTSB59A	20 & 40	Acenaphthene	690	1200	54.0	J
DTSB59A	20 & 40	Anthracene	1500	2400	46.2	None
DTSB59A	20 & 40	Benzo(a)anthracene	2900	3900	29.4	None
DTSB59A	20 & 40	Benzo(a)pyrene	2200	3200	37.0	None
DTSB59A	20 & 40	Benzo(b)fluoranthene	3700	5600	40.9	None
DTSB59A	20 & 40	Benzo(g,h,i)perylene	1100	1500	30.8	None
DTSB59A	20 & 40	Benzo(k)fluoranthene	1000	1300	26.1	None
DTSB59A	20 & 40	Chrysene	2700	4100	41.2	None
DTSB59A	20 & 40	Fluoranthene	8300	12000	36.5	None
DTSB59A	20 & 40	Fluorene	670	1100	48.6	None
DTSB59A	20 & 40	Indeno(1,2,3-c,d)Pyrene	1100	1600	37.0	None
DTSB59A	20 & 40	Phenanthrene	6700	11000	48.6	None
DTSB59A	20 & 40	Pyrene	6200	10000	46.9	None

J = Estimated Value.

XI-Quantitation Verification

The accuracy of analytical results was verified through the calculation of several parameters. Percent difference (%D) between the calculated and reported values must be ≤10%. Any sample value > MDL and < MRL or < 3*MDL (whichever is greater) was qualified as estimated, "J." Any tentatively identified compounds found were qualified as estimated "J". For where the sample concentrations exceeded the calibration range ("E" lab flag), the data was qualified "R" rejected. The diluted sample should be used for this case. This was the case for most of the samples.

Sample: DTSB48A (407075-001), acenaphthylene

Conc. μg/kg = (Ax * Is * Vt * DF) / (Ais * RRF * Vi * Ws * D)

where:
- Conc. = Sample concentration in μg/kg
- Ax = Area of characteristic ion for compound being measured.
- Is = Amount of internal standard injected (ng).
- Vt = Volume of total extract (μL).
- Ais = Area of characteristic ion for the internal standard.
- RRF = Average relative response factor for compound being measured (from ICAL)
- Vi = Volume of extract injected (μL).
- W(s) = Weight of sample extracted or diluted in grams.
- D = Percent dry weight (100 - % moisture in sample)/100
- DF = Dilution factor

Conc. μg/kg = (2928957 * 4 * 1000 * 1) / (1974294 * 1.600 * 1 * 30 * 0.8250) = 150 μg/kg
Reported Value = 150 μg/kg
% Difference = 0.0%
Values were within 10% difference

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – PCBs
GPL Laboratories, Inc., SDG 407075

DATE: August 26, 2004

The purpose of this memorandum is to present the data validation report for the samples collected for the New River WI at the RFAAP on July 13, 2004. Samples were analyzed for PCBs using USEPA Method 3540C/8082. A total of twenty-one soil samples were analyzed and validated for PCBs. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
DTSB48A	407075-001	TMSB59A	407075-014
TMSB48A	407075-002	DTSB60A	407075-015
DTSB50A	407075-004	DTSB62A	407075-017
DTSB51A	407075-005	DTSB63A	407075-018
DTSB52A	407075-006	DTSB64A	407075-019
DTSB54A	407075-008	DTSB65A	407075-020
DTSB55A	407075-009	DTSB66A	407075-021
DTSB56A	407075-010	DTSB67A	407075-022
DTSB57A	407075-011	DTSB68A	407075-023
DTSB58A	407075-012	DTSB69A	407075-024
DTSB59A	407075-013		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements* (USACE, February 2001), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (USEPA, September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
X		Holding Times
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
X		System Monitoring Compounds
	X	Laboratory Control Samples
	X	Matrix Spike/Spike Duplicate
	X	Field Sample Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

_____ _____

Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
PCB REVIEW
SDG 407075

I-Holding Times

The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For PCB soil samples, cooled @4°C ±2°C, the maximum holding time is 14 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis (USEPA criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For samples collected on 07/13/04, coolers were received by the laboratory at 3.0°C and 3.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The samples were collected 07/13/04 for PCB compounds. Sample DTSB64A (407075-019) was extracted 08/09/04 (13 days out of holding time) and analyzed 08/10/04 due to laboratory error. Sample DTSB64A (407075-019) was non-detect for all PCBs and qualified estimated non-detect "UJ" for all PCBs based upon this outlier. For the remaining samples, they were extracted on 07/16/04 and analyzed for PCBs on 07/20/04 and 07/21/04 within criteria guidelines. The actual extraction and analysis dates for each sample may be found on the attached form 1s to this report. No qualifiers were applied for these samples.

II-Initial Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. The initial 5-point calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run. The percent relative standard deviation (%RSD) for all single peak target analytes, and aroclors 1016 and 1260 must be $< 20\%$ or the mean %RSD for all analytes in the standard must be $\leq 20\%$. If linear regression is used, the correlation coefficient must be ≥ 0.990 (USEPA and USACE criteria).

- For the PCB initial calibration performed on 06/29/04 on instrument GC-L, all compounds were determined using calibration factors for PCB 1016 and PCB 1260. All criteria were met, except for the following. For PCB 1260 signal #2, PCB 1260 #1 (22.1%) and PCB 1260 #5 (22.7%) were above criteria limits. The average %RSD for PCB 1260 for signal #2 (20.0%) was within criteria. All associated samples were non-detect for PCB 1260. No qualifiers were applied based upon these outliers. Samples DTSB48A (407075-001), TMSB48A (407075-002), DTSB50A (407075-004), DTSB51A (407075-005), DTSB52A (407075-006), DTSB54A (407075-008), DTSB55A (407075-009), DTSB56A (407075-010), DTSB57A (407075-011), DTSB58A (407075-012), DTSB59A (407075-013), TMSB59A (407075-014), DTSB60A (407075-015), DTSB62A (407075-017), DTSB63A (407075-018), DTSB65A (407075-020), DTSB66A (407075-021), DTSB67A (407075-022), DTSB68A (407075-023), and DTSB69A (407075-024) apply to this initial calibration.

- For the PCB initial calibration performed on 07/29/04 on instrument GC-L, all compounds were determined using calibration factors for PCB 1016 and PCB 1260. All criteria were met, except for the following. For PCB 1260 signal #2, PCB 1260 #1 (20.7%), PCB 1260 #2 (21.5%), and PCB 1260 #5 (21.8%) were above criteria limits. The average %RSD for PCB 1260 for signal #2 (20.4%) was within criteria. All associated samples were non-detect for PCB 1260. No qualifiers were applied based upon these outliers. Sample DTSB64A (407075-019) applies to this initial calibration.

III-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for PCB target compounds. Continuing calibration standards containing both target compounds and surrogates are analyzed at the beginning of each 12-hour analytical shift and after every 20 samples. The percent difference (%D) or the mean %RSD for all analytes in the standard from the initial calibration should be no greater than ± 15%.

- For PCB continuing calibration performed on 07/20/04 @18:21 on instrument GC-L, the following %Ds were determined. For column #1, arochlor 1016 #5 (20.2%) was outside criteria. The average of the peaks for arochlor 1016 (8.8%) was within criteria and all samples were non-detect. No qualifiers were applied based upon this outlier. Arochlor 1260 was within criteria. For column #2, arochlor 1016 and arochlor 1260 were within criteria. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For PCB continuing calibration performed on 07/20/04 @21:44 on instrument GC-L, all criteria were met on column #1 and column #2 for all target compounds. No qualifiers were applied. Samples DTSB50A (407075-004), DTSB52A (407075-006), DTSB54A (407075-008), DTSB57A (407075-011), DTSB58A (407075-012), DTSB60A (407075-015), DTSB62A (407075-017), and DTSB63A (407075-018) apply to his continuing calibration.

- For PCB continuing calibration performed on 07/21/04 @03:03 on instrument GC-L, all criteria were met on column #1 and column #2 for all target compounds. No qualifiers were applied. Samples DTSB65A (407075-020), DTSB66A (407075-021), DTSB68A (407075-023), and DTSB69A (407075-024) apply to his continuing calibration.

- For PCB continuing calibration performed on 07/21/04 @05:57 on instrument GC-L, the following %Ds were determined. For column #1, arochlor 1016 #3 (16.1%) and arochlor 1016 #5 (25.5%) were outside criteria. The average of the peaks for arochlor 1016 (13.6%) was within criteria and all samples were non-detect. No qualifiers were applied based upon these outliers. For column #1, arochlor 1260 #4 (19.5%) was outside criteria. The average of the peaks for arochlor 1260 (6.9%) was within criteria and all samples were non-detect. No qualifiers were applied based upon this outlier. For column #2, arochlor 1016 was within criteria. For column #2, arochlor 1260 #4 (18.5%) was outside criteria and all samples were non-detect. The average of the peaks for arochlor 1260 (9.8%) was within criteria and all samples were non-detect. No qualifiers were applied based upon this outlier. Samples DTSB48A (407075-001), TMSB48A (407075-002), DTSB51A (407075-005), DTSB55A (407075-009), DTSB56A (407075-010), DTSB59A (407075-013), TMSB59A (407075-014), DTSB67A (407075-022), apply to this continuing calibration.

- For PCB continuing calibration performed on 07/21/04 @11:45 on instrument GC-L, the following %Ds were determined. For column #1, arochlor 1016 and arochlor 1260 were within criteria. For column #2, arochlor 1016 was within criteria. For column #2, arochlor 1260 #2 (15.6%), arochlor 1260 #4 (16.4%), and arochlor 1260 #5 (17.2%) were outside criteria. The average of the peaks for arochlor 1260 (15.0%) was within criteria and all samples were non-detect. No qualifiers were applied based upon these outliers. No samples reported apply to this continuing calibration.

- For PCB continuing calibration performed on 08/10/04 @11:13 on instrument GC-L, the following %Ds were determined. For column #1, arochlor 1016 and arochlor 1260 were within criteria. For column #2, arochlor 1260 #5 (16.4%) was outside criteria. The average of the peaks for arochlor 1260 (12.4%) was within criteria and all samples were non-detect. Arochlor 1016 was within criteria. No qualifiers were applied based upon this outlier. Sample DTSB64A (407075-019) applies to this continuing calibration.

- For PCB continuing calibration performed on 08/10/04 @14:16 on instrument GC-L, the following %Ds were determined. For column #1, arochlor 1260 #4 (22.3%) was outside criteria. The average of the peaks for arochlor 1260 (7.7%) was within criteria and all samples were non-detect. Arochlor 1016 was within criteria. No qualifiers were applied based upon this outlier. For column #2, arochlor 1016 and arochlor 1260 were within criteria. Samples apply to this continuing calibration.

IV-Blank Analysis

The purpose of laboratory or field blank analyses is to determine the existence and magnitude of contamination problems resulting from laboratory or field activities. One method blank per analytical batch must be run on each instrument used to analyze samples. No contaminants should be present in the blanks > MDL or MRL (USEPA criteria) or all target compounds < one-half the MRL (USACE criteria). **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one, 100% solids, and were converted to soil values (soil conversion factor = 30). Rinse blanks 071304R1 (407077-001) and 071304R2 (407077-002) apply to the surface soil samples ("A" fraction samples) and was analyzed in SDG 0407077. Rinse blank 072004R2 (407140-001) applies to the subsurface soil samples ("B" fraction samples) and was analyzed in SDG 0407140.

Table 2 Blank Contamination Analysis Summary

Parameter	Analysis Date	QC Blank ID	Compound	Max Conc. µg/kg	Action Level µg/kg	B qualified samples
PCBs	07/20/04	BLK67785	All < MRL	NA	NA	None
PCBs	08/10/04	BLK68171	All < MRL	NA	NA	None
PCBs	07/20/04	071304R1	All < MRL	NA	NA	None
PCBs	07/20/04	071304R2	All < MRL	NA	NA	None
PCBs	07/28/04	072004R2	All < MRL	NA	NA	None

V-System Monitoring Compound (Surrogates)

Laboratory performance on individual samples is established by means of spiking activities. The percent recovery (%R) for all samples and blanks must be within the specified laboratory control limits.

Criteria: Decachlorobiphenyl: PCBs: 47-161% (USACE criteria 50-130%)
Tetrachloro-m-xylene: PCBs: 54-168% (USACE criteria 50-130%)

- For PCB analysis for sample DTSB48A (407075-001), surrogate tetrachloro-m-xylene (50%) was outside USACE and/or lab criteria. Since surrogate decachlorobiphenyl was within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample DTSB50A (407075-004), surrogate decachlorobiphenyl (46%) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene was within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample DTSB51A (407075-005), surrogate decachlorobiphenyl (42%) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene was within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample DTSB52A (407075-006), surrogate decachlorobiphenyl (44%) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene was within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample DTSB55A (407075-009), surrogate tetrachloro-m-xylene (40%) was outside USACE and/or lab criteria. Since surrogate decachlorobiphenyl was within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample DTSB56A (407075-010), surrogate decachlorobiphenyl (40%) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene was within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample DTSB57A (407075-011), surrogate decachlorobiphenyl (44%, 41%) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene was within criteria, no qualifiers were applied based upon these outliers.

- For PCB analysis for sample DTSB58A (407075-012), surrogate decachlorobiphenyl (37%) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene was within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample DTSB59A (407075-013), surrogates decachlorobiphenyl (42%) and tetrachloro-m-xylene (42%) were outside USACE and/or lab criteria. Since both surrogates were below criteria, the sample was qualified bias low "UL" for all PCBs based upon these outliers.

- For PCB analysis for sample DTSB63A (407075-018), surrogate decachlorobiphenyl (34%) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene was within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample DTSB65A (407075-020), surrogate decachlorobiphenyl (43%) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene was within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample DTSB67A (407075-022), surrogate decachlorobiphenyl (36%) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene was within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample DTSB68A (407075-023), surrogate decachlorobiphenyl (34%) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene was within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample TMSB59A (407075-014), surrogate tetrachloro-m-xylene (32%) was outside USACE and/or lab criteria. Since surrogate decachlorobiphenyl was within criteria, no qualifiers were applied based upon this outlier.

- For samples TMSB48A (407075-002), DTSB54A (407075-008), DTSB60A (407075-015), DTSB62A (407075-017), DTSB64A (407075-019), DTSB66A (407075-021), DTSB69A (407075-024), all criteria were met. No qualifiers were applied.

VI-Laboratory Control Samples

Laboratory control samples (LCS) are used to monitor long-term precision and accuracy of the analytical method. The analysis is performed at a frequency of 1 per analytical batch. The percent recoveries (%Rs) must be within the specified control limits. USACE Shell limits for PCBs are 50-130% (30-150% for sporadic marginal failures (SMF)).

- Sample BKS67785 was used for the LCS for PCBs. All criteria were met. No qualifiers were applied. Samples DTSB48A (407075-001), TMSB48A (407075-002), DTSB50A (407075-004), DTSB51A (407075-005), DTSB52A (407075-006), DTSB54A (407075-008), DTSB55A (407075-009), DTSB56A (407075-010), DTSB57A (407075-011), DTSB58A (407075-012), DTSB59A (407075-013), TMSB59A (407075-014), DTSB60A (407075-015), DTSB62A (407075-017), DTSB63A (407075-018), DTSB65A (407075-020), DTSB66A (407075-021), DTSB67A (407075-022), DTSB68A (407075-023), and DTSB69A (407075-024) apply to this LCS.

- Sample BKS68171 was used for the LCS for PCBs. All criteria were met. No qualifiers were applied. Sample DTSB64A (407075-019) applies to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. USACE Shell limits for PCBs are 40-140%; RPD<50%.

- Sample DTSB63A (407075-018) was used for the MS/MSD analysis for PCB compounds. All criteria were met. No qualifiers were applied.

- Sample DTSB64A (407075-019) was used for the MS/MSD analysis for PCB compounds. All criteria were met. No qualifiers were applied.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. The project precision control criterion was established at 50% RPD for the solid samples.

- Field soil sample duplicate pair DTSB48A (407075-001) and TMSB48A (407075-002) was collected. The field duplicate evaluation is noted in **Table 3**. For where the duplicate pair was diluted due to high compound concentrations, was used in this assessment. If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. All criteria were met. No qualifiers were applied.

Table 3 Field Duplicate Analysis Summary DTSB48A (407075-001) and TMSB48A (407075-002)

Sample ID	Lab ID	Compound	Original Result (µg/kg)	Duplicate Result (µg/kg)	%RPD	Qualifier
DTSB48A	407075-001	All PCBs <MRL	NA	NA	NA	None

NA = Not Applicable

- Field soil sample duplicate pair DTSB59A (407075-013) and TMSB59A (407075-014) was collected. The field duplicate evaluation is noted in **Table 4**. For where the duplicate pair was diluted due to high compound concentrations, was used in this assessment. If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. All criteria were met. No qualifiers were applied.

Table 4 Field Duplicate Analysis Summary DTSB59A (407075-013) and TMSB59A (407075-014)

Sample ID	Lab ID	Compound	Original Result (µg/kg)	Duplicate Result (µg/kg)	%RPD	Qualifier
DTSB59A	407075-013	All PCBs <MRL	NA	NA	NA	None

NA = Not Applicable

IX-Quantitation Verification

The accuracy of analytical results was verified through the calculation of several parameters. The difference between the calculated value and the reported value must be within 10% difference. All samples were non-detect for PCBs, therefore the quantification verification not included here. Any sample value > MDL and < MRL or < 3*MDL (whichever is greater) was qualified as estimated, "J." The difference between the primary column and the confirmatory column must be ≤ 40% difference (USEPA and USACE criteria).

- For this SDG, all PCBs were non-detect for all samples. No qualifiers were applied.

Sample: DTSB63AMS (407075-018MS), Aroclor 1260

Conc. μg/kg = (Ax * Vt * DF) / (CF * Vi * Ws * D)

where: Conc. = Sample concentration in μg/kg
Ax = Area/response for compound being measured.
Vt = Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10000 μL.
CF = Ave calibration response factor for compound being measured from ICAL (Area/pg)
Vi = Volume of extract injected (mL).
W(s) = Weight of sample extracted or diluted in grams.
D = Percent dry weight (100 - % moisture in sample)/100 = 1.0 for Wet Weight
DF = Dilution factor

Signal #1
Conc1 μg/kg = (117320Area*10000μL*1) / (300.4Area/pg*(1000 pg/ng)*1 μL*10g*0.7688) = 507.99 μg/kg
Conc2 μg/kg = (160292Area*10000μL*1) / (405.0Area/pg*(1000 pg/ng)*1 μL*10g*0.7688) = 514.81 μg/kg
Conc3 μg/kg = (181852Area*10000μL*1) / (460.4Area/pg*(1000 pg/ng)*1 μL*10g*0.7688) = 514.22 μg/kg
Conc4 μg/kg = (52276Area*10000μL*1) / (209.8Area/pg*(1000 pg/ng)*1 μL*10g*0.7688) = 324.10 μg/kg
Conc5 μg/kg = (222302Area*10000μL*1) / (602.8Area/pg*(1000 pg/ng)*1 μL*10g*0.7688) = 479.69 μg/kg
Average concentration = 470 μg/kg

Signal #2
Conc1 μg/kg = (761946Area*10000μL*1) / (1926Area/pg*(1000 pg/ng)*1 μL*10g*0.7688) = 514.58 μg/kg
Conc2 μg/kg = (568462Area*10000μL*1) / (2046Area/pg*(1000 pg/ng)*1 μL*10g*0.7688) = 361.40 μg/kg
Conc3 μg/kg = (1052438Area*10000μL*1) / (2799Area/pg*(1000 pg/ng)*1 μL*10g*0.7688) = 489.08 μg/kg
Conc4 μg/kg = (409720Area*10000μL*1) / (1655Area/pg*(1000 pg/ng)*1 μL*10g*0.7688) = 322.01 μg/kg
Conc5 μg/kg = (1190766Area*10000μL*1) / (3156Area/pg*(1000 pg/ng)*1 μL*10g*0.7688) = 490.77 μg/kg
Average concentration = 436 μg/kg

Reported Value = 470 μg/kg (signal #1)
% Difference = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – PAHs
GPL Laboratories, Inc., SDG 407076

DATE: August 27, 2004

The purpose of this memorandum is to present the data validation report for the samples collected for the New River WI at the RFAAP on July 13, 2004. Samples were analyzed for polynuclear aromatic hydrocarbons (PAHs) using USEPA SW846 Methods 3550B/8270C low level. A total of seventeen soil samples were validated including diluted samples. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
DTSB70A	407076-001	DTSB75A	407076-007DL
TMSB71A	407076-002	TMSB75A	407076-008
TMSB71A	407076-002DL	TMSB75A	407076-008DL
DTSB71A	407076-003	DTSB76A	407076-009
DTSB71A	407076-003DL	DTSB76A	407076-009DL
DTSB72A	407076-004	DTSB77A	407076-010DL
DTSB73A	407076-005	DTSB77A	407076-010DL2
DTSB74A	407076-006	DTSB78A	407076-011
DTSB75A	407076-007		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements*, method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times
	X	Instrument Performance Check
X		Initial Calibration
X		Continuing Calibration
	X	Blank Analysis
	X	Surrogate Spikes
	X	Internal Standards
	X	Laboratory Control Standard
X		Matrix Spike/Spike Duplicate
X		Field Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications, except for the following. For where the sample concentrations exceeded the calibration range (“E” lab flag), the data was qualified “R” rejected. The diluted sample should be used for this case. This was the case for several of the samples.

_____ _____

Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
POLYNUCLEAR AROMATIC HYDROCARBONS REVIEW
SDG 407076

I-Holding Times
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For polynuclear aromatic hydrocarbons (PAHs) soil samples cooled @ 4°C ± 2°C; the maximum holding time is the maximum holding time is 14 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For samples collected on 07/13/04, coolers were received by the laboratory at 3.0°C and 3.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The soil samples were collected on 07/13/04, extracted on 07/14/04, and 07/16/04, and analyzed for PAHs on 07/14/04, 07/15/04, 07/16/04, and 07/19/04. The actual extraction and analysis dates for each sample may be found on the attached form 1s to this report. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check
GC/MS instrument performance checks are performed to ensure mass resolution, identification and, to some degree, sensitivity. The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, decafluorotriphenylphosphine (DFTPP), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for PAH compounds by GC/MS low level. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.99. The minimum relative response factor (RRF) criteria must be ≥ 0.05. Initial calibration percent relative standard deviation (%RSD) must be ≤ 15% on the average for all compounds (< 30% for CCCs). All detects are qualified as estimated “J” for where there were exceeding %RSDs, and all non-detects are qualified as estimated “UJ” for where there were grossly exceeding recoveries, unless determined to be unusable “R”. Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated “J” and non-detects are rejected “R”.

- Initial calibration for the PAHs by USEPA SW-846 8270C low level was performed on 07/14/04 on instrument GC/MS-Ins. All RRFs were ≥ 0.05. Target compound dibenz(a,h)anthracene (17.0%) was outside criteria. Dibenz(a,h)anthracene was qualified “J” for detects and no qualifier for non-detects based upon these outliers. Samples DTSB70A (407076-001), TMSB71A (407076-002), TMSB71A (407076-002DL), DTSB71A (407076-003), DTSB71A (407076-003DL), DTSB72A (407076-004), DTSB73A (407076-005), DTSB75A (407076-007), DTSB75A (407076-007DL), TMSB75A (407076-008), TMSB75A (407076-008DL), DTSB77A (407076-010DL), and DTSB77A (407076-010DL2) apply to this initial calibration.

- Initial calibration for the PAHs by USEPA SW-846 8270C low level was performed on 07/19/04 on instrument GC/MS-P. All RRFs were ≥ 0.05. All criteria were met. No qualifiers were applied. Samples DTSB74A (407076-006), DTSB76A (407076-009), DTSB76A (407076-009DL), and DTSB78A (407076-011) apply to this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Continuing calibration standards containing both target and surrogates compounds are analyzed at the beginning of each 12-hour analysis period following the analysis of the instrument performance check and prior to the analysis of blanks and samples. The minimum relative response factors (RRF) for semivolatile target compounds and surrogates must be ≥ 0.05. The percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within ± 20% for all target compounds. Grossly exceeding is defined where %D>40%. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For continuing calibration for the PAHs by USEPA SW-846 8270C low level performed on 07/14/04 @15:54 on instrument GC/MS-Ins, all target compounds were within criteria. No qualifiers were applied. Samples DTSB70A (407076-001), TMSB71A (407076-002), DTSB71A (407076-003), DTSB72A (407076-004), DTSB73A (407076-005), DTSB75A (407076-007), and TMSB75A (407076-008) apply to this continuing calibration.

- For continuing calibration for the PAHs by USEPA SW-846 8270C low level performed on 07/15/04 @16:52 on instrument GC/MS-Ins, pyrene (20.9%) was outside criteria limits. For associated samples, all detects were qualified "J" and non-detects no qualifier based upon this outlier. Samples TMSB71A (407076-002DL), DTSB71A (407076-003DL), TMSB75A (407076-008DL), DTSB77A (407076-010DL), and DTSB77A (407076-010DL2) apply to this continuing calibration.

- For continuing calibration for the PAHs by USEPA SW-846 8270C low level performed on 07/16/04 @09:27 on instrument GC/MS-Ins, fluoranthene (21.0%) and pyrene (28.7%) were outside criteria limits. For associated samples, all detects were qualified "J" and non-detects no qualifier based upon these outliers. Sample DTSB75A (407076-007DL) applies to this continuing calibration.

- For continuing calibration for the PAHs by USEPA SW-846 8270C low level performed on 07/19/04 @13:27 on instrument GC/MS-P, all target compounds were within criteria. No qualifiers were applied. Samples DTSB74A (407076-006), DTSB76A (407076-009), DTSB76A (407076-009DL), and DTSB78A (407076-011) apply to this continuing calibration.

V-Blank Analysis
The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. A method blank analysis must be performed after the calibration standards and once every 12-hour time period beginning with the injection of DFTPP. No contaminants should be detected in any of the associated blanks > the MDL. USACE Shell criteria specifies all concentrations should be less than one-half MRL (<MRL for common laboratory contaminants phthalate esters). Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤ 10 times (10x) the maximum amount in any blank for the common laboratory contaminants phthalate esters, or 5 times (5X) the maximum amount for other semivolatile target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one, 100% solids, and were converted to soil values (soil conversion factor = 33). Rinse blanks 071304R1 (407077-001) and 071304R2 (407077-002) apply to the surface soil samples ("A" fraction samples) and was analyzed in SDG 0407077. Rinse blank 072004R2 (407140-001) applies to the subsurface soil samples ("B" fraction samples) and was analyzed in SDG 0407140.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/kg	Action Level µg/kg	B qualified samples
07/14/04	BLK67695	All compounds < MRL	NA	NA	None
07/19/04	BLK67751	All compounds < MRL	NA	NA	None
07/20/04	071304R1	All compounds < MRL	NA	NA	None
07/20/04	071304R2	All compounds < MRL	NA	NA	None
07/26/04	072004R2	All compounds < MRL	NA	NA	None

VI-Surrogate Spikes
Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Surrogate spikes are added to all samples and blanks to measure their recovery in sample and blank matrices. The percent recoveries (%Rs) must be within the specified control limits.

Criteria: Nitrobenzene-d5 (29-140%) – S1 (USACE Shell Criteria: 45-135%)
2-Fluorobiphenyl (31-125%) – S2 (USACE Shell Criteria: 45-135%)
Terphenyl – d14 (26-160%) – S3 (USACE Shell Criteria: 45-135%)

- For sample DTSB75A (407076-007), surrogate 2-Fluorobiphenyl (41%) was below USACE criteria and within lab criteria. Since surrogates Nitrobenzene-d5 and Terphenyl – d14 were within criteria, no qualifiers were applied based upon this outlier.

- For all other samples, all criteria were met. No qualifiers were applied.

VII-Internal Standards
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Internal standard area counts for samples and blanks must not vary by more than a factor of two (- 50% to + 100%) from the associated calibration standard. The retention time of the internal standards in samples and blanks must not vary by more than ± 30 seconds from the retention time of the associated calibration standard.

- All criteria were met. No qualifiers were applied.

VIII-Laboratory Control Samples
Laboratory control samples (LCS) are used to monitor laboratory accuracy by calculating the percent recoveries of the spiked compounds. All LCS percent recoveries must be within the specified control limits. USACE Shell limits for PAHs by 8270C low level are 45-135% (25-150% for sporadic marginal failures (SMF)).

- Sample BKS67695 was used as the LCS for PAHs by USEPA SW-846 8270C low level analyzed 07/14/04. All criteria were met. No qualifiers were applied. Samples DTSB70A (407076-001), TMSB71A (407076-002), TMSB71A (407076-002DL), DTSB71A (407076-003), DTSB71A (407076-003DL), DTSB72A (407076-004), DTSB73A (407076-005), DTSB75A (407076-007), DTSB75A (407076-007DL), TMSB75A (407076-008), TMSB75A (407076-008DL), DTSB77A (407076-010DL), and DTSB77A (407076-010DL2) apply to this LCS.

- Sample BKS67751 was used as the LCS for PAHs by USEPA SW-846 8270C low level analyzed 07/19/04. All criteria were met. No qualifiers were applied. Samples DTSB74A (407076-006), DTSB76A (407076-009), DTSB76A (407076-009DL), and DTSB78A (407076-011) apply to this LCS.

IX-Matrix Spike/Matrix Spike Duplicate

Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. USACE Shell limits are 45-135%; RPD ≤ 60% (15-150%; RPD ≤ 60% for sporadic marginal failures (SMF)).

- Sample DTSB70A (407076-001) was used for the MS/MSD analysis for PAHs. Compounds benzo(a)pyrene (52%), benzo(k)fluoroanthene (55%, 46%), chrysene (54%), and fluoranthene (43%, RPD=53%) were outside USACE and/or lab criteria. The low recoveries were due to large amount of organic compounds detected in the spiked sample. All detects were qualified “L” estimated for the spiked sample and non-detects “UL” for the noted compounds based upon these outliers.

- Sample DTSB76A (407076-009) was used for the MS/MSD analysis for PAHs. The spiked sample was reported in SDG 407076. Compounds acenaphthene (410%, 445%), anthracene (265%, 350%), benzo(a)anthracene (555%, 555%), benzo(a)pyrene (830%, 880%), benzo(b)fluoranthene (890%, 990%), benzo(g,h,i)perylene (595%, 445%), benzo(k)fluoroanthene (265%, 410%; RPD=43%), chrysene (370%, 420%), dibenz(a,h)anthracene (265%, 200%), fluoranthene (310%, 410%), fluorene (365%, 415%), indeno(1,2,3-cd)pyrene (595%, 495%), naphthalene (190%, 170%), phenanthrene (345%, 345%), and pyrene (215%, 265%) were outside USACE and/or lab criteria. The high recoveries were due to large amount of organic compounds detected in the spiked sample. All detects were qualified “J” estimated for the spiked sample and non-detects no qualifier for the noted compounds based upon these outliers.

X-Field Duplicate Sample Analysis

Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the soil samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field soil sample duplicate pair DTSB71A (407076-003) and TMSB71A (407076-002) was collected. The field duplicate evaluation is noted in **Table 3**. For where the duplicate pair was diluted due to high compound concentrations, was used in this assessment. If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. All criteria were met. No qualifiers were applied.

Table 3 Field Duplicate Analysis Summary DTSB71A (407076-003) and TMSB71A (407076-002)

Sample ID	Dilution	Compound	Original Result (µg/kg)	Duplicate Result (µg/kg)	%RPD	Qualifier
DTSB71A	1	Acenaphthene	28	38	30.3	None
DTSB71A	1	Anthracene	68	71	4.3	None
DTSB71A	1	Benzo(a)anthracene	200	220	9.5	None
DTSB71A	1	Benzo(a)pyrene	190	200	5.1	None
DTSB71A	1	Benzo(b)fluoranthene	210	260	21.3	None
DTSB71A	1	Benzo(g,h,i)perylene	120	140	15.4	None
DTSB71A	1	Benzo(k)fluoranthene	160	150	6.5	None
DTSB71A	1	Chrysene	240	260	8.0	None
DTSB71A	1	Dibenz(a,h)Anthracene	56	64	13.3	None
DTSB71A	1	Fluorene	26	35	29.5	None
DTSB71A	1	Indeno(1,2,3-c,d)Pyrene	120	140	15.4	None
DTSB71A	1	Naphthalene	9.5 U	11	NA	None
DTSB71A	1	Phenanthrene	330	410	21.6	None
DTSB71A	1	Pyrene	400	440	9.5	None
DTSB71A	2	Fluoranthene	650	660	1.5	None

U = Analyte non-detect as <MRL.
NA = Not Applicable.

- Field soil sample duplicate pair DTSB75A (407076-007) and TMSB75A (407076-008) was collected. The field duplicate evaluation is noted in **Table 4**. For where the duplicate pair was diluted due to high compound concentrations, was used in this assessment. If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. Acenaphthene, fluorene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, fluoranthene, indeno(1,2,3-c,d)pyrene, phenanthrene, and pyrene were outside criteria. The duplicate pair was qualified estimated “J” based upon this outlier.

Table 4 Field Duplicate Analysis Summary DTSB75A (407076-007) and TMSB75A (407076-008)

Sample ID	Dilution	Compound	Original Result (µg/kg)	Duplicate Result (µg/kg)	%RPD	Qualifier
DTSB75A	1	Acenaphthene	63	260	122	J
DTSB75A	1	Acenaphthylene	11	16	37.0	None
DTSB75A	1	Dibenz(a,h)Anthracene	130	9.0 U	NA	None
DTSB75A	1	Fluorene	70	270	118	J
DTSB75A	1	Naphthalene	13	15	14.3	None
DTSB75A	4 & 10	Anthracene	170	630	115	J
DTSB75A	4 & 10	Benzo(a)anthracene	450	1200	90.9	J
DTSB75A	4 & 10	Benzo(a)pyrene	400	1100	93.3	J
DTSB75A	4 & 10	Benzo(b)fluoranthene	450	1200	90.9	J
DTSB75A	4 & 10	Benzo(g,h,i)perylene	300	800	90.9	J
DTSB75A	4 & 10	Benzo(k)fluoranthene	320	820	87.7	J
DTSB75A	4 & 10	Chrysene	550	1300	81.1	J

Table 4 Field Duplicate Analysis Summary DTSB75A (407076-007) and TMSB75A (407076-008), Continued

DTSB75A	4 & 10	Fluoranthene	1400	3700	90.2	J
DTSB75A	4 & 10	Indeno(1,2,3-c,d)Pyrene	290	750	88.5	J
DTSB75A	4 & 10	Phenanthrene	830	2900	111	J
DTSB75A	4 & 10	Pyrene	820	2100	87.7	J

J = Estimated Value.
U = Analyte non-detect as <MRL.
NA = Not Applicable.

XI-Quantitation Verification

The accuracy of analytical results was verified through the calculation of several parameters. Percent difference (%D) between the calculated and reported values must be ≤10%. Any sample value > MDL and < MRL or < 3*MDL (whichever is greater) was qualified as estimated, "J." Any tentatively identified compounds found were qualified as estimated "J". For where the sample concentrations exceeded the calibration range ("E" lab flag), the data was qualified "R" rejected. The diluted sample should be used for this case. This was the case for several of the samples.

Sample: DTSB70A (407076-001), acenaphthene

Conc. μg/kg = (Ax * Is * Vt * DF) / (Ais * RRF * Vi * Ws * D)

where: Conc. = Sample concentration in μg/kg
Ax = Area of characteristic ion for compound being measured.
Is = Amount of internal standard injected (ng).
Vt = Volume of total extract (μL).
Ais = Area of characteristic ion for the internal standard.
RRF = Average relative response factor for compound being measured (from ICAL)
Vi = Volume of extract injected (μL).
W(s) = Weight of sample extracted or diluted in grams.
D = Percent dry weight (100 - % moisture in sample)/100
DF = Dilution factor

Conc. μg/kg = (195201 * 4 * 1000 * 1) / (2722384 * 0.998 * 1 * 30 * 0.7216) = 13 μg/kg
Reported Value = 13 μg/kg
% Difference = 0.0%
Values were within 10% difference

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – PCBs
GPL Laboratories, Inc., SDG 407076

DATE: August 27, 2004

The purpose of this memorandum is to present the data validation report for the samples collected for the New River WI at the RFAAP on July 13, 2004. Samples were analyzed for PCBs using USEPA Methods 3540C/8082 or 3550B/8082. A total of eleven soil samples were analyzed and validated for PCBs. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
DTSB70A	407076-001	DTSB75A	407076-007
TMSB71A	407076-002	TMSB75A	407076-008
DTSB71A	407076-003	DTSB76A	407076-009
DTSB72A	407076-004	DTSB77A	407076-010
DTSB73A	407076-005	DTSB78A	407076-011
DTSB74A	407076-006		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements* (USACE, February 2001), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (USEPA, September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
X		System Monitoring Compounds
	X	Laboratory Control Samples
	X	Matrix Spike/Spike Duplicate
	X	Field Sample Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

_____ _____

Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
PCB REVIEW
SDG 407076

I-Holding Times
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For PCB soil samples, cooled @4°C ±2°C, the maximum holding time is 14 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis (USEPA criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For samples collected on 07/13/04, coolers were received by the laboratory at 3.0°C and 3.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The samples were collected 07/13/04 for PCB compounds. They were extracted on 07/15/04 and 07/22/04 and analyzed for PCBs on 07/26/04 and 08/03/04 within criteria guidelines. The actual extraction and analysis dates for each sample may be found on the attached form 1s to this report. No qualifiers were applied for these samples.

II-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. The initial 5-point calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run. The percent relative standard deviation (%RSD) for all single peak target analytes, and aroclors 1016 and 1260 must be $< 20\%$ or the mean %RSD for all analytes in the standard must be $\leq 20\%$. If linear regression is used, the correlation coefficient must be ≥ 0.990 (USEPA and USACE criteria).

- For the PCB initial calibration performed on 06/29/04 on instrument GC-L, all compounds were determined using calibration factors for PCB 1016 and PCB 1260. All criteria were met, except for the following. For PCB 1260 signal #2, PCB 1260 #1 (22.1%) and PCB 1260 #5 (22.7%) were above criteria limits. The average %RSD for PCB 1260 for signal #2 (20.0%) was within criteria. All associated samples were non-detect for PCB 1260. No qualifiers were applied based upon these outliers. Samples TMSB71A (407076-002), DTSB71A (407076-003), DTSB72A (407076-004), DTSB73A (407076-005), DTSB74A (407076-006), DTSB75A (407076-007), TMSB75A (407076-008), DTSB76A (407076-009), DTSB77A (407076-010), and DTSB78A (407076-011) apply to this initial calibration.

- For the PCB initial calibration performed on 07/29/04 on instrument GC-L, all compounds were determined using calibration factors for PCB 1016 and PCB 1260. All criteria were met, except for the following. For PCB 1260 signal #2, PCB 1260 #1 (20.7%), PCB 1260 #2 (21.5%), and PCB 1260 #5 (21.8%) were above criteria limits. The average %RSD for PCB 1260 for signal #2 (20.4%) was within criteria. All associated samples were non-detect for PCB 1260. No qualifiers were applied based upon these outliers. Sample DTSB70A (407076-001) applies to this initial calibration.

III-Continuing Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for PCB target compounds. Continuing calibration standards containing both target compounds and surrogates are analyzed at the beginning of each 12-hour analytical shift and after every 20 samples. The percent difference (%D) or the mean %RSD for all analytes in the standard from the initial calibration should be no greater than ± 15%.

- For PCB continuing calibration performed on 07/26/04 @12:25 on instrument GC-L, the following %Ds were determined. For column #1, arochlor 1016 #5 (20.9%) was outside criteria. The average of the peaks for arochlor 1016 (8.1%) was within criteria and all samples were non-detect. No qualifiers were applied based upon this outlier. Arochlor 1260 was within criteria. For column #2, arochlor 1016 and arochlor 1260 were within criteria. No qualifiers were applied. Samples TMSB71A (407076-002), DTSB71A (407076-003), DTSB72A (407076-004), DTSB74A (407076-006), DTSB75A (407076-007), and TMSB75A (407076-008) apply to this continuing calibration.

- For PCB continuing calibration performed on 07/26/04 @17:21 on instrument GC-L, the following %Ds were determined. For column #1, arochlor 1016 #2 (25.8%), arochlor 1016 #3 (25.4%), and arochlor 1016 #5 (34.3%) were outside criteria. The average of the peaks for arochlor 1016 (21.2%) was outside criteria. Since all samples were non-detect, no qualifiers were applied based upon these outliers. Arochlor 1260 was within criteria for column #1. For column #2, arochlor 1016 was within criteria. For column #2, arochlor 1260 #2 (24.1%), arochlor 1260 #3 (16.3%), and arochlor 1260 #4 (30.9%) were outside criteria. The average of the peaks for arochlor 1260 (16.5%) was outside criteria. Since all samples were non-detect, no qualifiers were applied based upon these outliers. Samples DTSB73A (407076-005), DTSB76A (407076-009), DTSB77A (407076-010), and DTSB78A (407076-011) apply to this continuing calibration.

- For PCB continuing calibration performed on 07/26/04 @23:09 on instrument GC-L, the following %Ds were determined. For column #1, arochlor 1260 #2 (21.4%) and arochlor 1260 #3 (18.6%) were outside criteria. The average of the peaks for arochlor 1260 (15.7%) was outside criteria. Since all samples were non-detect, no qualifiers were applied based upon these outliers. Arochlor 1016 was within criteria for column #1. For column #2, arochlor 1016 and arochlor 1260 were within criteria. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For PCB continuing calibration performed on 08/03/04 @08:57 on instrument GC-L, the following %Ds were determined. All criteria were met. No qualifiers were applied. Sample DTSB70A (407076-001) applies to this continuing calibration.

- For PCB continuing calibration performed on 08/03/04 @11:51 on instrument GC-L, the following %Ds were determined. All criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

IV-Blank Analysis
The purpose of laboratory or field blank analyses is to determine the existence and magnitude of contamination problems resulting from laboratory or field activities. One method blank per analytical batch must be run on each instrument used to analyze samples. No contaminants should be present in the blanks > MDL or MRL (USEPA criteria) or all target compounds < one-half the MRL (USACE criteria). **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one, 100% solids, and were converted to soil values (soil conversion factor = 30). Rinse blanks 071304R1 (407077-001) and 071304R2 (407077-002) apply to the surface soil samples ("A" fraction samples) and was analyzed in SDG 0407077. Rinse blank 072004R2 (407140-001) applies to the subsurface soil samples ("B" fraction samples) and was analyzed in SDG 0407140.

Table 2 Blank Contamination Analysis Summary

Parameter	Analysis Date	QC Blank ID	Compound	Max Conc. µg/kg	Action Level µg/kg	B qualified samples
PCBs	07/26/04	BLK67881	All < MRL	NA	NA	None
PCBs	08/03/04	BLK67720	All < MRL	NA	NA	None
PCBs	07/20/04	071304R1	All < MRL	NA	NA	None
PCBs	07/20/04	071304R2	All < MRL	NA	NA	None
PCBs	07/28/04	072004R2	All < MRL	NA	NA	None

V-System Monitoring Compound (Surrogates)

Laboratory performance on individual samples is established by means of spiking activities. The percent recovery (%R) for all samples and blanks must be within the specified laboratory control limits.

Criteria: Decachlorobiphenyl: PCBs: 47-161% (USACE criteria 50-130%)
Tetrachloro-m-xylene: PCBs: 54-168% (USACE criteria 50-130%)

- For PCB analysis for sample DTSB71A (407076-003), surrogate decachlorobiphenyl (23%, 39%) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene was within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample DTSB72A (407076-004), surrogate decachlorobiphenyl (44%) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene was within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample DTSB73A (407076-005), surrogates decachlorobiphenyl (22%, 39%) and tetrachloro-m-xylene (23%) were outside USACE and/or lab criteria. Since both surrogates were below criteria, the sample was qualified bias low “UL” for all PCBs based upon these outliers.

- For PCB analysis for sample DTSB74A (407076-006), surrogate decachlorobiphenyl (36%) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene was within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample DTSB75A (407076-007), surrogate decachlorobiphenyl (41%) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene was within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample DTSB78A (407076-011), surrogate decachlorobiphenyl (33%) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene was within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample TMSB71A (407076-002), surrogate decachlorobiphenyl (32%) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene was within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample TMSB75A (407076-008), surrogates decachlorobiphenyl (38%, 27%) and tetrachloro-m-xylene (37%) were outside USACE and/or lab criteria. Since both surrogates were below criteria, the sample was qualified bias low “UL” for all PCBs based upon these outliers.

- For samples DTSB70A (407076-001), DTSB76A (407076-009), and DTSB77A (407076-010), all criteria were met. No qualifiers were applied.

VI-Laboratory Control Samples
Laboratory control samples (LCS) are used to monitor long-term precision and accuracy of the analytical method. The analysis is performed at a frequency of 1 per analytical batch. The percent recoveries (%Rs) must be within the specified control limits. USACE Shell limits for PCBs are 50-130% (30-150% for sporadic marginal failures (SMF)).

- Sample BKS67881 was used for the LCS for PCBs. All criteria were met. No qualifiers were applied. Samples TMSB71A (407076-002), DTSB71A (407076-003), DTSB72A (407076-004), DTSB73A (407076-005), DTSB74A (407076-006), DTSB75A (407076-007), TMSB75A (407076-008), DTSB76A (407076-009), DTSB77A (407076-010), and DTSB78A (407076-011) apply to this LCS.

- Sample BKS67720 was used for the LCS for PCBs. All criteria were met. No qualifiers were applied. Sample DTSB70A (407076-001) applies to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. USACE Shell limits for PCBs are 40-140%; RPD<50%.

- Sample DTSB70A (407076-001) was used for the MS/MSD analysis for PCB compounds. All criteria were met. No qualifiers were applied.

- Sample DTSB76A (407076-009) was used for the MS/MSD analysis for PCB compounds. All criteria were met. No qualifiers were applied.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. The project precision control criterion was established at 50% RPD for the solid samples.

- Field soil sample duplicate pair DTSB71A (407076-003) and TMSB71A (407076-002) was collected. The field duplicate evaluation is noted in **Table 3**. For where the duplicate pair was diluted due to high compound concentrations, was used in this assessment. If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. All criteria were met. No qualifiers were applied.

Table 3 Field Duplicate Analysis Summary DTSB71A (407076-003) and TMSB71A (407076-002)

Sample ID	Lab ID	Compound	Original Result (µg/kg)	Duplicate Result (µg/kg)	%RPD	Qualifier
DTSB71A	407076-003	All PCBs <MRL	NA	NA	NA	None

NA = Not Applicable

- Field soil sample duplicate pair DTSB75A (407076-007) and TMSB75A (407076-008) was collected. The field duplicate evaluation is noted in **Table 4**. For where the duplicate pair was diluted due to high compound concentrations, was used in this assessment. If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. All criteria were met. No qualifiers were applied.

Table 4 Field Duplicate Analysis Summary DTSB75A (407076-007) and TMSB75A (407076-008)

Sample ID	Lab ID	Compound	Original Result (μg/kg)	Duplicate Result (μg/kg)	%RPD	Qualifier
DTSB75A	407076-007	All PCBs <MRL	NA	NA	NA	None

NA = Not Applicable

IX-Quantitation Verification

The accuracy of analytical results was verified through the calculation of several parameters. The difference between the calculated value and the reported value must be within 10% difference. All samples were non-detect for PCBs, therefore the quantification verification not included here. Any sample value > MDL and < MRL or < 3*MDL (whichever is greater) was qualified as estimated, "J." The difference between the primary column and the confirmatory column must be ≤ 40% difference (USEPA and USACE criteria).

- For this SDG, all PCBs were non-detect for all samples. No qualifiers were applied.

Sample: DTSB70AMS (407076-001MS), Aroclor 1260

Conc. μg/kg = (Ax * Vt * DF) / (CF * Vi * Ws * D)

where: Conc. = Sample concentration in μg/kg
Ax = Area/response for compound being measured.
Vt = Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10000 μL.
CF = Ave calibration response factor for compound being measured from ICAL (Area/pg)
Vi = Volume of extract injected (mL).
W(s) = Weight of sample extracted or diluted in grams.
D = Percent dry weight (100 - % moisture in sample)/100 = 1.0 for Wet Weight
DF = Dilution factor

Signal #1
Conc1 μg/kg = (145730Area*10000μL*1) / (300.4Area/pg*(1000 pg/ng)*1 μL*30g*0.8261) = 195.75 μg/kg
Conc2 μg/kg = (225550Area*10000μL*1) / (405.0Area/pg*(1000 pg/ng)*1 μL*30g*0.8261) = 224.72 μg/kg
Conc3 μg/kg = (257010Area*10000μL*1) / (460.4Area/pg*(1000 pg/ng)*1 μL*30g*0.8261) = 225.25 μg/kg
Conc4 μg/kg = (86244Area*10000μL*1) / (209.8Area/pg*(1000 pg/ng)*1 μL*30g*0.8261) = 165.87 μg/kg
Conc5 μg/kg = (280824Area*10000μL*1) / (602.8Area/pg*(1000 pg/ng)*1 μL*30g*0.8261) = 187.98 μg/kg
Average concentration = 200 μg/kg

Signal #2
Conc1 μg/kg = (811186Area*10000μL*1) / (1926Area/pg*(1000 pg/ng)*1 μL*30g*0.8261) = 169.95 μg/kg
Conc2 μg/kg = (685158Area*10000μL*1) / (2046Area/pg*(1000 pg/ng)*1 μL*30g*0.8261) = 135.12 μg/kg
Conc3 μg/kg = (1151378Area*10000μL*1) / (2799Area/pg*(1000 pg/ng)*1 μL*30g*0.8261) = 165.98 μg/kg
Conc4 μg/kg = (560664Area*10000μL*1) / (1655Area/pg*(1000 pg/ng)*1 μL*30g*0.8261) = 136.69 μg/kg
Conc5 μg/kg = (1151282Area*10000μL*1) / (3156Area/pg*(1000 pg/ng)*1 μL*30g*0.8261) = 147.19 μg/kg
Average concentration = 151 μg/kg

Reported Value = 200 μg/kg (signal #1)
% Difference = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – TAL Metals
GPL Laboratories, Inc., SDG 409105

DATE: January 11, 2005

The purpose of this memorandum is to present the data validation report for the samples collected for the New River Unit WI at the RFAAP on September 14, 2004. Samples were analyzed for target analyte list (TAL) metals using USEPA SW-846 3050B/6010B for ICP metals and USEPA SW-846 7471A for mercury. A total of two soil samples and three sediment samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
WBGSB53A	409105-001	WBGSD24	409105-004
TMSB53A	409105-002	WBGSD25	409105-005
WBGSD23	409105-003		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements* (USACE, February 2001), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Inorganic Data Review* (April, 1993). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times and Preservation
	X	Initial and Continuing Calibration
X		Blank Analysis
	X	ICP Interference Check Sample (ICS)
	X	Laboratory Control Sample (LCS)
	X	Lab Sample Duplicate
X		Matrix Spike
	X	ICP Serial Dilution
X		Field Sample Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

_____ _____

Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
TAL METALS REVIEW
SDG 409105

I-Holding Times and Preservation

The primary objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample analysis. The soil and sediment samples are received and stored cool @4 °C ± 2 °C, with a maximum holding time of 180 days for ICP metals and 28 days for mercury from collection (USEPA criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For samples collected on 09/14/04, cooler was received by the laboratory at 2.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: Samples were collected on 09/14/04. They were digested on 09/22/04 and analyzed for ICP metals on 09/23/04 and 09/24/04. Samples were digested on 09/21/04 for mercury and were analyzed for mercury on 09/22/04. All holding time criteria were met. No qualifiers were applied.

II-Initial and Continuing Calibration

Requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of the analysis run, and continuing calibration verification documents that the initial calibration is still valid.

ICP:	1- blank (USACE <MDL)	Hg:	1 – blank (USACE <MDL)
	3 – standards (r≥0.995)		5 – standards (r≥0.995)
	ICV/CCV (90-110%) (USACE 90-110%)		ICV/CCV (80-120%) (USACE ICV 90-110% / CCV 80-120%)
	MRL (70-130%) (USACE 80-120%)		MRL (80-120%)

- The samples were analyzed for ICP metals on 09/23/04 and 09/24/04. Mercury was analyzed on 09/22/04 with a correlation coefficient of 0.9999. All ICV/CCV standards were within criteria. No qualifiers were applied. **Table 2** summarizes the MRL standard analysis for metals. Samples with concentrations detected less than two times the MRL with out of criteria MRL recovery were qualified.

Table 2 MRL Analysis Summary

Analysis Date	Analysis	MRL (µg/L)	MRL (mg/kg)	MRL %Recovery	Qualified samples @ <2xMRL	Validation Qualifiers
09/23/04	ICP	Various	Various	All within criteria	None	None
09/22/04	Hg	0.2	0.033	All within criteria	None	None

III-Blanks

Blanks (preparation and calibration blanks) are assessed to determine the existence and magnitude of contamination problems. No contaminants should be detected (i.e. <MDL) in any of the associated blanks. USACE Shell limits are < ½MRL for the method blank. Samples are qualified "B" when they are less than 5X the absolute value of the maximum blank concentration. **Table 3** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one, 100% solids, and were converted to soil values (soil conversion factors = 10 for ICP; 6 for Hg). The rinse blank breakout is as follows.

- Rinse blank 091304R applies to the September western burning ground ("WBG" prefix samples) surface soil ("A" suffix samples) and sediment ("SD") samples and was analyzed in SDG 0409105.

Table 3 Blank Contamination Analysis Summary

Analysis Date	Analysis	QC Blank ID	Max Conc. mg/kg	Action Level mg/kg	B qualified samples
09/23/04	ICP-Al	ICB/CCBs	3.3B	16.5	None
09/23/04	ICP-Sb	ICB/CCBs	0.38B	1.9	WBGSB53A, WBGSD23
09/23/04	ICP-Be	ICB/CCBs	0.02B	0.10	None
09/23/04	ICP-Cr	ICB/CCBs	0.07B	0.35	None
09/23/04	ICP-Co	ICB/CCBs	0.10B	0.50	None
09/23/04	ICP-Pb	ICB/CCBs	0.19B	0.95	None
09/23/04	ICP-Mg	ICB/CCBs	2.47B	12.4	None
09/23/04	ICP-Mn	ICB/CCBs	0.08B	0.40	None
09/23/04	ICP-Ag	ICB/CCBs	0.29B	1.5	None
09/23/04	ICP-Tl	ICB/CCBs	0.49B	2.5	None
09/23/04	ICP-V	ICB/CCBs	0.17B	0.85	None
09/22/04	Hg	ICB/CCBs	<MRL	NA	None
09/23/04	ICP-Al	PBS	3.8B	19.0	None
09/23/04	ICP-Ba	PBS	0.050B	0.25	None
09/23/04	ICP-Be	PBS	0.023B	0.12	None
09/23/04	ICP-Ca	PBS	15.6B	78.0	None
09/23/04	ICP-Cr	PBS	0.18B	0.90	None
09/23/04	ICP-Cu	PBS	0.11B	0.55	None
09/23/04	ICP-Mg	PBS	1.3B	6.5	None
09/23/04	ICP-Mn	PBS	0.038B	0.19	None
09/23/04	ICP-Ni	PBS	0.30B	1.5	None
09/23/04	ICP-K	PBS	5.3B	26.5	None
09/23/04	ICP-Na	PBS	80.5B	403	WBGSB53A, TMSB53A, WBGSD23, WBGSD24, WBGSD25
09/23/04	ICP-Tl	PBS	0.44B	2.2	None
09/23/04	ICP-V	PBS	0.16B	0.80	None
09/22/04	Hg	PBS	<MRL	NA	None
09/22/04	ICP-Al	091304R	2.92B	14.6	None
09/22/04	ICP-Mg	091304R	1.29B	6.5	None
09/22/04	ICP-Na	091304R	69.5B	348	WBGSB53A, TMSB53A, WBGSD23, WBGSD24, WBGSD25
09/22/04	ICP-Zn	091304R	0.50B	2.5	None

B = Value is estimated <MRL and >MDL.
N = Laboratory spike sample recovery not within control limits.

IV-ICP Interference Check Sample (ICS)
The ICP interference check sample (ICS) verifies interelement and background correction factors. ICP Interference Check is performed at the beginning and end of each sample analysis run. Control limits are 80-120% (USACE limits 80-120%).

- All criteria were met. No qualifiers were applied.

V-Laboratory Control Samples (LCS)
The laboratory control sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. All soil LCS results must fall within the control limits of 80-120% for ICP metals and mercury. USACE Shell limits for metals are 80-120% (60-140% for sporadic marginal failures (SMF)).

- Sample BKS68967 was used as LCS for ICP metals analysis dated 9/23/04. All criteria were met. No qualifiers were applied.

- Sample BKS68954 was used as LCS for total mercury analysis dated 09/22/04. All criteria were met. No qualifiers were applied.

VI-Duplicate Sample Analysis
Duplicate sample determinations are used to demonstrate acceptable method precision by the laboratory at the time of analysis. Duplicate analysis generate data in order to determine the long-term precision of the analytical method on various matrices. RPDs must be within established control limits. USACE Shell limits for metals are 25% RPD for ICP metals and 20% RPD for mercury.

- Sample WBGSB53A (409105-001) was used as sample duplicate for ICP metals analysis. Antimony (200%) and cadmium (53.0%) were outside criteria due to low sample concentrations. Therefore, no qualifiers were applied based upon this outlier.

- Sample 409046-007 was used as sample duplicate for mercury analysis. Since this was not a RFAAP sample, it was not evaluated.

VII-Matrix Spike
MS are generated to determine long-term accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. Specific criteria include the analyses of matrix spike and matrix spike duplicate samples at a frequency of one MS per 20 samples of similar matrix. MS recoveries and relative percent differences between MS recoveries should be within the specified limits. USACE Shell limits for metals are 75-125% for ICP metals and 80-120% for mercury. Post digestion spikes limits are 75-125% for ICP metals and 85-115% for mercury.

- Sample WBGSB53A (409105-001) was used for the MS analysis for ICP analysis. Aluminum (2080%), antimony (40.1%), iron (126%), magnesium (145%), and potassium (138%) were outside of control limits. Post digestion spikes were within criteria for antimony, magnesium, and potassium. The sample concentration was >4 times the spike added for aluminum and iron, therefore no qualifiers were applied based upon these outliers. For antimony, the spiked sample and duplicate pair TMSB53A (409105-002) were qualified bias low non-detect “UL” based upon the low recovery. For magnesium and potassium, the spiked sample and duplicate pair TMSB53A (409105-002) were qualified bias high “K” based upon the high recovery.

- Sample 409046-007 was used for the MS analysis for mercury analysis. Since this was not a RFAAP sample, it was not evaluated.

VIII-ICP Serial Dilution
An ICP serial dilution is performed to determine whether significant physical or chemical interferences exist due to sample matrix at high concentrations. An analysis of a 5-fold dilution should agree within 10% difference of the original result when the concentration in sample is a factor of 50 above MDL.

- The serial dilution for the ICP was analyzed for sample WBGSB53A (409105-001). Antimony (100%), cadmium (100%), selenium (100%), and sodium (100%) were outside of criteria limits. Sample concentrations were <50 times MDL for antimony, cadmium, selenium, and sodium, therefore no qualifiers were applied based upon these outliers.

IX-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the solid samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field soil sample duplicate pair WBGSB53A (409105-001) and TMSB53A (409105-002) was collected. The field duplicate evaluation is noted in **Table 4.** If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. Cadmium was outside criteria and qualified as estimated "J" for the duplicate pair. For all other metals, all criteria were met.

Table 4 Field Duplicate Analysis Summary

Sample ID	Lab ID	Compound	Original Result (mg/kg)		Duplicate Result (mg/kg)		%RPD	Qualifier
WBGSB53A	409105-001	Aluminum	24200		22000		9.5	None
WBGSB53A	409105-001	Antimony	0.52	BN	0.31	UN	NA	None
WBGSB53A	409105-001	Arsenic	10.3		9.8		5.0	None
WBGSB53A	409105-001	Barium	32.8		31.7		3.4	None
WBGSB53A	409105-001	Beryllium	0.99		0.98		1.0	None
WBGSB53A	409105-001	Cadmium	0.14	B	0.069	B	***67.9***	J
WBGSB53A	409105-001	Calcium	2280		2250		1.3	None
WBGSB53A	409105-001	Chromium	38.4		36.9		4.0	None
WBGSB53A	409105-001	Cobalt	10.3		10.8		4.7	None
WBGSB53A	409105-001	Copper	19.6		19.2		2.1	None
WBGSB53A	409105-001	Iron	33500		32700		2.4	None
WBGSB53A	409105-001	Lead	33.3		32.0		4.0	None
WBGSB53A	409105-001	Magnesium	1720	N	1800	N	4.6	None
WBGSB53A	409105-001	Manganese	136		136		0.0	None
WBGSB53A	409105-001	Nickel	16.6		15.7		5.6	None
WBGSB53A	409105-001	Potassium	1170	N	1150	N	1.7	None
WBGSB53A	409105-001	Selenium	0.83	B	1.1	B	28.0	None
WBGSB53A	409105-001	Sodium	66.5	B	65.6	B	1.4	None
WBGSB53A	409105-001	Vanadium	65.6		64.0		2.5	None
WBGSB53A	409105-001	Zinc	35.9		33.2		7.8	None
WBGSB53A	409105-001	Mercury	0.065		0.069		6.0	None

B = Estimated value <MRL and >MDL.
N = Laboratory spike sample recovery not within control limits.
U = Value non-detect as <MDL.

NA = Not Applicable.

X-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value > MDL and < MRL or < 3*MDL (whichever was greater) was qualified as estimated, "J." The following calculations were performed for verification.

ICP Sample: WBGSB53A (409105-001), Total Barium

Conc. (mg/kg) = {(conc. μg/L)*(Final Volume L)*(DF)} / {(Weight Sample g)*(Fraction Solids)}

Conc. (mg/kg) = {(341.161 μg/L)*(0.100 L)*(1)} / {(1.26 g)*(0.8267)} = 32.8 μg/g = 32.8 mg/kg

Reported concentration = 32.8 mg/kg
%D = 0.0%
Values were within 10% difference.

CVAA Sample: WBGSB53A (409105-001), Total Mercury

Conc. (mg/kg) = {(conc. μg/L)*(Final Volume L)*(DF)} / {(Weight Sample g)*(Fraction Solids)}

Conc. (mg/kg) = {(0.383 μg/L)*(0.100 L)*(1)} / {(0.71 g)*(0.8267)} = 0.065 μg/g = 0.065 mg/kg

Reported concentration = 0.065 mg/kg
%D = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – TAL Metals
GPL Laboratories, Inc., SDG 407108

DATE: November 19, 2004

The purpose of this memorandum is to present the data validation report for the samples collected for the New River Unit WI at the RFAAP on July 14-16, 2004. Samples were analyzed for target analyte list (TAL) metals using USEPA SW-846 3050B/6010B for ICP metals and USEPA SW-846 7471A for mercury. A total of four soil samples and five sediment samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
WBGSB26A	407108-001	TMSD16	407108-006
WBGSB27A	407108-002	NBGSD02	407108-007
WBGSB28A	407108-003	NBGSD03	407108-008
TMSB28A	407108-004	NBGSD04	407108-009
WBGSD16	407108-005		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements* (USACE, February 2001), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Inorganic Data Review* (April, 1993). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times and Preservation
	X	Initial and Continuing Calibration
X		Blank Analysis
	X	ICP Interference Check Sample (ICS)
	X	Laboratory Control Sample (LCS)
	X	Lab Sample Duplicate
X		Matrix Spike
X		ICP Serial Dilution
X		Field Sample Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

_____ _____

Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
TAL METALS REVIEW
SDG 407108

I-Holding Times and Preservation

The primary objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample analysis. The soil samples are received and stored cool @4 °C ± 2 °C, with a maximum holding time of 180 days for ICP metals and 28 days for mercury from collection (USEPA criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For samples collected on 07/14/04 and 07/16/04, cooler was received by the laboratory at 2.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: Samples were collected on 07/14/04 and 07/16/04. They were digested on 07/20/04 and analyzed for ICP metals on 07/29/04 and 07/30/04. Samples were digested on 07/20/04 for mercury and were analyzed for mercury on 07/21/04. All holding time criteria were met. No qualifiers were applied.

II-Initial and Continuing Calibration

Requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of the analysis run, and continuing calibration verification documents that the initial calibration is still valid.

ICP:	1- blank (USACE <MDL)	Hg:	1 – blank (USACE <MDL)
	3 – standards (r≥0.995)		5 – standards (r≥0.995)
	ICV/CCV (90-110%) (USACE 90-110%)		ICV/CCV (80-120%) (USACE ICV 90-110% / CCV 80-120%)
	MRL (70-130%) (USACE 80-120%)		MRL (80-120%)

- The samples were analyzed for ICP metals on 07/29/04 and 07/30/04. Mercury was analyzed on 07/21/04 with a correlation coefficient of 0.9997. All ICV/CCV standards were within criteria. No qualifiers were applied. **Table 2** summarizes the MRL standard analysis for metals. Samples with concentrations detected less than two times the MRL with out of criteria MRL recovery were qualified.

Table 2 MRL Analysis Summary

Analysis Date	Analysis	MRL (µg/L)	MRL (mg/kg)	MRL %Recovery	Qualified samples @ <2xMRL	Validation Qualifiers
07/29/04	ICP	Various	Various	All within criteria	None	None
07/21/04	Hg	0.2	0.033	All within criteria	None	None

III-Blanks

Blanks (preparation and calibration blanks) are assessed to determine the existence and magnitude of contamination problems. No contaminants should be detected (i.e. <MDL) in any of the associated blanks. USACE Shell limits are < ½MRL for the method blank. Samples are qualified "B" when they are less than 5X the absolute value of the maximum blank concentration. **Table 3** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one, 100% solids, and were converted to soil values (soil conversion factors = 10 for ICP; 6 for Hg). The rinse blank breakout is as follows.

- Rinse blank 072004R3 applies to the northern burning ground ("NBG" prefix samples) surface soil ("A" suffix samples) and sediment ("SD") samples and was analyzed in SDG 0407135.
- Rinse blank 072004R1 applies to the northern burning ground ("NBG" prefix samples) subsurface soil samples ("B→D" suffix samples) and was analyzed in SDG 0407135.
- Rinse blanks 071904R2 (for July samples) and 091304R (for September samples) apply to the western burning ground ("WBG" prefix samples) surface soil samples ("A" suffix samples) and was analyzed in SDG 0407135 and SDG 0409105, respectively.
- Rinse blank 071904R1 applies to the western burning ground ("WBG" prefix samples) subsurface soil samples ("B→C" suffix samples) and was analyzed in SDG 0407135.
- Rinse blank 072304R applies to the western burning ground ("WBG" prefix samples) sediment samples and was analyzed in SDG 407170.

Table 3 Blank Contamination Analysis Summary

Analysis Date	Analysis	QC Blank ID	Max Conc. mg/kg	Action Level mg/kg	B qualified samples
07/29/04	ICP-Al	ICB/CCBs	3.10B	15.5	None
07/29/04	ICP-Sb	ICB/CCBs	0.52B	2.6	WBGSB27A, WBGSB28A, TMSB28A, NBGSD02, NBGSD03 , NBGSD04
07/29/04	ICP-Ba	ICB/CCBs	0.05B	0.25	None
07/29/04	ICP-Be	ICB/CCBs	0.02B	0.10	None
07/29/04	ICP-Ca	ICB/CCBs	8.5B	42.5	None
07/29/04	ICP-Cr	ICB/CCBs	0.09B	0.45	None
07/29/04	ICP-Co	ICB/CCBs	0.16B	0.80	None
07/29/04	ICP-Cu	ICB/CCBs	0.09B	0.45	None
07/29/04	ICP-Mg	ICB/CCBs	4.39B	22.0	None
07/29/04	ICP-Mn	ICB/CCBs	0.05B	0.25	None
07/29/04	ICP-Ni	ICB/CCBs	0.11B	0.55	None
07/29/04	ICP-Ag	ICB/CCBs	0.21B	1.05	None
07/29/04	ICP-Na	ICB/CCBs	49.0B	245	WBGSB26A, WBGSB27A, WBGSB28A, TMSB28A, WBGSD16, TMSD16, NBGSD02, NBGSD04
07/29/04	ICP-Tl	ICB/CCBs	0.42B	2.10	None
07/29/04	ICP-V	ICB/CCBs	0.14B	0.70	None
08/12/04	Hg	ICB/CCBs	<MRL	NA	None
07/29/04	ICP-Al	PBS	1.7B	8.50	None
07/29/04	ICP-Ba	PBS	0.040B	0.20	None
07/29/04	ICP-Be	PBS	0.017B	0.085	None
07/29/04	ICP-Ca	PBS	15.9B	79.5	None
07/29/04	ICP-Cr	PBS	0.12B	0.60	None
07/29/04	ICP-Co	PBS	0.13B	0.65	None
07/29/04	ICP-Cu	PBS	0.18B	0.90	None
07/29/04	ICP-Mg	PBS	1.6B	8.0	None
07/29/04	ICP-Mn	PBS	0.11B	0.55	None
07/29/04	ICP-Ni	PBS	0.31B	1.55	None
07/29/04	ICP-Na	PBS	57.7B	289	WBGSB26A, WBGSB27A, WBGSB28A, TMSB28A, WBGSD16, TMSD16, NBGSD02, NBGSD04
07/29/04	ICP-Tl	PBS	0.40B	2.00	None
07/20/04	Hg	PBS	<MRL	NA	None

Table 3 Blank Contamination Analysis Summary, Continued

Analysis Date	Analysis	QC Blank ID	Max Conc. mg/kg	Action Level mg/kg	B qualified samples
08/05/04	ICP-Al	072004R3	2.51BN	12.6	None
08/05/04	ICP-Sb	072004R3	0.49B	2.45	NBGSD02, NBGSD03, NBGSD04
08/05/04	ICP-Ca	072004R3	7.83B	39.2	None
08/05/04	ICP-Cr	072004R3	0.11B	0.55	None
08/05/04	ICP-Co	072004R3	0.064B	0.32	None
08/05/04	ICP-Pb	072004R3	0.18B	0.90	None
08/05/04	ICP-Mg	072004R3	1.42B	7.1	None
08/05/04	ICP-Mn	072004R3	0.16B	0.80	None
08/05/04	ICP-Ag	072004R3	0.073B	0.37	None
08/05/04	ICP-Na	072004R3	49.9B	250	NBGSD02, NBGSD04
08/05/04	Hg	072004R3	<MRL	NA	None
08/05/04	ICP-Ba	072004R1	0.042B	0.21	None
08/05/04	ICP-Ca	072004R1	10.8B	54.0	None
08/05/04	ICP-Cr	072004R1	0.12B	0.60	None
08/05/04	ICP-Mg	072004R1	2.61B	13.1	None
08/05/04	ICP-Mn	072004R1	0.18B	0.90	None
08/05/04	ICP-Ag	072004R1	0.12B	0.60	None
08/05/04	ICP-Na	072004R1	37.3B	189	None
08/05/04	ICP-V	072004R1	0.089B	0.45	None
08/05/04	Hg	072004R1	<MRL	NA	None
08/05/04	ICP-Al	071904R2	2.14BN	10.7	None
08/05/04	ICP-Ba	071904R2	0.048B	0.24	None
08/05/04	ICP-Ca	071904R2	10.3B	51.5	None
08/05/04	ICP-Co	071904R2	0.085B	0.43	None
08/05/04	ICP-Cu	071904R2	0.51B	2.6	None
08/05/04	ICP-Fe	071904R2	2.64B	13.2	None
08/05/04	ICP-Mg	071904R2	3.59B	18.0	None
08/05/04	ICP-Mn	071904R2	0.14B	0.70	None
08/05/04	ICP-K	071904R2	4.40B	22.0	None
08/05/04	ICP-Se	071904R2	0.44B	2.2	WBGSB26A, WBGSB27A, WBGSB28A, TMSB28A
08/05/04	ICP-Ag	071904R2	0.12B	0.60	None
08/05/04	Hg	071904R2	<MRL	NA	None
08/05/04	ICP-Al	071904R1	2.07BN	10.4	None
08/05/04	ICP-Sb	071904R1	0.69B	3.5	None
08/05/04	ICP-Ba	071904R1	0.024B	0.12	None
08/05/04	ICP-Co	071904R1	0.13B	0.65	None
08/05/04	ICP-Mg	071904R1	2.42B	12.1	None
08/05/04	ICP-Mn	071904R1	0.074B	0.37	None
08/05/04	ICP-Na	071904R1	56.7B	284	None
08/05/04	ICP-V	071904R1	0.13B	0.65	None
08/05/04	Hg	071904R1	<MRL	NA	None
08/05/04	ICP-Ba	072304R	0.054B	0.27	None
08/05/04	ICP-Ca	072304R	23.2B	116	None
08/05/04	ICP-Fe	072304R	3.98B	19.9	None
08/05/04	ICP-Mg	072304R	4.20B	21.0	None
08/05/04	ICP-Mn	072304R	0.14B	0.70	None
08/05/04	ICP-Ni	072304R	0.11B	0.55	None
08/05/04	ICP-K	072304R	4.63B	23.2	None
08/05/04	ICP-Na	072304R	55.7B	279	WBGSD16, TMSD16
08/05/04	ICP-Zn	072304R	0.49B	2.45	None
08/05/04	Hg	072304R	<MRL	NA	None
09/22/04	ICP-Al	091304R	2.92B	14.6	None
09/22/04	ICP-Mg	091304R	1.29B	6.5	None
09/22/04	ICP-Na	091304R	69.5B	348	None
09/22/04	ICP-Zn	091304R	0.50B	2.5	None

B = Value is estimated <MRL and >MDL.
N = Laboratory spike sample recovery not within control limits.

IV-ICP Interference Check Sample (ICS)
The ICP interference check sample (ICS) verifies interelement and background correction factors. ICP Interference Check is performed at the beginning and end of each sample analysis run. Control limits are 80-120% (USACE limits 80-120%).

- All criteria were met. No qualifiers were applied.

V-Laboratory Control Samples (LCS)
The laboratory control sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. All soil LCS results must fall within the control limits of 80-120% for ICP metals and mercury. USACE Shell limits for metals are 80-120% (60-140% for sporadic marginal failures (SMF)).

- Sample BKS67796 was used as LCS for ICP metals analysis dated 7/29/04. All criteria were met. No qualifiers were applied.

- Sample BKS67817 was used as LCS for total mercury analysis dated 7/21/04. All criteria were met. No qualifiers were applied.

VI-Duplicate Sample Analysis
Duplicate sample determinations are used to demonstrate acceptable method precision by the laboratory at the time of analysis. Duplicate analysis generate data in order to determine the long-term precision of the analytical method on various matrices. RPDs must be within established control limits. USACE Shell limits for metals are 25% RPD for ICP metals and 20% RPD for mercury.

- Sample WBGSB26A (407108-001) was used as sample duplicate for ICP metals analysis. Antimony (200%) was outside criteria due to low sample concentrations. Therefore, no qualifiers were applied based upon this outlier.

- Sample WBGSB26A (407108-001) was used as sample duplicate for mercury analysis. All criteria were met. No qualifiers were applied.

VII-Matrix Spike
MS are generated to determine long-term accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. Specific criteria include the analyses of matrix spike and matrix spike duplicate samples at a frequency of one MS per 20 samples of similar matrix. MS recoveries and relative percent differences between MS recoveries should be within the specified limits. USACE Shell limits for metals are 75-125% for ICP metals and 80-120% for mercury. Post digestion spikes limits are 75-125% for ICP metals and 85-115% for mercury.

- Sample WBGSB26A (407108-001) was used for the MS analysis for ICP analysis. Aluminum (1510%), antimony (39.5%), iron (243%), magnesium (135%), and manganese (50.0%) were outside of control limits. Post digestion spikes were within criteria for antimony and magnesium. The sample concentration was >4 times the spike added for aluminum, iron, and manganese, therefore no qualifiers were applied based upon these outliers. For antimony, the spiked sample was qualified bias low non-detect “UL” based upon the low recovery. For magnesium, the spiked sample was qualified bias high “K” based upon the high recovery.

- Sample WBGSB26A (407108-001) was used for the MS analysis for mercury analysis. All criteria were met. No qualifiers were applied.

VIII-ICP Serial Dilution

An ICP serial dilution is performed to determine whether significant physical or chemical interferences exist due to sample matrix at high concentrations. An analysis of a 5-fold dilution should agree within 10% difference of the original result when the concentration in sample is a factor of 50 above MDL.

- The serial dilution for the ICP was analyzed for sample WBGSB26A (407108-001). Beryllium (12.2%), selenium (100%), and sodium (100%) were outside of criteria limits. Sample concentrations were <50 times MDL for selenium, and sodium, therefore no qualifiers were applied based upon these outliers. Beryllium was qualified estimated "J" for all samples based upon the high %D.

IX-Field Duplicate Sample Analysis

Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the solid samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field soil sample duplicate pair WBGSB28A (407108-003) and TMSB28A (407108-004) was collected. The field duplicate evaluation is noted in **Table 4.** If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. All criteria were met. No qualifiers were applied.

Table 4 Field Duplicate Analysis Summary

Sample ID	Lab ID	Compound	Original Result (mg/kg)	Duplicate Result (mg/kg)	%RPD	Qualifier
WBGSB28A	407108-003	Aluminum	21800	22400	2.7	None
WBGSB28A	407108-003	Antimony	0.61 BN	0.57 BN	6.8	None
WBGSB28A	407108-003	Arsenic	9.4	9.9	5.2	None
WBGSB28A	407108-003	Barium	81.7	86.5	5.7	None
WBGSB28A	407108-003	Beryllium	1.3 E	1.4 E	7.4	None
WBGSB28A	407108-003	Cadmium	0.084 B	0.088 B	4.7	None
WBGSB28A	407108-003	Calcium	3980	4000	0.5	None
WBGSB28A	407108-003	Chromium	45.2	45.5	0.7	None
WBGSB28A	407108-003	Cobalt	9.8	11.2	13.3	None
WBGSB28A	407108-003	Copper	28.6	29.8	4.1	None
WBGSB28A	407108-003	Iron	28300	29200	3.1	None
WBGSB28A	407108-003	Lead	114	112	1.8	None
WBGSB28A	407108-003	Magnesium	3140 N	3230 N	2.8	None
WBGSB28A	407108-003	Manganese	251	294	15.8	None
WBGSB28A	407108-003	Nickel	20.7	21.4	3.3	None
WBGSB28A	407108-003	Potassium	1200	1250	4.1	None
WBGSB28A	407108-003	Selenium	0.86 B	0.72 B	17.7	None
WBGSB28A	407108-003	Sodium	84.5 B	77.9 B	8.1	None
WBGSB28A	407108-003	Vanadium	53.9	56.5	4.7	None
WBGSB28A	407108-003	Zinc	202	200	1.0	None
WBGSB28A	407108-003	Mercury	0.067	0.060	11.0	None

B = Estimated value <MRL and >MDL.
N = Laboratory spike sample recovery not within control limits.
E = Reported value is estimated because of the presence of interferences.

- Field sediment sample duplicate pair WBGSD16 (407108-005) and TMSD16 (407108-006) was collected. The field duplicate evaluation is noted in **Table 5.** If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. Data qualifiers were applied for the duplicate pair as noted.

Table 5 Field Duplicate Analysis Summary

Sample ID	Lab ID	Compound	Original Result (mg/kg)	Duplicate Result (mg/kg)	%RPD	Qualifier
WBGSD16	407108-005	Aluminum	19300	18400	4.8	None
WBGSD16	407108-005	Arsenic	9.6	11.0	13.6	None
WBGSD16	407108-005	Barium	63.3	59.5	6.2	None
WBGSD16	407108-005	Beryllium	1.1 E	1.2 E	8.7	None
WBGSD16	407108-005	Cadmium	0.045 U	0.090 B	NA	None
WBGSD16	407108-005	Calcium	14500	24000	49.4	None
WBGSD16	407108-005	Chromium	42.7	44.4	3.9	None
WBGSD16	407108-005	Cobalt	17.2	15.7	9.1	None
WBGSD16	407108-005	Copper	19.3	21.0	8.4	None
WBGSD16	407108-005	Iron	31500	35700	12.5	None
WBGSD16	407108-005	Lead	45.5	40.6	11.4	None
WBGSD16	407108-005	Magnesium	4200 N	9140 N	***74.1***	J
WBGSD16	407108-005	Manganese	1700	1370	21.5	None
WBGSD16	407108-005	Nickel	17.0	16.7	1.8	None
WBGSD16	407108-005	Potassium	1140	920	21.4	None
WBGSD16	407108-005	Sodium	123 B	179 B	37.1	None
WBGSD16	407108-005	Vanadium	52.8	61.5	15.2	None
WBGSD16	407108-005	Zinc	63.1	65.4	3.6	None
WBGSD16	407108-005	Mercury	0.041 B	0.054	27.4	None

B = Estimated value <MRL and >MDL.
N = Laboratory spike sample recovery not within control limits.
U = Value non-detect at MDL.
NA = Not Applicable
E = Reported value is estimated because of the presence of interferences.

X-Quantitation Verification

The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value > MDL and < MRL or < 3*MDL (whichever was greater) was qualified as estimated, "J." The following calculations were performed for verification.

ICP Sample: WBGSB26A (407108-001), Total Barium

Conc. (mg/kg) = {(conc. μg/L)*(Final Volume L)*(DF)} / {(Weight Sample g)*(Fraction Solids)}

Conc. (mg/kg) = {(417.5421 μg/L)*(0.100 L)*(1)} / {(1.25 g)*(0.7349)} = 45.5 μg/g = 45.5 mg/kg

Reported concentration = 45.5 mg/kg
%D = 0.0%
Values were within 10% difference.

CVAA Sample: WBGSB26A (407108-001), Total Mercury

Conc. (mg/kg) = {(conc. μg/L)*(Final Volume L)*(DF)} / {(Weight Sample g)*(Fraction Solids)}

Conc. (mg/kg) = {(0.285 μg/L)*(0.100 L)*(1)} / {(0.64 g)*(0.7349)} = 0.061 μg/g = 0.061 mg/kg

Reported concentration = 0.061 mg/kg
%D = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – PAHs
GPL Laboratories, Inc., SDG 407108

DATE: December 9, 2004

The purpose of this memorandum is to present the data validation report for the samples collected for the New River Unit WI at the RFAAP on July 16, 2004. Samples were analyzed for polynuclear aromatic hydrocarbons (PAHs) using USEPA SW846 Methods 3540C/8270C low level. A total of four soil samples, one diluted soil sample, and two sediment samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
WBGSB26A	407108-001	TMSB28A	407108-004
WBGSB27A	407108-002	WBGSD16	407108-005
WBGSB27A	407108-002DL	TMSD16	407108-006
WBGSB28A	407108-003		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements*, method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times
	X	Instrument Performance Check
	X	Initial Calibration
X		Continuing Calibration
	X	Blank Analysis
	X	Surrogate Spikes
	X	Internal Standards
	X	Laboratory Control Standard
	X	Matrix Spike/Spike Duplicate
X		Field Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications, except for the following. For sample WBGSB27A (407108-002), benzo(a)pyrene, benzo(b)fluoranthene, and fluoranthene were outside calibration range (“E” lab flag) and qualified rejected “R”. Sample WBGSB27A (407108-002DL) should be used for these compounds.

_____ _____

Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
POLYNUCLEAR AROMATIC HYDROCARBONS REVIEW
SDG 407108

I-Holding Times
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For polynuclear aromatic hydrocarbons (PAHs) soil samples cooled @ 4°C ± 2°C; the maximum holding time is the maximum holding time is 14 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For samples collected on 07/16/04, cooler was received by the laboratory at 2.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The soil sample was collected on 07/16/04, extracted on 07/22/04, and analyzed for PAHs on 07/27/04. The actual extraction and analysis dates for each sample may be found on the attached form 1 to this report. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check
GC/MS instrument performance checks are performed to ensure mass resolution, identification and, to some degree, sensitivity. The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, decafluorotriphenylphosphine (DFTPP), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for PAH compounds by GC/MS low level. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.99. The minimum relative response factor (RRF) criteria must be ≥ 0.05. Initial calibration percent relative standard deviation (%RSD) must be ≤ 15% on the average for all compounds (< 30% for CCCs). All detects are qualified as estimated “J” for where there were exceeding %RSDs, and all non-detects are qualified as estimated “UJ” for where there were grossly exceeding recoveries, unless determined to be unusable “R”. Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated “J” and non-detects are rejected “R”.

- Initial calibration for the PAHs by USEPA SW-846 8270C low level was performed on 07/19/04 on instrument GC/MS-P. All RRFs were ≥ 0.05. All criteria were met. No qualifiers were applied. Samples WBGSB26A (407108-001), WBGSB27A (407108-002), WBGSB27A (407108-002DL), WBGSB28A (407108-003), TMSB28A (407108-004), WBGSD16 (407108-005), and TMSD16 (407108-006) applies to this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Continuing calibration standards containing both target and surrogates compounds are analyzed at the beginning of each 12-hour analysis period following the analysis of the instrument performance check and prior to the analysis of blanks and samples. The minimum relative response factors (RRF) for semivolatile target compounds and surrogates must be $\geq$ 0.05. The percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within $\pm$ 20% for all target compounds. Grossly exceeding is defined where %D>40%. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For continuing calibration for the PAHs by USEPA SW-846 8270C low level performed on 07/26/04 @19:11 on instrument GC/MS-P, target compound pyrene (21.8%) was outside criteria. All detects were qualified estimated "J" based upon the high %D. Samples WBGSB26A (407108-001) and WBGSB28A (407108-003) apply to this continuing calibration.

- For continuing calibration for the PAHs by USEPA SW-846 8270C low level performed on 07/27/04 @13:13 on instrument GC/MS-P, all target compounds were within criteria. No qualifiers were applied. Samples WBGSB27A (407108-002), WBGSB27A (407108-002DL), TMSB28A (407108-004), WBGSD16 (407108-005), and TMSD16 (407108-006) apply to his continuing calibration.

V-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. A method blank analysis must be performed after the calibration standards and once every 12-hour time period beginning with the injection of DFTPP. No contaminants should be detected in any of the associated blanks > the MDL. USACE Shell criteria specifies all concentrations should be less than one-half MRL (<MRL for common laboratory contaminants phthalate esters). Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is $\leq$ 10 times (10x) the maximum amount in any blank for the common laboratory contaminants phthalate esters, or 5 times (5X) the maximum amount for other semivolatile target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one, 100% solids, and were converted to soil values (soil conversion factor = 33). The rinse blank breakout is as follows.

- For PAHs, rinse blank 071904R2 applies to the western burning ground ("WBG" prefix samples) surface soil and sediment samples ("A" suffix samples) and was analyzed in SDG 0407135.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/kg	Action Level µg/kg	B qualified samples
07/26/04	BLK67933	All compounds < MRL	NA	NA	None
07/26/04	071904R2	All compounds < MRL	NA	NA	None

VI-Surrogate Spikes
Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Surrogate spikes are added to all samples and blanks to measure their recovery in sample and blank matrices. The percent recoveries (%Rs) must be within the specified control limits.

Criteria: Nitrobenzene-d5 (29-140%) – S1 (USACE Shell Criteria: 45-135%)
2-Fluorobiphenyl (31-125%) – S2 (USACE Shell Criteria: 45-135%)
Terphenyl – d14 (26-160%) – S3 (USACE Shell Criteria: 45-135%)

- All criteria were met. No qualifiers were applied.

VII-Internal Standards
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Internal standard area counts for samples and blanks must not vary by more than a factor of two (- 50% to + 100%) from the associated calibration standard. The retention time of the internal standards in samples and blanks must not vary by more than $\pm$ 30 seconds from the retention time of the associated calibration standard.

- All criteria were met. No qualifiers were applied.

VIII-Laboratory Control Samples
Laboratory control samples (LCS) are used to monitor laboratory accuracy by calculating the percent recoveries of the spiked compounds. All LCS percent recoveries must be within the specified control limits. USACE Shell limits for PAHs by 8270C low level are 45-135% (25-150% for sporadic marginal failures (SMF)).

- Sample BKS67933 was used as the LCS for PAHs by USEPA SW-846 8270C low level analyzed 07/26/04. All criteria were met. No qualifiers were applied. Samples WBGSB26A (407108-001), WBGSB27A (407108-002), WBGSB27A (407108-002DL), WBGSB28A (407108-003), TMSB28A (407108-004), WBGSD16 (407108-005), and TMSD16 (407108-006) applies to this LCS.

IX-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. USACE Shell limits are 45-135%; RPD $\leq$ 60% (15-150%; RPD $\leq$ 60% for sporadic marginal failures (SMF)).

- Sample WBGSB26A (407108-001) was used for the MS/MSD analysis for PAHs. Compounds dibenz(a,h)anthracene (122%), fluoranthene (148%), and indeno(1,2,3-cd)pyrene (118%) were outside USACE and/or lab criteria. There were a total of 34 spike recoveries with 0 sporadic marginal failures. The high recoveries were due to large amount of organic compounds detected in the spiked sample. The LCS was within criteria limits. No qualifiers were applied based upon these outliers.

X-Field Duplicate Sample Analysis

Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the soil samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field soil sample duplicate pair WBGSB28A (407108-003) and TMSB28A (407108-004) was collected. The field duplicate evaluation is noted in **Table 3.** If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. Data qualifiers were applied for the duplicate pair as noted.

Table 3 Field Duplicate Analysis Summary

Sample ID	Lab ID	Compound	Original Result (µg/kg)	Duplicate Result (µg/kg)	%RPD	Qualifier
WBGSB28A	407108-003	2-methylnaphthalene	8.5 U	16	NA	None
WBGSB28A	407108-003	benzo(a)anthracene	21	36	***52.6***	J
WBGSB28A	407108-003	benzo(a)pyrene	29	50	***53.2***	J
WBGSB28A	407108-003	benzo(b)fluoranthene	46	81	***55.1***	J
WBGSB28A	407108-003	benzo(g,h,i)perylene	27	37	31.3	None
WBGSB28A	407108-003	benzo(k)fluoranthene	17	25	38.1	None
WBGSB28A	407108-003	chrysene	26	43	49.3	None
WBGSB28A	407108-003	fluoranthene	48	67	33.0	None
WBGSB28A	407108-003	indeno(1,2,3-c,d)pyrene	25	35	33.3	None
WBGSB28A	407108-003	naphthalene	8.5 U	9.2	NA	None
WBGSB28A	407108-003	phenanthrene	16	23	35.9	None
WBGSB28A	407108-003	pyrene	28	41	37.7	None

U = Value non-detect at MRL.
J = Estimated value.
NA = Not Applicable.

- Field sediment sample duplicate pair WBGSD16 (407108-005) and TMSD16 (407108-006) was collected. The field duplicate evaluation is noted in **Table 4.** If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. Data qualifiers were applied for the duplicate pair as noted.

Table 4 Field Duplicate Analysis Summary

Sample ID	Lab ID	Compound	Original Result (µg/kg)	Duplicate Result (µg/kg)	%RPD	Qualifier
WBGSD16	407108-005	acenaphthene	16 U	29	NA	None
WBGSD16	407108-005	anthracene	78	48	47.6	None
WBGSD16	407108-005	benzo(a)anthracene	78	160	***68.9***	J
WBGSD16	407108-005	benzo(a)pyrene	87	170	***64.6***	J
WBGSD16	407108-005	benzo(b)fluoranthene	170	270	45.5	None
WBGSD16	407108-005	benzo(g,h,i)perylene	54	95	***55.0***	J
WBGSD16	407108-005	benzo(k)fluoranthene	53	120	***77.5***	J
WBGSD16	407108-005	chrysene	99	170	***52.8***	J
WBGSD16	407108-005	fluoranthene	180	390	***73.7***	J
WBGSD16	407108-005	fluorene	16 U	26	NA	None
WBGSD16	407108-005	indeno(1,2,3-c,d)pyrene	60	96	46.2	None
WBGSD16	407108-005	phenanthrene	74	220	***99.3***	J
WBGSD16	407108-005	pyrene	120	270	***76.9***	J

U = Value non-detect at MRL.
J = Estimated value.
NA = Not Applicable

XI-Quantitation Verification

The accuracy of analytical results was verified through the calculation of several parameters. Percent difference (%D) between the calculated and reported values must be ≤10%. Any sample value > MDL and < MRL or < 3*MDL (whichever is greater) was qualified as estimated, "J." For sample WBGSB27A (407108-002), benzo(a)pyrene, benzo(b)fluoranthene, and fluoranthene were outside calibration range ("E" lab flag) and qualified rejected "R". Sample WBGSB27A (407108-002DL) should be used for these compounds

Sample: WBGSB26A (407108-001), pyrene

Conc. µg/kg = (Ax * Is * Vt * DF) / (Ais * RRF * Vi * Ws * D)

where: Conc. = Sample concentration in µg/kg
Ax = Area of characteristic ion for compound being measured.
Is = Amount of internal standard injected (ng).
Vt = Volume of total extract (µL).
Ais = Area of characteristic ion for the internal standard.
RRF = Average relative response factor for compound being measured (from ICAL)
Vi = Volume of extract injected (µL).
W(s) = Weight of sample extracted or diluted in grams.
D = Percent dry weight (100 - % moisture in sample)/100
DF = Dilution factor

Conc. µg/kg = (1774154 * 4 * 1000 * 1) / (1509461 * 1.503 * 1 * 30 * 0.7349) = 140 µg/kg
Reported Value = 140 µg/kg
% Difference = 0.0%
Values were within 10% difference

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – PCBs
GPL Laboratories, Inc., SDG 407108

DATE: November 19, 2004

The purpose of this memorandum is to present the data validation report for the samples collected for the New River WI at the RFAAP on July 14-16, 2004. Samples were analyzed for PCBs using USEPA Method 3540C/8082. A total of four soil samples and five sediment samples were analyzed and validated for PCBs. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
WBGSB26A	407108-001	TMSD16	407108-006
WBGSB27A	407108-002	NBGSD02	407108-007
WBGSB28A	407108-003	NBGSD03	407108-008
TMSB28A	407108-004	NBGSD04	407108-009
WBGSD16	407108-005		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements* (USACE, February 2001), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (USEPA, September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
X		System Monitoring Compounds
	X	Laboratory Control Samples
	X	Matrix Spike/Spike Duplicate
	X	Field Sample Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

_____ _____

Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
PCB REVIEW
SDG 407108

I-Holding Times
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For PCB soil samples, cooled @4°C ±2°C, the maximum holding time is 14 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis (USEPA criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For samples collected on 07/14/04 and 07/16/04, cooler was received by the laboratory at 2.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The samples were collected on 07/14/04 and 07/16/04 for PCB compounds. They were extracted on 07/22/04 and analyzed for PCBs on 07/26/04, 07/27/04, and 07/31/04 within criteria guidelines. The actual extraction and analysis dates for each sample may be found on the attached form 1s to this report. No qualifiers were applied.

II-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. The initial 5-point calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run. The percent relative standard deviation (%RSD) for all single peak target analytes, and aroclors 1016 and 1260 must be $< 20\%$ or the mean %RSD for all analytes in the standard must be $\leq 20\%$. If linear regression is used, the correlation coefficient must be ≥ 0.990 (USEPA and USACE criteria).

- For the PCB initial calibration performed on 06/29/04 on instrument GC-L, all compounds were determined using calibration factors for PCB 1016 and PCB 1260. All criteria were met, except for the following. For PCB 1260 signal #2, PCB 1260 #1 (22.1%) and PCB 1260 #5 (22.7%) were above criteria limits. The average %RSD for PCB 1260 for signal #2 (20.0%) was within criteria. All associated samples were non-detect for PCB 1260. No qualifiers were applied based upon these outliers. Samples WBGSB26A (407108-001), WBGSB27A (407108-002), WBGSB28A (407108-003), TMSB28A (407108-004), WBGSD16 (407108-005), TMSD16 (407108-006), and NBGSD03 (407108-008) apply to this initial calibration.

- For the PCB initial calibration performed on 07/29/04 on instrument GC-L, all compounds were determined using calibration factors for PCB 1016 and PCB 1260. All criteria were met, except for the following. For PCB 1260 signal #2, PCB 1260 #1 (20.7%), PCB 1260 #2 (21.5%), and PCB 1260 #5 (21.8%) were above criteria limits. The average %RSD for PCB 1260 for signal #2 (20.4%) was within criteria. All associated samples were non-detect for PCB 1260. No qualifiers were applied based upon these outliers. Samples NBGSD02 (407108-007) and NBGSD04 (407108-009) apply to this initial calibration.

III-Continuing Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for PCB target compounds. Continuing calibration standards containing both target compounds and surrogates are analyzed at the beginning of each 12-hour analytical shift and after every 20 samples. The percent difference (%D) or the mean %RSD for all analytes in the standard from the initial calibration should be no greater than $\pm$ 15%.

- For PCB continuing calibration performed on 07/26/04 @12:25 on instrument GC-L, all criteria were met on column #2 for all target compounds arochlor 1016 and arochlor 1260. For column #1, arochlor 1016 #5 (20.9%) was outside criteria. The average of the peaks for arochlor 1016 (8.1%) was within criteria and all associated samples were non-detect. Arochlor 1260 was within criteria limits for column #1. No qualifiers were applied. No samples reported apply to his continuing calibration.

- For PCB continuing calibration performed on 07/26/04 @17:21 on instrument GC-L, the following %Ds were determined. For column #1, arochlor 1016 #2 (25.8%), arochlor 1016 #3 (25.4%), arochlor 1016 #4 (15.1%), arochlor #5 (34.3%) were outside criteria. The average of the peaks for arochlor 1016 (21.2%) was outside criteria. All samples were non-detect for arochlor 1016, therefore no qualifiers were applied based upon these outliers. Arochlor 1016 was within criteria for column #2. For column #2, arochlor 1260 #2 (24.1%), arochlor 1260 #3 (16.3%), and arochlor 1260 #4 (30.9%) were outside criteria. The average of the peaks for arochlor 1260 (16.5%) was outside criteria. All samples were non-detect for arochlor 1260, therefore no qualifiers were applied based upon these outliers. Arochlor 1260 was within criteria for column #1. Samples WBGSB26A (407108-001), WBGSB27A (407108-002), and WBGSB28A (407108-003) apply to this continuing calibration.

- For PCB continuing calibration performed on 07/26/04 @22:40 on instrument GC-L, all criteria were met on column #2 for all target compounds arochlor 1016 and arochlor 1260. For column #1, arochlor 1016 #2 (24.2%) and arochlor 1016 #5 (29.6%) were outside criteria. The average of the peaks for arochlor 1016 (14.8%) was within criteria and all associated samples were non-detect. For column #1, arochlor 1260 #2 (15.4%), arochlor 1260 #3 (15.3%), and arochlor 1260 #4 (21.2%) were outside criteria. The average of the peaks for arochlor 1260 (14.6%) was within criteria and all associated samples were non-detect. No qualifiers were applied. Samples TMSB28A (407108-004), WBGSD16 (407108-005), TMSD16 (407108-006), and NBGSD03 (407108-008) apply to his continuing calibration.

- For PCB continuing calibration performed on 07/27/04 @03:01 on instrument GC-L, the following %Ds were determined. For column #1, arochlor 1016 #2 (16.5%) and arochlor 1016 #5 (16.5%) were outside criteria. The average of the peaks for arochlor 1016 (12.2%) was within criteria and all samples were non-detect. No qualifiers were applied based upon these outliers. Arochlor 1260 was within criteria. For column #2, arochlor 1016 and arochlor 1260 were within criteria. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For PCB continuing calibration performed on 07/31/04 @10:39 on instrument GC-L, the following %Ds were determined. For column #1, arochlor 1221 #2 (15.3%) was outside criteria. The average of the peaks for arochlor 1221 (6.2%) was within criteria and all samples were non-detect. No qualifiers were applied based upon these outliers. Arochlor 1254 was within criteria. For column #2, arochlor 1221 and arochlor 1254 were within criteria. No qualifiers were applied. Samples NBGSD02 (407108-007) and NBGSD04 (407108-009) apply to this continuing calibration.

- For PCB continuing calibration performed on 07/31/04 @15:29 on instrument GC-L, all criteria were met on column #1 and column #2 for all target compounds arochlor 1221 and arochlor 1254. No qualifiers were applied. No samples reported apply to his continuing calibration.

IV-Blank Analysis

The purpose of laboratory or field blank analyses is to determine the existence and magnitude of contamination problems resulting from laboratory or field activities. One method blank per analytical batch must be run on each instrument used to analyze samples. No contaminants should be present in the blanks > MDL or MRL (USEPA criteria) or all target compounds < one-half the MRL (USACE criteria). **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one, 100% solids, and were converted to soil values (soil conversion factor = 30). The rinse blank breakout is as follows.

- Rinse blank 072004R3 applies to the northern burning ground ("NBG" prefix samples) surface soil ("A" suffix samples) and NBG sediment ("SD") samples and was analyzed in SDG 0407135.

- Rinse blank 072004R1 applies to the northern burning ground ("NBG" prefix samples) subsurface soil samples ("B→D" suffix samples) and was analyzed in SDG 0407135.

- Rinse blank 071904R2 applies to the western burning ground ("WBG" prefix samples) surface soil samples ("A" suffix samples) and was analyzed in SDG 0407135.

- Rinse blank 071904R1 applies to the western burning ground ("WBG" prefix samples) subsurface soil samples ("B→C" suffix samples) and was analyzed in SDG 0407135.

- Rinse blank 072304R applies to the western burning ground ("WBG" prefix samples) sediment samples and was analyzed in SDG 407170.

Table 2 Blank Contamination Analysis Summary

Parameter	Analysis Date	QC Blank ID	Compound	Max Conc. µg/kg	Action Level µg/kg	B qualified samples
PCBs	07/26/04	BLK67881	All < MRL	NA	NA	None
PCBs	07/28/04	072004R3	All < MRL	NA	NA	None
PCBs	07/28/04	072004R1	All < MRL	NA	NA	None
PCBs	07/28/04	071904R2	All < MRL	NA	NA	None
PCBs	07/28/04	071904R1	All < MRL	NA	NA	None
PCBs	07/31/04	072304R	All < MRL	NA	NA	None

V-System Monitoring Compound (Surrogates)

Laboratory performance on individual samples is established by means of spiking activities. The percent recovery (%R) for all samples and blanks must be within the specified laboratory control limits.

Criteria: Decachlorobiphenyl: PCBs: 47-161% (USACE criteria 50-130%)
Tetrachloro-m-xylene: PCBs: 54-168% (USACE criteria 50-130%)

- For PCB analysis for sample WBGSB26A (407108-001), surrogate decachlorobiphenyl (26%; signal #1) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene (signals #1 and #2) and decachlorobiphenyl (signal #2) were within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample WBGSB28A (407108-003), surrogate decachlorobiphenyl (49%; signal #1) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene (signals #1 and #2) and decachlorobiphenyl (signal #2) were within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample WBGSD16 (407108-005), surrogates decachlorobiphenyl (25%, 40%) and tetrachloro-m-xylene (42%) were outside USACE and/or lab criteria. For sample WBGSD16 (407108-005), all PCBs were non-detect and were qualified bias low non-detect "UL" based upon these outliers.

- For PCB analysis for sample TMSD16 (407108-006), surrogates decachlorobiphenyl (23%, 28%) and tetrachloro-m-xylene (34%) were outside USACE and/or lab criteria. For sample TMSD16 (407108-006), all PCBs were non-detect and were qualified bias low non-detect "UL" based upon these outliers.

- For all other samples, all criteria were met. No qualifiers were applied.

VI-Laboratory Control Samples
Laboratory control samples (LCS) are used to monitor long-term precision and accuracy of the analytical method. The analysis is performed at a frequency of 1 per analytical batch. The percent recoveries (%Rs) must be within the specified control limits. USACE Shell limits for PCBs are 50-130% (30-150% for sporadic marginal failures (SMF)).

- Sample BKS67881 was used for the LCS for PCBs. All criteria were met. No qualifiers were applied. Samples WBGSB26A (407108-001), WBGSB27A (407108-002), WBGSB28A (407108-003), TMSB28A (407108-004), WBGSD16 (407108-005), TMSD16 (407108-006), NBGSD02 (407108-007), NBGSD03 (407108-008), and NBGSD04 (407108-009) apply to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. USACE Shell limits for PCBs are 40-140%; RPD<50%.

- Sample WBGSB26A (407108-001) was used for the MS/MSD analysis for PCB compounds. All criteria were met. No qualifiers were applied.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. The project precision control criterion was established at 50% RPD for the solid samples.

- Field soil sample duplicate pair WBGSB28A (407108-003) and TMSB28A (407108-004) was collected. The field duplicate evaluation is noted in **Table 3**. If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. All criteria were met. No qualifiers were applied.

Table 3 Field Duplicate Analysis Summary WBGSB28A (407108-003) and TMSB28A (407108-004)

Sample ID	Lab ID	Compound	Original Result (µg/kg)	Duplicate Result (µg/kg)	%RPD	Qualifier
WBGSB28A	407108-003	All PCBs <MRL	NA	NA	NA	None

NA = Not Applicable

- Field sediment sample duplicate pair WBGSD16 (407108-005) and TMSD16 (407108-006) was collected. The field duplicate evaluation is noted in **Table 4**. If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. All criteria were met. No qualifiers were applied.

Table 4 Field Duplicate Analysis Summary WBGSD16 (407108-005) and TMSD16 (407108-006)

Sample ID	Lab ID	Compound	Original Result (µg/kg)	Duplicate Result (µg/kg)	%RPD	Qualifier
WBGSD16	407108-005	All PCBs <MRL	NA	NA	NA	None

NA = Not Applicable

IX-Quantitation Verification

The accuracy of analytical results was verified through the calculation of several parameters. The difference between the calculated value and the reported value must be within 10% difference. All samples were non-detect for PCBs, therefore the quantification verification not included here. Any sample value > MDL and < MRL or < 3*MDL (whichever is greater) was qualified as estimated, "J." The difference between the primary column and the confirmatory column must be ≤ 40% difference (USEPA and USACE criteria).

- PCB 1254 was detected in samples NBGSD02 (407108-007) and NBGSD04 (407108-009). All confirmatory criteria were met. No qualifiers were applied. For all other samples, all PCBs were non-detect.

Sample: NBGSD02 (407108-007), Aroclor 1254

Conc. μg/kg = (Ax * Vt * DF) / (CF * Vi * Ws * D)

where: Conc. = Sample concentration in μg/kg
Ax = Area/response for compound being measured.
Vt = Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10000 μL.
CF = Ave calibration response factor for compound being measured from ICAL (Area/pg)
Vi = Volume of extract injected (mL).
W(s) = Weight of sample extracted or diluted in grams.
D = Percent dry weight (100 - % moisture in sample)/100 = 1.0 for Wet Weight
DF = Dilution factor

Signal #1
Conc1 μg/kg = (36688Area*10000μL*1) / (229.8Area/pg*(1000 pg/ng)*1 μL*30g*0.8064) = 65.99 μg/kg
Conc2 μg/kg = (25976Area*10000μL*1) / (184.7Area/pg*(1000 pg/ng)*1 μL*30g*0.8064) = 58.13 μg/kg
Conc3 μg/kg = (57662Area*10000μL*1) / (398.8Area/pg*(1000 pg/ng)*1 μL*30g*0.8064) = 59.77 μg/kg
Conc4 μg/kg = (44954Area*10000μL*1) / (273.2Area/pg*(1000 pg/ng)*1 μL*30g*0.8064) = 68.02 μg/kg
Conc5 μg/kg = (87742Area*10000μL*1) / (440.8Area/pg*(1000 pg/ng)*1 μL*30g*0.8064) = 82.28 μg/kg
Average concentration = 67 μg/kg

Signal #2
Conc1 μg/kg = (207452Area*10000μL*1) / (1332Area/pg*(1000 pg/ng)*1 μL*30g*0.8064) = 64.38 μg/kg
Conc2 μg/kg = (135368Area*10000μL*1) / (856.1Area/pg*(1000 pg/ng)*1 μL*30g*0.8064) = 65.36 μg/kg
Conc3 μg/kg = (330674Area*10000μL*1) / (1998Area/pg*(1000 pg/ng)*1 μL*30g*0.8064) = 68.41 μg/kg
Conc4 μg/kg = (169710Area*10000μL*1) / (1142Area/pg*(1000 pg/ng)*1 μL*30g*0.8064) = 61.43 μg/kg
Conc5 μg/kg = (374852Area*10000μL*1) / (1882Area/pg*(1000 pg/ng)*1 μL*30g*0.8064) = 82.33 μg/kg
Average concentration = 68 μg/kg

Reported Value = 68 μg/kg (signal #2)
% Difference = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – Perchlorate
GPL Laboratories, Inc., SDG 407108

DATE: December 9, 2004

The purpose of this memorandum is to present the data validation report for the samples collected for the New River Unit WI at the RFAAP on July 16, 2004. Samples were analyzed for perchlorate using USEPA 314.0. A total of three aqueous samples were validated. The sample IDs are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
WBGSW16	407108-010	TMSW17	407108-012
WBGSW17	407108-011		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements* (USACE, February 2001), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Inorganic Data Review* (April, 1993). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times
	X	Initial and Continuing Calibration
	X	Blank Analysis
	X	Laboratory Control Samples
	X	Matrix Spike/Spike Duplicate
	X	Calculation Verification

The quality of data collected in support of this sampling activity is considered acceptable.

_____ _____

Eric Malarek, Chemist Date

RADFORD ARMY AMMUNITION VALIDATION REPORT
PERCHLORATE REVIEW
SDG 407108

I-Holding Times and Preservation

The primary objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample analysis. Holding time criteria: Preserved, Cool 4°C±2°C, 28 days for perchlorate. The dates and times were compared between the sample collection and laboratory analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For samples collected on 07/16/04, cooler was received by the laboratory at 2.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: Samples were collected on 07/16/04. Samples were analyzed for perchlorate on 07/28/04. All holding time criteria were met. No qualifiers were applied.

II-Initial and Continuing Calibration

Bench and run summary sheets were reviewed to determine whether calibration was performed at the beginning of sample analysis and at a frequency of 10% using the following criteria.

Perchlorate: 1 - blank
5 - standards ($r \geq 0.995$)
High ICV (90-110%); Low ICV (75-125%)
CCV (85-115%)
Performance Verification: Conductivity ±10%, Peak Area ±25%, RT Cal Curve ±20%,
RT Previous IPC ±5%, Perchlorate mid level std. ±20%

- For initial calibration performed on 06/30/04, all criteria were met. Perchlorate was calibrated using linear regression with a correlation coefficient of 0.9984. No qualifiers were applied.

- For continuing calibration performed on 07/28/04 @12:08, all criteria (ICV=87%) were met. No qualifiers were applied.

- For continuing calibration performed on 07/28/04 @15:42, all criteria (CCV=89%) were met. No qualifiers were applied.

III-Blank Analysis

Blanks are assessed to determine the existence and magnitude of contamination problems. The following analytes were detected in associated blanks. Any sample with detected concentrations of less than the five times the maximum (5x Max) concentration detected with the QC blanks were qualified "B." **Table 2** summarizes the blank contamination analysis. Since all samples are surface water samples, no equipment blank is required.

Table 2 Blank Contamination Analysis Summary

Analysis Date	Analysis	QC Blank ID	Target Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
06/30/04	Perchlorate	CAL BLANK	All <MRL	NA	NA	None
07/28/04	Perchlorate	LRB	All <MRL	NA	NA	None

IV-Laboratory Control Samples
The laboratory control sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. All aqueous LCS results must fall within the control limits of 80-120%.

- Sample LCSW-25 was used as perchlorate LCS. All criteria were met. No qualifier was applied.

V-Matrix Spike/Spike Duplicate
MS/MSD are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. Specific criteria include the analyses of matrix spike and matrix spike duplicate samples at a frequency of one MS and MSD per 20 samples of similar matrix. MS and MSD recoveries and relative percent differences between MS and MSD recoveries should be within the specified limits.

Criteria: Perchlorate: 80-120%; 15%RPD

- For the MS/MSD analyses, sample WBGSW16 (407108-010) was used for perchlorate. All criteria were met. No qualifiers were applied.

VI-Calculation Verification
The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. The following calculations were performed for verification:

Perchlorate Sample: WBGSW16MS (407108-010MS)

y (peak area μS*min) = m * x (μg/L) + b

where: x = concentration μg/L

m = 0.0096 b = 0.00

0.180444 = 0.0096 (X μg/L) + 0.00

X (μg/L) = 18.8 μg/L

Reported value = 18.8 μg/L

% Difference = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – PAHs
GPL Laboratories, Inc., SDG 407137

DATE: August 30, 2004

The purpose of this memorandum is to present the data validation report for the samples collected for the New River WI at the RFAAP on July 20, 2004. Samples were analyzed for polynuclear aromatic hydrocarbons (PAHs) using USEPA SW846 Methods 3550B/8270C low level. A total of nine soil samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
DTSB85A	407137-006	DTSB87A	407137-012
DTSB81A	407137-007	DTSB86A	407137-013
DTSB82A	407137-008	DTSB88A	407137-014
DTSB83A	407137-010	DTSB80A	407137-015
DTSB84A	407137-011		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements*, method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times
	X	Instrument Performance Check
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	Surrogate Spikes
	X	Internal Standards
	X	Laboratory Control Standard
X		Matrix Spike/Spike Duplicate
	X	Field Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

_____ _____

Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
POLYNUCLEAR AROMATIC HYDROCARBONS REVIEW
SDG 407137

I-Holding Times
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For polynuclear aromatic hydrocarbons (PAHs) soil samples cooled @ 4°C ± 2°C; the maximum holding time is the maximum holding time is 14 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For samples collected on 07/20/04, cooler was received by the laboratory at 4.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The soil samples were collected on 07/20/04, extracted on 07/21/04, and analyzed for PAHs on 07/21/04. The actual extraction and analysis dates for each sample may be found on the attached form 1s to this report. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check
GC/MS instrument performance checks are performed to ensure mass resolution, identification and, to some degree, sensitivity. The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, decafluorotriphenylphosphine (DFTPP), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for PAH compounds by GC/MS low level. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.99. The minimum relative response factor (RRF) criteria must be ≥ 0.05. Initial calibration percent relative standard deviation (%RSD) must be ≤ 15% on the average for all compounds (< 30% for CCCs). All detects are qualified as estimated “J” for where there were exceeding %RSDs, and all non-detects are qualified as estimated “UJ” for where there were grossly exceeding recoveries, unless determined to be unusable “R”. Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated “J” and non-detects are rejected “R”.

- Initial calibration for the PAHs by USEPA SW-846 8270C low level was performed on 07/19/04 on instrument GC/MS-P. All RRFs were ≥ 0.05. All criteria were met. No qualifiers were applied. Samples DTSB85A (407137-006), DTSB81A (407137-007), DTSB82A (407137-008), DTSB83A (407137-010), DTSB84A (407137-011), DTSB87A (407137-012), DTSB86A (407137-013), DTSB88A (407137-014), and DTSB80A (407137-015) apply to this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Continuing calibration standards containing both target and surrogates compounds are analyzed at the beginning of each 12-hour analysis period following the analysis of the instrument performance check and prior to the analysis of blanks and samples. The minimum relative response factors (RRF) for semivolatile target compounds and surrogates must be $\geq$ 0.05. The percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within $\pm$ 20% for all target compounds. Grossly exceeding is defined where %D>40%. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For continuing calibration for the PAHs by USEPA SW-846 8270C low level performed on 07/21/04 @16:05 on instrument GC/MS-P, all target compounds were within criteria. No qualifiers were applied. Samples DTSB85A (407137-006), DTSB81A (407137-007), DTSB82A (407137-008), DTSB83A (407137-010), DTSB84A (407137-011), DTSB87A (407137-012), DTSB86A (407137-013), DTSB88A (407137-014), and DTSB80A (407137-015) apply to this continuing calibration.

V-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. A method blank analysis must be performed after the calibration standards and once every 12-hour time period beginning with the injection of DFTPP. No contaminants should be detected in any of the associated blanks > the MDL. USACE Shell criteria specifies all concentrations should be less than one-half MRL (<MRL for common laboratory contaminants phthalate esters). Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is $\leq$ 10 times (10x) the maximum amount in any blank for the common laboratory contaminants phthalate esters, or 5 times (5X) the maximum amount for other semivolatile target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one, 100% solids, and were converted to soil values (soil conversion factor = 33). Rinse blanks 071304R1 (407077-001) and 071304R2 (407077-002) apply to the surface soil samples ("A" fraction samples) and was analyzed in SDG 0407077. Rinse blank 072004R2 (407140-001) applies to the subsurface soil samples ("B" fraction samples) and was analyzed in SDG 0407140.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/kg	Action Level µg/kg	B qualified samples
07/21/04	BLK67842	All compounds < MRL	NA	NA	None
07/20/04	071304R1	All compounds < MRL	NA	NA	None
07/20/04	071304R2	All compounds < MRL	NA	NA	None
07/26/04	072004R2	All compounds < MRL	NA	NA	None

VI-Surrogate Spikes

Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Surrogate spikes are added to all samples and blanks to measure their recovery in sample and blank matrices. The percent recoveries (%Rs) must be within the specified control limits.

Criteria: Nitrobenzene-d5 (29-140%) – S1 (USACE Shell Criteria: 45-135%)
2-Fluorobiphenyl (31-125%) – S2 (USACE Shell Criteria: 45-135%)
Terphenyl – d14 (26-160%) – S3 (USACE Shell Criteria: 45-135%)

- All criteria were met. No qualifiers were applied.

VII-Internal Standards
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Internal standard area counts for samples and blanks must not vary by more than a factor of two (- 50% to + 100%) from the associated calibration standard. The retention time of the internal standards in samples and blanks must not vary by more than ± 30 seconds from the retention time of the associated calibration standard.

- All criteria were met. No qualifiers were applied.

VIII-Laboratory Control Samples
Laboratory control samples (LCS) are used to monitor laboratory accuracy by calculating the percent recoveries of the spiked compounds. All LCS percent recoveries must be within the specified control limits. USACE Shell limits for PAHs by 8270C low level are 45-135% (25-150% for sporadic marginal failures (SMF)).

- Sample BKS67842 was used as the LCS for PAHs by USEPA SW-846 8270C low level analyzed 07/21/04. All criteria were met. No qualifiers were applied. Samples DTSB85A (407137-006), DTSB81A (407137-007), DTSB82A (407137-008), DTSB83A (407137-010), DTSB84A (407137-011), DTSB87A (407137-012), DTSB86A (407137-013), DTSB88A (407137-014), and DTSB80A (407137-015) apply to this LCS.

IX-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. USACE Shell limits are 45-135%; RPD ≤ 60% (15-150%; RPD ≤ 60% for sporadic marginal failures (SMF)).

- Sample DTSB80A (407137-015) was used for the MS/MSD analysis for PAHs. Compounds benzo(a)anthracene (148%, 158%), benzo(a)pyrene (143%, 153%), benzo(b)fluoranthene (155%, 170%), benzo(k)fluoroanthene (141%, 141%), chrysene (133%, 148%), dibenz(a,h)anthracene (125%), fluoranthene (210%, 225%), indeno(1,2,3-cd)pyrene (132%, 127%), phenanthrene (159%, 174%), and pyrene (153%, 173%) were outside USACE and/or lab criteria. The high recoveries were due to large amount of organic compounds detected in the spiked sample. All detects were qualified “K” estimated high for the spiked sample and non-detects no qualifier for the noted compounds based upon these outliers.

X-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the soil samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No field soil sample duplicate pair was analyzed in this SDG.

XI-Quantitation Verification

The accuracy of analytical results was verified through the calculation of several parameters. Percent difference (%D) between the calculated and reported values must be ≤10%. Any sample value > MDL and < MRL or < 3*MDL (whichever is greater) was qualified as estimated, "J." Any tentatively identified compounds found were qualified as estimated "J".

Sample: DTSB81A (407137-007), pyrene

Conc. μg/kg = (Ax * Is * Vt * DF) / (Ais * RRF * Vi * Ws * D)

where:
- Conc. = Sample concentration in μg/kg
- Ax = Area of characteristic ion for compound being measured.
- Is = Amount of internal standard injected (ng).
- Vt = Volume of total extract (μL).
- Ais = Area of characteristic ion for the internal standard.
- RRF = Average relative response factor for compound being measured (from ICAL)
- Vi = Volume of extract injected (μL).
- W(s) = Weight of sample extracted or diluted in grams.
- D = Percent dry weight (100 - % moisture in sample)/100
- DF = Dilution factor

Conc. μg/kg = (3452582 * 4 * 1000 * 1) / (2616129 * 1.503 * 1 * 30 * 0.7346) = 160 μg/kg
Reported Value = 160 μg/kg
% Difference = 0.0%
Values were within 10% difference

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – TAL Metals
GPL Laboratories, Inc., SDG 407138

DATE: November 11, 2004

The purpose of this memorandum is to present the data validation report for the samples collected for the New River Unit WI at the RFAAP on July 20, 2004. Samples were analyzed for target analyte list (TAL) metals using USEPA SW-846 3050B/6010B for ICP metals and USEPA SW-846 7471A for mercury. A total of fifteen soil samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
NBGSB20A	407138-001	NBGSB21D	407138-009
NBGSB20B	407138-002	NBGSB22A	407138-010
NBGSB20C	407138-003	NBGSB22B	407138-011
TMSB20C	407138-004	TMSB22B	407138-012
NBGSB20D	407138-005	NBGSB25B	407138-013
NBGSB21A	407138-006	NBGSB25C	407138-014
NBGSB21B	407138-007	NBGSB25D	407138-015
NBGSB21C	407138-008		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements* (USACE, February 2001), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Inorganic Data Review* (April, 1993). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times and Preservation
X		Initial and Continuing Calibration
X		Blank Analysis
	X	ICP Interference Check Sample (ICS)
	X	Laboratory Control Sample (LCS)
X		Lab Sample Duplicate
	X	Matrix Spike
	X	ICP Serial Dilution
	X	Field Sample Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

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Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
TAL METALS REVIEW
SDG 407138

I-Holding Times and Preservation

The primary objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample analysis. The soil samples are received and stored cool @4 °C ± 2 °C, with a maximum holding time of 180 days for ICP metals and 28 days for mercury from collection (USEPA criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For samples collected on 07/20/04, cooler was received by the laboratory at 4.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: Samples were collected 07/20/04. They were digested on 07/26/04 and analyzed for ICP metals on 08/05/04 and 08/06/04. Samples were digested on 08/03/04 for mercury and were analyzed for mercury on 08/04/04. All holding time criteria were met. No qualifiers were applied.

II-Initial and Continuing Calibration

Requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of the analysis run, and continuing calibration verification documents that the initial calibration is still valid.

ICP:	1- blank (USACE <MDL)	Hg:	1 – blank (USACE <MDL)
	3 – standards (r≥0.995)		5 – standards (r≥0.995)
	ICV/CCV (90-110%) (USACE 90-110%)		ICV/CCV (80-120%) (USACE ICV 90-110% / CCV 80-120%)
	MRL (70-130%) (USACE 80-120%)		MRL (80-120%)

- The samples were analyzed for ICP metals on 08/05/04 and 08/06/04. Mercury was analyzed on 08/04/04 with a correlation coefficient of 0.9998. All ICV/CCV standards were within criteria. No qualifiers were applied. **Table 2** summarizes the MRL standard analysis for metals. Samples with concentrations detected less than two times the MRL with out of criteria MRL recovery were qualified.

Table 2 MRL Analysis Summary

Analysis Date	Analysis	MRL (µg/L)	MRL (mg/kg)	MRL %Recovery	Qualified samples @ <2xMRL	Validation Qualifiers
08/05/04	ICP-Ag	3.0	0.3	138%	NBGSB21D	K
08/04/04	Hg	0.2	0.033	All within criteria	None	None

III-Blanks

Blanks (preparation and calibration blanks) are assessed to determine the existence and magnitude of contamination problems. No contaminants should be detected (i.e. <MDL) in any of the associated blanks. USACE Shell limits are < ½MRL for the method blank. Samples are qualified "B" when they are less than 5X the absolute value of the maximum blank concentration. **Table 3** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one, 100% solids, and were converted to soil values (soil conversion factors = 10 for ICP; 6 for Hg). The rinse blank breakout is as follows.

- Rinse blank 072004R3 applies to the northern burning ground ("NBG" prefix samples) surface soil ("A" suffix samples) and sediment ("SD") samples and was analyzed in SDG 0407135.

- Rinse blank 072004R1 applies to the northern burning ground ("NBG" prefix samples) subsurface soil samples ("B→D" suffix samples) and was analyzed in SDG 0407135.

Table 3 Blank Contamination Analysis Summary

Analysis Date	Analysis	QC Blank ID	Max Conc. mg/kg	Action Level mg/kg	B qualified samples
08/05/04	ICP-Al	ICB/CCBs	6.1B	30.5	None
08/05/04	ICP-Ba	ICB/CCBs	0.03B	0.15	None
08/05/04	ICP-Be	ICB/CCBs	0.02B	0.10	None
08/05/04	ICP-Cr	ICB/CCBs	0.07B	0.35	None
08/05/04	ICP-Pb	ICB/CCBs	0.37B	1.9	None
08/05/04	ICP-Mg	ICB/CCBs	7.44B	37.2	None
08/05/04	ICP-Mn	ICB/CCBs	0.04B	0.20	None
08/05/04	ICP-K	ICB/CCBs	3.34B	16.7	None
08/05/04	ICP-Na	ICB/CCBs	54.7B	274	NBGSB20A, NBGSB20B, NBGSB20C, TMSB20C, NBGSB20D, NBGSB21A, NBGSB21B, NBGSB21D, NBGSB22A, NBGSB22B, TMSB22B, NBGSB25B, NBGSB25C, NBGSB25D
08/05/04	ICP-V	ICB/CCBs	0.17B	0.85	None
08/05/04	ICP-Tl	ICB/CCBs	0.053B	0.27	None
08/05/04	Hg	ICB/CCBs	<MRL	NA	None
08/05/04	ICP-Ba	PBS	0.055B	0.28	None
08/05/04	ICP-Ca	PBS	14.2B	71.0	None
08/05/04	ICP-Cr	PBS	0.10B	0.50	None
08/05/04	ICP-Cu	PBS	0.14B	0.70	None
08/05/04	ICP-Mg	PBS	2.2B	11.0	None
08/05/04	ICP-Mn	PBS	0.23B	1.2	None
08/05/04	ICP-Ni	PBS	0.27B	1.4	None
08/05/04	ICP-K	PBS	3.5B	17.5	None
08/05/04	ICP-Na	PBS	7.56B	37.8	NBGSB20A, TMSB20C, NBGSB20D
08/04/04	Hg	PBS	<MRL	NA	None
08/05/04	ICP-Al	072004R3	2.51BN	12.6	None
08/05/04	ICP-Sb	072004R3	0.49B	2.45	NBGSB22A
08/05/04	ICP-Ca	072004R3	7.83B	39.2	None
08/05/04	ICP-Cr	072004R3	0.11B	0.55	None
08/05/04	ICP-Co	072004R3	0.064B	0.32	None
08/05/04	ICP-Pb	072004R3	0.18B	0.90	None
08/05/04	ICP-Mg	072004R3	1.42B	7.1	None
08/05/04	ICP-Mn	072004R3	0.16B	0.80	None
08/05/04	ICP-Ag	072004R3	0.073B	0.37	None
08/05/04	ICP-Na	072004R3	49.9B	250	NBGSB20A, NBGSB21A, NBGSB22A
08/05/04	Hg	072004R3	<MRL	NA	None
08/05/04	ICP-Ba	072004R1	0.042B	0.21	None
08/05/04	ICP-Ca	072004R1	10.8B	54.0	None
08/05/04	ICP-Cr	072004R1	0.12B	0.60	None
08/05/04	ICP-Mg	072004R1	2.61B	13.1	None
08/05/04	ICP-Mn	072004R1	0.18B	0.90	None
08/05/04	ICP-Ag	072004R1	0.12B	0.60	NBGSB21D
08/05/04	ICP-Na	072004R1	37.3B	189	NBGSB20B, NBGSB20C, TMSB20C, NBGSB20D, NBGSB21B, NBGSB21D, NBGSB22B, TMSB22B, NBGSB25B, NBGSB25C, NBGSB25D
08/05/04	ICP-V	072004R1	0.089B	0.45	None
08/05/04	Hg	072004R1	<MRL	NA	None

B = Value is estimated <MRL and >MDL.
N = Laboratory spike sample recovery not within control limits.

IV-ICP Interference Check Sample (ICS)

The ICP interference check sample (ICS) verifies interelement and background correction factors. ICP Interference Check is performed at the beginning and end of each sample analysis run. Control limits are 80-120% (USACE limits 80-120%).

- All criteria were met. No qualifiers were applied.

V-Laboratory Control Samples (LCS)
The laboratory control sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. All soil LCS results must fall within the control limits of 80-120% for ICP metals and mercury. USACE Shell limits for metals are 80-120% (60-140% for sporadic marginal failures (SMF)).

- Sample BKS67924 was used as LCS for ICP metals analysis. All criteria were met. No qualifiers were applied.

- Sample BKS68062 was used as LCS for total mercury analysis. All criteria were met. No qualifiers were applied.

VI-Duplicate Sample Analysis
Duplicate sample determinations are used to demonstrate acceptable method precision by the laboratory at the time of analysis. Duplicate analysis generate data in order to determine the long-term precision of the analytical method on various matrices. RPDs must be within established control limits. USACE Shell limits for metals are 25% RPD for ICP metals and 20% RPD for mercury.

- Sample NBGSB20A (407138-001) was used as sample duplicate for ICP metals analysis. Antimony (200%), magnesium (44.8%), and thallium (44.4%) were outside criteria. Antimony and thallium were outside criteria due to low sample concentrations, therefore no qualifiers were applied based upon these outliers. Magnesium was qualified as estimated “J” for detects based upon the high RPD.

- Sample NBGSB20A (407138-001) was used as sample duplicate for mercury analysis. All criteria were met. No qualifiers were applied.

VII-Matrix Spike
MS are generated to determine long-term accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. Specific criteria include the analyses of matrix spike and matrix spike duplicate samples at a frequency of one MS per 20 samples of similar matrix. MS recoveries and relative percent differences between MS recoveries should be within the specified limits. USACE Shell limits for metals are 75-125% for ICP metals and 80-120% for mercury. Post digestion spikes limits are 75-125% for ICP metals and 85-115% for mercury.

- Sample NBGSB20A (407138-001) was used for the MS analysis for ICP analysis. Aluminum (991%), antimony (55.6%), calcium (455%), chromium (0%), iron (271%), lead (1134%), magnesium (246%), and potassium (131%) were outside of control limits. Post digestion spikes were within criteria for antimony and potassium. The sample concentration was >4 times the spike added for aluminum, calcium, chromium, iron, lead, and magnesium, therefore no qualifiers were applied based upon this outlier. For antimony, the spiked sample was qualified bias low non-detect “UL” based upon the low recovery. For potassium, the spiked sample was qualified bias high “K” based upon the high recovery.

- Sample NBGSB20A (407138-001) was used for the MS analysis for mercury analysis. All criteria were met. No qualifiers were applied.

VIII-ICP Serial Dilution

An ICP serial dilution is performed to determine whether significant physical or chemical interferences exist due to sample matrix at high concentrations. An analysis of a 5-fold dilution should agree within 10% difference of the original result when the concentration in sample is a factor of 50 above MDL.

- The serial dilution for the ICP was analyzed for sample NBGSB20A (407138-001). Arsenic (100%), beryllium (11.3%), sodium (100%), and thallium (100%) were outside of criteria limits. Sample concentrations were <50 times MDL for arsenic, beryllium, sodium, and thallium, therefore no qualifiers were applied based upon these outliers.

IX-Field Duplicate Sample Analysis

Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the solid samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field soil sample duplicate pair NBGSB20C (407138-003) and TMSB20C (407138-004) was collected. The field duplicate evaluation is noted in **Table 4.** If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. All criteria were met. No qualifiers were applied.

Table 4 Field Duplicate Analysis Summary

Sample ID	Lab ID	Compound	Original Result (mg/kg)	Duplicate Result (mg/kg)	%RPD	Qualifier
NBGSB20C	407138-003	Aluminum	51400	56300	9.1	None
NBGSB20C	407138-003	Antimony	0.82 BN	0.66 UN	NA	None
NBGSB20C	407138-003	Arsenic	16.1	15.7	2.5	None
NBGSB20C	407138-003	Barium	22.8	23.9	4.7	None
NBGSB20C	407138-003	Beryllium	0.72	0.74	2.7	None
NBGSB20C	407138-003	Cadmium	0.78	0.65 B	18.2	None
NBGSB20C	407138-003	Calcium	277 *	453 *	48.2	None
NBGSB20C	407138-003	Chromium	54.8	60.8	10.4	None
NBGSB20C	407138-003	Cobalt	6.8	5.9	14.2	None
NBGSB20C	407138-003	Copper	30.8	28.6	7.4	None
NBGSB20C	407138-003	Iron	55200	58400	5.6	None
NBGSB20C	407138-003	Lead	34.0	33.3	2.1	None
NBGSB20C	407138-003	Magnesium	755 *	836 *	10.2	None
NBGSB20C	407138-003	Manganese	135	125	7.7	None
NBGSB20C	407138-003	Nickel	24.2	22.3	8.2	None
NBGSB20C	407138-003	Potassium	1250 N*	1260 N*	0.8	None
NBGSB20C	407138-003	Selenium	1.3 B	1.9 B	37.5	None
NBGSB20C	407138-003	Sodium	72.1 B	76.8 B	6.3	None
NBGSB20C	407138-003	Vanadium	103	109	5.7	None
NBGSB20C	407138-003	Zinc	31.9	32.9	3.1	None
NBGSB20C	407138-003	Mercury	0.16	0.23	35.9	None

B = Estimated value <MRL and >MDL.
N = Laboratory spike sample recovery not within control limits.
* = Laboratory duplicate not within control limits.
U = Value non-detect at MDL.
NA = Not Applicable

- Field soil sample duplicate pair NBGSB22B (407138-011) and TMSB22B (407138-012) was collected. The field duplicate evaluation is noted in **Table 5.** If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. All criteria were met. No qualifiers were applied.

Table 5 Field Duplicate Analysis Summary

Sample ID	Lab ID	Compound	Original Result (mg/kg)	Duplicate Result (mg/kg)	%RPD	Qualifier
NBGSB22B	407138-011	Aluminum	13700	15100	9.7	None
NBGSB22B	407138-011	Antimony	0.37 BN	0.27 BN	31.3	None
NBGSB22B	407138-011	Arsenic	4.1	3.7	10.3	None
NBGSB22B	407138-011	Barium	25.9	27.1	4.5	None
NBGSB22B	407138-011	Beryllium	0.29	0.30	3.4	None
NBGSB22B	407138-011	Cadmium	0.19 B	0.19 B	0.0	None
NBGSB22B	407138-011	Calcium	820 *	891 *	8.3	None
NBGSB22B	407138-011	Chromium	23.0	18.0	24.4	None
NBGSB22B	407138-011	Cobalt	4.1	3.1	27.8	None
NBGSB22B	407138-011	Copper	4.0	4.7	16.1	None
NBGSB22B	407138-011	Iron	16700	16700	0.0	None
NBGSB22B	407138-011	Lead	27.6	16.6	49.8	None
NBGSB22B	407138-011	Magnesium	575 *	580 *	0.9	None
NBGSB22B	407138-011	Manganese	182	167	8.6	None
NBGSB22B	407138-011	Nickel	4.2	5.2	21.3	None
NBGSB22B	407138-011	Potassium	514 N*	535 N*	4.0	None
NBGSB22B	407138-011	Selenium	0.68 B	0.71 B	4.3	None
NBGSB22B	407138-011	Sodium	73.7 B	57.6 B	24.5	None
NBGSB22B	407138-011	Vanadium	35.3	33.6	4.9	None
NBGSB22B	407138-011	Zinc	14.2	12.3	14.3	None
NBGSB22B	407138-011	Mercury	0.039	0.028 B	32.8	None

B = Estimated value <MRL and >MDL.
N = Laboratory spike sample recovery not within control limits.
* = Laboratory duplicate not within control limits.

X-Quantitation Verification

The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value > MDL and < MRL or < 3*MDL (whichever was greater) was qualified as estimated, “J.” The following calculations were performed for verification.

ICP Sample: NBGSB20A (407138-001), Total Barium

Conc. (mg/kg) = {(conc. μg/L)*(Final Volume L)*(DF)} / {(Weight Sample g)*(Fraction Solids)}

Conc. (mg/kg) = {(919.4396 μg/L)*(0.100 L)*(1)} / {(1.21 g)*(0.8388)} = 90.6 μg/g = 90.6 mg/kg

Reported concentration = 90.6 mg/kg
%D = 0.0%
Values were within 10% difference.

CVAA Sample: NBGSB20A (407138-001), Total Mercury

Conc. (mg/kg) = {(conc. μg/L)*(Final Volume L)*(DF)} / {(Weight Sample g)*(Fraction Solids)}

Conc. (mg/kg) = {(0.270 μg/L)*(0.100 L)*(1)} / {(0.72 g)*(0.8388)} = 0.045 μg/g = 0.045 mg/kg

Reported concentration = 0.045 mg/kg
%D = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – PCBs
GPL Laboratories, Inc., SDG 407138

DATE: November 12, 2004

The purpose of this memorandum is to present the data validation report for the samples collected for the New River WI at the RFAAP on July 20, 2004. Samples were analyzed for PCBs using USEPA Method 3540C/8082. A total of fifteen soil samples were analyzed and validated for PCBs. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
NBGSB20A	407138-001	NBGSB21D	407138-009
NBGSB20B	407138-002	NBGSB22A	407138-010
NBGSB20C	407138-003	NBGSB22B	407138-011
TMSB20C	407138-004	TMSB22B	407138-012
NBGSB20D	407138-005	NBGSB25B	407138-013
NBGSB21A	407138-006	NBGSB25C	407138-014
NBGSB21B	407138-007	NBGSB25D	407138-015
NBGSB21C	407138-008		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements* (USACE, February 2001), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (USEPA, September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	System Monitoring Compounds
	X	Laboratory Control Samples
	X	Matrix Spike/Spike Duplicate
	X	Field Sample Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable.

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Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
PCB REVIEW
SDG 407138

I-Holding Times

The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For PCB soil samples, cooled @4°C ±2°C, the maximum holding time is 14 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis (USEPA criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For samples collected on 07/20/04, cooler was received by the laboratory at 4.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The samples were collected 07/20/04 for PCB compounds. They were extracted on 07/23/04 and analyzed for PCBs on 07/27/04 and 07/31/04 within criteria guidelines. The actual extraction and analysis dates for each sample may be found on the attached form 1s to this report. No qualifiers were applied.

II-Initial Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. The initial 5-point calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run. The percent relative standard deviation (%RSD) for all single peak target analytes, and aroclors 1016 and 1260 must be $< 20\%$ or the mean %RSD for all analytes in the standard must be $\leq 20\%$. If linear regression is used, the correlation coefficient must be ≥ 0.990 (USEPA and USACE criteria).

- For the PCB initial calibration performed on 06/29/04 on instrument GC-L, all compounds were determined using calibration factors for PCB 1016 and PCB 1260. All criteria were met, except for the following. For PCB 1260 signal #2, PCB 1260 #1 (22.1%) and PCB 1260 #5 (22.7%) were above criteria limits. The average %RSD for PCB 1260 for signal #2 (20.0%) was within criteria. All associated samples were non-detect for PCB 1260. No qualifiers were applied based upon these outliers. Samples NBGSB20A (407138-001), NBGSB20B (407138-002), NBGSB20C (407138-003), TMSB20C (407138-004), NBGSB20D (407138-005), NBGSB21B (407138-007), NBGSB21D (407138-009), NBGSB22B (407138-011), TMSB22B (407138-012), NBGSB25B (407138-013), NBGSB25C (407138-014), and NBGSB25D (407138-015) apply to this initial calibration.

- For the PCB initial calibration performed on 07/29/04 on instrument GC-L, all compounds were determined using calibration factors for PCB 1016 and PCB 1260. All criteria were met, except for the following. For PCB 1260 signal #2, PCB 1260 #1 (20.7%), PCB 1260 #2 (21.5%), and PCB 1260 #5 (21.8%) were above criteria limits. The average %RSD for PCB 1260 for signal #2 (20.4%) was within criteria. All associated samples were non-detect for PCB 1260. No qualifiers were applied based upon these outliers. Samples NBGSB21A (407138-006), NBGSB21C (407138-008), and NBGSB22A (407138-010) apply to this initial calibration.

III-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for PCB target compounds. Continuing calibration standards containing both target compounds and surrogates are analyzed at the beginning of each 12-hour analytical shift and after every 20 samples. The percent difference (%D) or the mean %RSD for all analytes in the standard from the initial calibration should be no greater than ± 15%.

- For PCB continuing calibration performed on 07/27/04 @03:01 on instrument GC-L, the following %Ds were determined. For column #1, arochlor 1016 #2 (16.5%) and arochlor 1016 #5 (16.5%) were outside criteria. The average of the peaks for arochlor 1016 (12.2%) was within criteria and all samples were non-detect. No qualifiers were applied based upon these outliers. Arochlor 1260 was within criteria. For column #2, arochlor 1016 and arochlor 1260 were within criteria. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For PCB continuing calibration performed on 07/27/04 @09:17 on instrument GC-L, the following %Ds were determined. For column #1, arochlor 1016 #3 (17.1%) and arochlor 1016 #5 (33.1%) were outside criteria. The average of the peaks for arochlor 1016 (12.7%) was within criteria and all samples were non-detect. No qualifiers were applied based upon this outlier. For column #1, arochlor 1260 #2 (17.1%) and arochlor 1260 #3 (16.4%) were outside criteria. The average of the peaks for arochlor 1260 (12.9%) was within criteria and all samples were non-detect. No qualifiers were applied based upon these outliers. For column #2, arochlor 1016 #4 (34.6%) was outside criteria. The average of the peaks for arochlor 1016 (11.5%) was within criteria and all samples were non-detect. For column #2, arochlor 1260 was within criteria. No qualifiers were applied. Samples NBGSB20B (407138-002), NBGSB20C (407138-003), TMSB20C (407138-004), NBGSB20D (407138-005), NBGSB21B (407138-007), NBGSB21D (407138-009), and NBGSB22B (407138-011) apply to this continuing calibration.

- For PCB continuing calibration performed on 07/27/04 @15:34 on instrument GC-L, the following %Ds were determined. For column #1, arochlor 1016 #2 (26.5%), arochlor 1016 #3 (22.2%), and arochlor 1016 #5 (27.5%) were outside criteria. The average of the peaks for arochlor 1016 (19.3%) was outside criteria, however all samples were non-detect for arochlor 1016. No qualifiers were applied based upon this outlier. For column #1, arochlor 1260 #2 (15.2%) and arochlor 1260 #3 (17.2%) were outside criteria. The average of the peaks for arochlor 1260 (13.5%) was within criteria and all samples were non-detect. No qualifiers were applied based upon these outliers. For column #2, arochlor 1016 and arochlor 1260 were within criteria. No qualifiers were applied. Samples TMSB22B (407138-012), NBGSB25B (407138-013), NBGSB25C (407138-014), and NBGSB25D (407138-015) apply to this continuing calibration.

- For PCB continuing calibration performed on 07/27/04 @18:28 on instrument GC-L, the following %Ds were determined. For column #1, arochlor 1016 #2 (20.8%), arochlor 1016 #3 (20.6%), arochlor 1016 #4 (15.9%), and arochlor 1016 #5 (33.6%) were outside criteria. The average of the peaks for arochlor 1016 (18.7%) was outside criteria, however all samples were non-detect for arochlor 1016. No qualifiers were applied based upon this outlier. For column #1, arochlor 1260 #2 (15.3%) was outside criteria. The average of the peaks for arochlor 1260 (12.7%) was within criteria and all samples were non-detect. No qualifiers were applied based upon these outliers. For column #2, arochlor 1016 and arochlor 1260 were within criteria. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For PCB continuing calibration performed on 07/31/04 @10:39 on instrument GC-L, the following %Ds were determined. For column #1, arochlor 1221 #2 (15.3%) was outside criteria. The average of the peaks for arochlor 1221 (6.2%) was within criteria and all samples were non-detect. No qualifiers were applied based upon these outliers. Arochlor 1254 was within criteria. For column #2, arochlor 1221 and arochlor 1254 were within criteria. No qualifiers were applied. Samples NBGSB20A (407138-001), NBGSB21A (407138-006), and NBGSB21C (407138-008) apply to this continuing calibration.

- For PCB continuing calibration performed on 07/31/04 @15:29 on instrument GC-L, all criteria were met on column #1 and column #2 for all target compounds arochlor 1221 and arochlor 1254. No qualifiers were applied. Sample NBGSB22A (407138-010) applies to his continuing calibration.

IV-Blank Analysis

The purpose of laboratory or field blank analyses is to determine the existence and magnitude of contamination problems resulting from laboratory or field activities. One method blank per analytical batch must be run on each instrument used to analyze samples. No contaminants should be present in the blanks > MDL or MRL (USEPA criteria) or all target compounds < one-half the MRL (USACE criteria). **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one, 100% solids, and were converted to soil values (soil conversion factor = 30). The rinse blank breakout is as follows.

- Rinse blank 072004R3 applies to the northern burning ground ("NBG" prefix samples) surface soil ("A" suffix samples) and NBG sediment ("SD") samples and was analyzed in SDG 0407135.

- Rinse blank 072004R1 applies to the northern burning ground ("NBG" prefix samples) subsurface soil samples ("B→D" suffix samples) and was analyzed in SDG 0407135.

Table 2 Blank Contamination Analysis Summary

Parameter	Analysis Date	QC Blank ID	Compound	Max Conc. µg/kg	Action Level µg/kg	B qualified samples
PCBs	07/27/04	BLK67908	All < MRL	NA	NA	None
PCBs	07/28/04	072004R3	All < MRL	NA	NA	None
PCBs	07/28/04	072004R1	All < MRL	NA	NA	None

V-System Monitoring Compound (Surrogates)

Laboratory performance on individual samples is established by means of spiking activities. The percent recovery (%R) for all samples and blanks must be within the specified laboratory control limits.

Criteria: Decachlorobiphenyl: PCBs: 47-161% (USACE criteria 50-130%)
Tetrachloro-m-xylene: PCBs: 54-168% (USACE criteria 50-130%)

- For PCB analysis for sample NBGSB21A (407138-006), surrogate tetrachloro-m-xylene (142% 135%) was outside USACE and/or lab criteria due to sample dilution effects. Since surrogate decachlorobiphenyl was within criteria and the sample (surrogate) was diluted, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample NBGSB22A (407138-010), surrogate tetrachloro-m-xylene (179%) was outside USACE and/or lab criteria due to sample dilution effects. Since surrogate decachlorobiphenyl was within criteria and the sample (surrogate) was diluted, no qualifiers were applied based upon this outlier.

- For all other samples, all criteria were met. No qualifiers were applied.

VI-Laboratory Control Samples
Laboratory control samples (LCS) are used to monitor long-term precision and accuracy of the analytical method. The analysis is performed at a frequency of 1 per analytical batch. The percent recoveries (%Rs) must be within the specified control limits. USACE Shell limits for PCBs are 50-130% (30-150% for sporadic marginal failures (SMF)).

- Sample BKS67908 was used for the LCS for PCBs. All criteria were met. No qualifiers were applied. Samples NBGSB20A (407138-001), NBGSB20B (407138-002), NBGSB20C (407138-003), TMSB20C (407138-004), NBGSB20D (407138-005), NBGSB21A (407138-006), NBGSB21B (407138-007), NBGSB21C (407138-008), NBGSB21D (407138-009), NBGSB22A (407138-010), NBGSB22B (407138-011), TMSB22B (407138-012), NBGSB25B (407138-013), NBGSB25C (407138-014), and NBGSB25D (407138-015) apply to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. USACE Shell limits for PCBs are 40-140%; RPD<50%.

- Sample NBGSB20A (407138-001) was used for the MS/MSD analysis for PCB compounds. PCB 1016 (142%) was outside USACE and/or lab criteria. All RPDs and LCS recoveries were within criteria. Since all samples were non-detect for this PCB, no qualifiers were applied based upon this outlier.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. The project precision control criterion was established at 50% RPD for the solid samples.

- Field soil sample duplicate pair NBGSB20C (407138-003) and TMSB20C (407138-004) was collected. The field duplicate evaluation is noted in **Table 3**. For where the duplicate pair was diluted due to high compound concentrations, was used in this assessment. If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. All criteria were met. No qualifiers were applied.

Table 3 Field Duplicate Analysis Summary NBGSB20C (407138-003) and TMSB20C (407138-004)

Sample ID	Lab ID	Compound	Original Result (µg/kg)	Duplicate Result (µg/kg)	%RPD	Qualifier
NBGSB20C	407138-003	All PCBs <MRL	NA	NA	NA	None

NA = Not Applicable

- Field soil sample duplicate pair NBGSB22B (407138-011) and TMSB22B (407138-012) was collected. The field duplicate evaluation is noted in **Table 4**. For where the duplicate pair was diluted due to high compound concentrations, was used in this assessment. If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. All criteria were met. No qualifiers were applied.

Table 4 Field Duplicate Analysis Summary NBGSB22B (407138-011) and TMSB22B (407138-012)

Sample ID	Lab ID	Compound	Original Result (μg/kg)	Duplicate Result (μg/kg)	%RPD	Qualifier
NBGSB22B	407138-011	All PCBs <MRL	NA	NA	NA	None

NA = Not Applicable

IX-Quantitation Verification

The accuracy of analytical results was verified through the calculation of several parameters. The difference between the calculated value and the reported value must be within 10% difference. All samples were non-detect for PCBs, therefore the quantification verification not included here. Any sample value > MDL and < MRL or < 3*MDL (whichever is greater) was qualified as estimated, "J." The difference between the primary column and the confirmatory column must be ≤ 40% difference (USEPA and USACE criteria).

- PCB 1254 was detected in samples NBGSB20A (407138-001), NBGSB21A (407138-006), NBGSB21C (407138-008), and NBGSB22A (407138-010). All confirmatory criteria were met. No qualifiers were applied. For all other samples, all PCBs were non-detect.

Sample: NBGSB20A (407138-001), Aroclor 1254

Conc. μg/kg = (Ax * Vt * DF) / (CF * Vi * Ws * D)

where: Conc. = Sample concentration in μg/kg
Ax = Area/response for compound being measured.
Vt = Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10000 μL.
CF = Ave calibration response factor for compound being measured from ICAL (Area/pg)
Vi = Volume of extract injected (mL).
W(s) = Weight of sample extracted or diluted in grams.
D = Percent dry weight (100 - % moisture in sample)/100 = 1.0 for Wet Weight
DF = Dilution factor

Signal #1
Conc1 μg/kg = (92732Area*10000μL*1) / (229.8Area/pg*(1000 pg/ng)*1 μL*30g*0.8388) = 160.36 μg/kg
Conc2 μg/kg = (113862Area*10000μL*1) / (184.7Area/pg*(1000 pg/ng)*1 μL*30g*0.8388) = 244.98 μg/kg
Conc3 μg/kg = (237998Area*10000μL*1) / (398.8Area/pg*(1000 pg/ng)*1 μL*30g*0.8388) = 237.16 μg/kg
Conc4 μg/kg = (154126Area*10000μL*1) / (273.2Area/pg*(1000 pg/ng)*1 μL*30g*0.8388) = 224.19 μg/kg
Conc5 μg/kg = (302458Area*10000μL*1) / (440.8Area/pg*(1000 pg/ng)*1 μL*30g*0.8388) = 272.67 μg/kg
Average concentration = 230 μg/kg

Signal #2
Conc1 μg/kg = (610588Area*10000μL*1) / (1332Area/pg*(1000 pg/ng)*1 μL*30g*0.8388) = 182.16 μg/kg
Conc2 μg/kg = (535804Area*10000μL*1) / (856.1Area/pg*(1000 pg/ng)*1 μL*30g*0.8388) = 248.71 μg/kg
Conc3 μg/kg = (1137238Area*10000μL*1) / (1998Area/pg*(1000 pg/ng)*1 μL*30g*0.8388) = 226.19 μg/kg
Conc4 μg/kg = (567384Area*10000μL*1) / (1142Area/pg*(1000 pg/ng)*1 μL*30g*0.8388) = 197.44 μg/kg
Conc5 μg/kg = (1218878Area*10000μL*1) / (1882Area/pg*(1000 pg/ng)*1 μL*30g*0.8388) = 257.37 μg/kg
Average concentration = 220 μg/kg

Reported Value = 230 μg/kg (signal #1)
% Difference = 0.0%

Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – PAHs
GPL Laboratories, Inc., SDG 407140

DATE: August 31, 2004

The purpose of this memorandum is to present the data validation report for the samples collected for the New River WI at the RFAAP on July 20, 2004. Samples were analyzed for polynuclear aromatic hydrocarbons (PAHs) using USEPA SW846 Methods 3540C/8270C low level. A total of seven soil samples were validated including diluted samples. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
DTSB48B	407140-002DL	DTSB59B	407140-004
DTSB48B	407140-002DL2	DTSB67B	407140-005
DTSB55B	407140-003	DTSB77B	407140-006
DTSB55B	407140-003DL		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements*, method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times
	X	Instrument Performance Check
	X	Initial Calibration
X		Continuing Calibration
	X	Blank Analysis
	X	Surrogate Spikes
	X	Internal Standards
	X	Laboratory Control Standard
X		Matrix Spike/Spike Duplicate
	X	Field Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications, except for the following. For where the sample concentrations exceeded the calibration range (“E” lab flag), the data was qualified “R” rejected. The diluted sample should be used for this case. This was the case for several of the samples.

_____ _____

Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
POLYNUCLEAR AROMATIC HYDROCARBONS REVIEW
SDG 407140

I-Holding Times
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For polynuclear aromatic hydrocarbons (PAHs) soil samples cooled @ 4°C ± 2°C; the maximum holding time is the maximum holding time is 14 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For samples collected on 07/20/04, cooler was received by the laboratory at 4.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The soil samples were collected on 07/20/04, extracted on 07/22/04, and analyzed for PAHs on 07/26/04 and 07/27/04. The actual extraction and analysis dates for each sample may be found on the attached form 1s to this report. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check
GC/MS instrument performance checks are performed to ensure mass resolution, identification and, to some degree, sensitivity. The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, decafluorotriphenylphosphine (DFTPP), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for PAH compounds by GC/MS low level. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.99. The minimum relative response factor (RRF) criteria must be ≥ 0.05. Initial calibration percent relative standard deviation (%RSD) must be ≤ 15% on the average for all compounds (< 30% for CCCs). All detects are qualified as estimated “J” for where there were exceeding %RSDs, and all non-detects are qualified as estimated “UJ” for where there were grossly exceeding recoveries, unless determined to be unusable “R”. Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated “J” and non-detects are rejected “R”.

- Initial calibration for the PAHs by USEPA SW-846 8270C low level was performed on 07/19/04 on instrument GC/MS-P. All RRFs were ≥ 0.05. All criteria were met. No qualifiers were applied. Samples DTSB48B (407140-002DL), DTSB48B (407140-002DL2), DTSB55B (407140-003), DTSB55B (407140-003DL), DTSB59B (407140-004), DTSB67B (407140-005), and DTSB77B (407140-006) apply to this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Continuing calibration standards containing both target and surrogates compounds are analyzed at the beginning of each 12-hour analysis period following the analysis of the instrument performance check and prior to the analysis of blanks and samples. The minimum relative response factors (RRF) for semivolatile target compounds and surrogates must be $\geq$ 0.05. The percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within $\pm$ 20% for all target compounds. Grossly exceeding is defined where %D>40%. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For continuing calibration for the PAHs by USEPA SW-846 8270C low level performed on 07/26/04 @19:11 on instrument GC/MS-P, pyrene (21.8%) was outside criteria limits. For associated samples, all detects were qualified "J" and non-detects no qualifier based upon this outlier. Samples DTSB55B (407140-003), DTSB59B (407140-004), DTSB67B (407140-005), and DTSB77B (407140-006) apply to this continuing calibration.

- For continuing calibration for the PAHs by USEPA SW-846 8270C low level performed on 07/27/04 @13:13 on instrument GC/MS-Ins, all target compounds were within criteria. No qualifiers were applied. Samples DTSB48B (407140-002DL), DTSB48B (407140-002DL2), and DTSB55B (407140-003DL) apply to this continuing calibration.

V-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. A method blank analysis must be performed after the calibration standards and once every 12-hour time period beginning with the injection of DFTPP. No contaminants should be detected in any of the associated blanks > the MDL. USACE Shell criteria specifies all concentrations should be less than one-half MRL (<MRL for common laboratory contaminants phthalate esters). Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is $\leq$ 10 times (10x) the maximum amount in any blank for the common laboratory contaminants phthalate esters, or 5 times (5X) the maximum amount for other semivolatile target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one, 100% solids, and were converted to soil values (soil conversion factor = 33). Rinse blanks 071304R1 (407077-001) and 071304R2 (407077-002) apply to the surface soil samples ("A" fraction samples) and was analyzed in SDG 0407077. Rinse blank 072004R2 (407140-001) applies to the subsurface soil samples ("B" fraction samples) and was analyzed in SDG 0407140.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/kg	Action Level µg/kg	B qualified samples
07/26/04	BLK67933	All compounds < MRL	NA	NA	None
07/20/04	071304R1	All compounds < MRL	NA	NA	None
07/20/04	071304R2	All compounds < MRL	NA	NA	None
07/26/04	072004R2	All compounds < MRL	NA	NA	None

VI-Surrogate Spikes
Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Surrogate spikes are added to all samples and blanks to measure their recovery in sample and blank matrices. The percent recoveries (%Rs) must be within the specified control limits.

Criteria: Nitrobenzene-d5 (29-140%) – S1 (USACE Shell Criteria: 45-135%)
2-Fluorobiphenyl (31-125%) – S2 (USACE Shell Criteria: 45-135%)
Terphenyl – d14 (26-160%) – S3 (USACE Shell Criteria: 45-135%)

- For sample DTSB48B (407140-002DL2), all surrogates were diluted out. No qualifiers were applied based upon these outliers.

- For all other samples, all criteria were met. No qualifiers were applied.

VII-Internal Standards
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Internal standard area counts for samples and blanks must not vary by more than a factor of two (- 50% to + 100%) from the associated calibration standard. The retention time of the internal standards in samples and blanks must not vary by more than $\pm$ 30 seconds from the retention time of the associated calibration standard.

- All criteria were met. No qualifiers were applied.

VIII-Laboratory Control Samples
Laboratory control samples (LCS) are used to monitor laboratory accuracy by calculating the percent recoveries of the spiked compounds. All LCS percent recoveries must be within the specified control limits. USACE Shell limits for PAHs by 8270C low level are 45-135% (25-150% for sporadic marginal failures (SMF)).

- Sample BKS67933 was used as the LCS for PAHs by USEPA SW-846 8270C low level analyzed 07/26/04. All criteria were met. No qualifiers were applied. Samples DTSB48B (407140-002DL), DTSB48B (407140-002DL2), DTSB55B (407140-003), DTSB55B (407140-003DL), DTSB59B (407140-004), DTSB67B (407140-005), and DTSB77B (407140-006) apply to this LCS.

IX-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. USACE Shell limits are 45-135%; RPD $\leq$ 60% (15-150%; RPD $\leq$ 60% for sporadic marginal failures (SMF)).

- Sample WBGSB26A (407108-001) was used for the MS/MSD analysis for PAHs. The spiked sample was reported in SDG 407108. Compounds dibenz(a,h)anthracene (122%), fluoranthene (148%), and indeno(1,2,3-cd)pyrene (118%) were outside USACE and/or lab criteria. The high recoveries were due to large amount of organic compounds detected in the spiked sample. All detects were qualified “K” estimated high for the spiked sample and non-detects no qualifier for the noted compounds based upon these outliers.

X-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the soil samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No field soil sample duplicate pair was analyzed in this SDG.

XI-Quantitation Verification
The accuracy of analytical results was verified through the calculation of several parameters. Percent difference (%D) between the calculated and reported values must be ≤10%. Any sample value > MDL and < MRL or < 3*MDL (whichever is greater) was qualified as estimated, "J." Any tentatively identified compounds found were qualified as estimated "J". For where the sample concentrations exceeded the calibration range ("E" lab flag), the data was qualified "R" rejected. The diluted sample should be used for this case. This was the case for several of the samples.

Sample: DTSB48B (407140-002DL), naphthylene

Conc. μg/kg = (Ax * Is * Vt * DF) / (Ais * RRF * Vi * Ws * D)

where: Conc. = Sample concentration in μg/kg
Ax = Area of characteristic ion for compound being measured.
Is = Amount of internal standard injected (ng).
Vt = Volume of total extract (μL).
Ais = Area of characteristic ion for the internal standard.
RRF = Average relative response factor for compound being measured (from ICAL)
Vi = Volume of extract injected (μL).
W(s) = Weight of sample extracted or diluted in grams.
D = Percent dry weight (100 - % moisture in sample)/100
DF = Dilution factor

Conc. μg/kg = (241216 * 4 * 1000 * 10) / (1124510 * 1.092 * 1 * 30 * 0.8228) = 320 μg/kg
Reported Value = 320 μg/kg
% Difference = 0.0%
Values were within 10% difference

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – PCBs
GPL Laboratories, Inc., SDG 407140

DATE: August 31, 2004

The purpose of this memorandum is to present the data validation report for the samples collected for the New River WI at the RFAAP on July 20, 2004. Samples were analyzed for PCBs using USEPA Methods 3540C/8082. A total of five soil samples were analyzed and validated for PCBs. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
DTSB48B	407140-002	DTSB67B	407140-005
DTSB55B	407140-003	DTSB77B	407140-006
DTSB59B	407140-004		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements* (USACE, February 2001), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (USEPA, September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	System Monitoring Compounds
	X	Laboratory Control Samples
	X	Matrix Spike/Spike Duplicate
	X	Field Sample Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable.

_____ _____

Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
PCB REVIEW
SDG 407140

I-Holding Times
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For PCB soil samples, cooled @4°C ±2°C, the maximum holding time is 14 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis (USEPA criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For samples collected on 07/20/04, cooler was received by the laboratory at 4.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The samples were collected 07/20/04 for PCB compounds. They were extracted on 07/23/04 and analyzed for PCBs on 07/27/04 within criteria guidelines. The actual extraction and analysis dates for each sample may be found on the attached form 1s to this report. No qualifiers were applied for these samples.

II-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. The initial 5-point calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run. The percent relative standard deviation (%RSD) for all single peak target analytes, and aroclors 1016 and 1260 must be $< 20\%$ or the mean %RSD for all analytes in the standard must be $\leq 20\%$. If linear regression is used, the correlation coefficient must be ≥ 0.990 (USEPA and USACE criteria).

- For the PCB initial calibration performed on 06/29/04 on instrument GC-L, all compounds were determined using calibration factors for PCB 1016 and PCB 1260. All criteria were met, except for the following. For PCB 1260 signal #2, PCB 1260 #1 (22.1%) and PCB 1260 #5 (22.7%) were above criteria limits. The average %RSD for PCB 1260 for signal #2 (20.0%) was within criteria. All associated samples were non-detect for PCB 1260. No qualifiers were applied based upon these outliers. Samples DTSB48B (407140-002), DTSB55B (407140-003), DTSB59B (407140-004), DTSB67B (407140-005), and DTSB77B (407140-006) apply to this initial calibration.

III-Continuing Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for PCB target compounds. Continuing calibration standards containing both target compounds and surrogates are analyzed at the beginning of each 12-hour analytical shift and after every 20 samples. The percent difference (%D) or the mean %RSD for all analytes in the standard from the initial calibration should be no greater than $\pm$ 15%.

- For PCB continuing calibration performed on 07/27/04 @03:30 on instrument GC-L, the following %Ds were determined. For column #1, arochlor 1016 #2 (22.1%) and arochlor 1016 #5 (29.0%) were outside criteria. The average of the peaks for arochlor 1016 (16.1%) was outside criteria. All samples were non-detect, therefore no qualifiers were applied based upon these outliers. Arochlor 1260 was within criteria for column #1. For column #2, arochlor 1016 and arochlor 1260 were within criteria. No qualifiers were applied. Samples DTSB48B (407140-002), DTSB55B (407140-003), DTSB59B (407140-004), DTSB67B (407140-005), and DTSB77B (407140-006) apply to this continuing calibration.

- For PCB continuing calibration performed on 07/27/04 @09:17 on instrument GC-L, the following %Ds were determined. For column #1, arochlor 1016 #2 (17.1%) and arochlor 1016 #5 (33.1%) were outside criteria. The average of the peaks for arochlor 1016 (12.7%) was within criteria. All samples were also non-detect. No qualifiers were applied based upon these outliers. For column #1, arochlor 1260 #2 (17.1%) and arochlor 1260 #3 (16.4%) were outside criteria. The average of the peaks for arochlor 1260 (12.9%) was within criteria. All samples were also non-detect. No qualifiers were applied based upon these outliers. For column #2, arochlor 1016 #4 (34.6%) was outside criteria. The average of the peaks for arochlor 1016 (11.5%) was within criteria. All samples were also non-detect. No qualifiers were applied based upon these outliers. Arochlor 1260 was within criteria for column #2. No samples reported apply to this continuing calibration.

- For PCB continuing calibration performed on 07/27/04 @23:45 on instrument GC-L, the following %Ds were determined. For column #1, arochlor 1016 #2 (23.8%), arochlor #3 (15.9%), and arochlor 1016 #5 (26.3%) were outside criteria. The average of the peaks for arochlor 1016 (16.4%) was outside criteria. All samples were non-detect, therefore no qualifiers were applied based upon these outliers. For column #1, arochlor 1260 #2 (16.2%) and arochlor 1260 #3 (17.0%) were outside criteria. The average of the peaks for arochlor 1260 (13.3%) was within criteria. All samples were non-detect. No qualifiers were applied based upon these outliers. For column #2, arochlor 1016 and arochlor 1260 were within criteria. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For PCB continuing calibration performed on 07/28/04 @04:35 on instrument GC-L, the following %Ds were determined. For column #1, arochlor 1016 #2 (19.3%), arochlor #3 (16.9%), and arochlor 1016 #5 (28.3%) were outside criteria. The average of the peaks for arochlor 1016 (15.5%) was outside criteria. All samples were non-detect, therefore no qualifiers were applied based upon these outliers. For column #1, arochlor 1260 was within criteria. For column #2, arochlor 1016 #4 (23.2%) was outside criteria. The average of the peaks for arochlor 1016 (9.8%) was within criteria. All samples were non-detect. No qualifiers were applied based upon these outliers. For column #2, arochlor 1260 was within criteria. No qualifiers were applied. No samples reported apply to this continuing calibration.

IV-Blank Analysis

The purpose of laboratory or field blank analyses is to determine the existence and magnitude of contamination problems resulting from laboratory or field activities. One method blank per analytical batch must be run on each instrument used to analyze samples. No contaminants should be present in the blanks > MDL or MRL (USEPA criteria) or all target compounds < one-half the MRL (USACE criteria). **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one, 100% solids, and were converted to soil values (soil conversion factor = 30). Rinse blanks 071304R1 (407077-001) and 071304R2 (407077-002) apply to the surface soil samples ("A" fraction samples) and was analyzed in SDG 0407077. Rinse blank 072004R2 (407140-001) applies to the subsurface soil samples ("B" fraction samples) and was analyzed in SDG 0407140.

Table 2 Blank Contamination Analysis Summary

Parameter	Analysis Date	QC Blank ID	Compound	Max Conc. µg/kg	Action Level µg/kg	B qualified samples
PCBs	07/27/04	BLK67908	All < MRL	NA	NA	None
PCBs	07/20/04	071304R1	All < MRL	NA	NA	None
PCBs	07/20/04	071304R2	All < MRL	NA	NA	None
PCBs	07/28/04	072004R2	All < MRL	NA	NA	None

V-System Monitoring Compound (Surrogates)
Laboratory performance on individual samples is established by means of spiking activities. The percent recovery (%R) for all samples and blanks must be within the specified laboratory control limits.

Criteria: Decachlorobiphenyl: PCBs: 47-161% (USACE criteria 50-130%)
Tetrachloro-m-xylene: PCBs: 54-168% (USACE criteria 50-130%)

- For PCB analysis for sample DTSB48B (407140-002), surrogate tetrachloro-m-xylene (25%) was outside USACE and/or lab criteria. Since surrogate decachlorobiphenyl was within criteria, no qualifiers were applied based upon this outlier.

- For samples DTSB55B (407140-003), DTSB59B (407140-004), DTSB67B (407140-005), and DTSB77B (407140-006) all criteria were met. No qualifiers were applied.

VI-Laboratory Control Samples
Laboratory control samples (LCS) are used to monitor long-term precision and accuracy of the analytical method. The analysis is performed at a frequency of 1 per analytical batch. The percent recoveries (%Rs) must be within the specified control limits. USACE Shell limits for PCBs are 50-130% (30-150% for sporadic marginal failures (SMF)).

- Sample BKS67908 was used for the LCS for PCBs. All criteria were met. No qualifiers were applied. Samples DTSB48B (407140-002), DTSB55B (407140-003), DTSB59B (407140-004), DTSB67B (407140-005), and DTSB77B (407140-006) apply to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. USACE Shell limits for PCBs are 40-140%; RPD<50%.

- Sample NBGSB20A (407138-001) was used for the MS/MSD analysis for PCB compounds. The spiked sample was analyzed in SDG 407138. PCB-1016 (142%) was outside USACE criteria limits. Since the spiked sample was non-detect, no qualifiers were applied based upon this outlier.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. The project precision control criterion was established at 50% RPD for the solid samples.

- No field soil sample duplicate pair was analyzed in this SDG.

IX-Quantitation Verification
The accuracy of analytical results was verified through the calculation of several parameters. The difference between the calculated value and the reported value must be within 10% difference. All samples were non-detect for PCBs, therefore the quantification verification not included here. Any sample value > MDL and < MRL or < 3*MDL (whichever is greater) was qualified as estimated, “J.” The difference between the primary column and the confirmatory column must be ≤ 40% difference (USEPA and USACE criteria).

- For this SDG, all PCBs were non-detect for all samples. No qualifiers were applied.

Sample: NBGSB20AMS (407138-001MS), Aroclor 1260

Conc. μg/kg = (Ax * Vt * DF) / (CF * Vi * Ws * D)

where: Conc. = Sample concentration in μg/kg
Ax = Area/response for compound being measured.
Vt = Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10000 μL.
CF = Ave calibration response factor for compound being measured from ICAL (Area/pg)
Vi = Volume of extract injected (mL).
W(s) = Weight of sample extracted or diluted in grams.
D = Percent dry weight (100 - % moisture in sample)/100 = 1.0 for Wet Weight
DF = Dilution factor

Signal #1
Conc1 μg/kg = (190856Area*10000μL*1) / (300.4Area/pg*(1000 pg/ng)*1 μL*30g*0.8388) = 252.48 μg/kg
Conc2 μg/kg = (294806Area*10000μL*1) / (405.0Area/pg*(1000 pg/ng)*1 μL*30g*0.8388) = 289.27 μg/kg
Conc3 μg/kg = (375546Area*10000μL*1) / (460.4Area/pg*(1000 pg/ng)*1 μL*30g*0.8388) = 324.15 μg/kg
Conc4 μg/kg = (91108Area*10000μL*1) / (209.8Area/pg*(1000 pg/ng)*1 μL*30g*0.8388) = 172.57 μg/kg
Conc5 μg/kg = (284130Area*10000μL*1) / (602.8Area/pg*(1000 pg/ng)*1 μL*30g*0.8388) = 187.31 μg/kg
Average concentration = 250 μg/kg

Signal #2
Conc1 μg/kg = (880556Area*10000μL*1) / (1926Area/pg*(1000 pg/ng)*1 μL*30g*0.8388) = 181.69 μg/kg
Conc2 μg/kg = (973083Area*10000μL*1) / (2046Area/pg*(1000 pg/ng)*1 μL*30g*0.8388) = 189.00 μg/kg
Conc3 μg/kg = (1780776Area*10000μL*1) / (2799Area/pg*(1000 pg/ng)*1 μL*30g*0.8388) = 252.83 μg/kg
Conc4 μg/kg = (827508Area*10000μL*1) / (1655Area/pg*(1000 pg/ng)*1 μL*30g*0.8388) = 198.70 μg/kg
Conc5 μg/kg = (1341128Area*10000μL*1) / (3156Area/pg*(1000 pg/ng)*1 μL*30g*0.8388) = 168.87 μg/kg
Average concentration = 200 μg/kg

Reported Value = 250 μg/kg (signal #1)
% Difference = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – TAL Metals
GPL Laboratories, Inc., SDG 407146

DATE: December 6, 2004

The purpose of this memorandum is to present the data validation report for the samples collected for the New River Unit WI at the RFAAP on July 20, 2004. Samples were analyzed for target analyte list (TAL) metals using USEPA SW-846 3050B/6010B for ICP metals and USEPA SW-846 7471A for mercury. A total of twelve soil samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
NBGSB22C	407146-001	NBGSB24A	407146-007
NBGSB22D	407146-002	NBGSB24B	407146-008
NBGSB23A	407146-003	TMSB24B	407146-009
NBGSB23B	407146-004	NBGSB24C	407146-010
NBGSB23C	407146-005	NBGSB24D	407146-011
NBGSB23D	407146-006	NBGSB25A	407146-012

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements* (USACE, February 2001), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Inorganic Data Review* (April, 1993). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times and Preservation
	X	Initial and Continuing Calibration
X		Blank Analysis
	X	ICP Interference Check Sample (ICS)
	X	Laboratory Control Sample (LCS)
X		Lab Sample Duplicate
X		Matrix Spike
	X	ICP Serial Dilution
	X	Field Sample Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

_____ _____

Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
TAL METALS REVIEW
SDG 407146

I-Holding Times and Preservation

The primary objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample analysis. The soil samples are received and stored cool @4 °C ± 2 °C, with a maximum holding time of 180 days for ICP metals and 28 days for mercury from collection (USEPA criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For samples collected on 07/20/04, cooler was received by the laboratory at 4.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: Samples were collected 07/20/04. They were digested on 07/24/04 and analyzed for ICP metals on 07/30/04 and 08/02/04 (select samples for lead, sodium, silver, and zinc). Samples were digested on 08/03/04 for mercury and were analyzed for mercury on 08/04/04. All holding time criteria were met. No qualifiers were applied.

II-Initial and Continuing Calibration

Requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of the analysis run, and continuing calibration verification documents that the initial calibration is still valid.

ICP:	1- blank (USACE <MDL)	Hg:	1 – blank (USACE <MDL)
	3 – standards (r≥0.995)		5 – standards (r≥0.995)
	ICV/CCV (90-110%) (USACE 90-110%)		ICV/CCV (80-120%) (USACE ICV 90-110% / CCV 80-120%)
	MRL (70-130%) (USACE 80-120%)		MRL (80-120%)

- The samples were analyzed for ICP metals on 07/30/04 and 08/02/04 (select samples for lead, sodium, silver, and zinc). Mercury was analyzed on 08/04/04 with a correlation coefficient of 0.9998. All ICV/CCV standards were within criteria. No qualifiers were applied. **Table 2** summarizes the MRL standard analysis for metals. Samples with concentrations detected less than two times the MRL with out of criteria MRL recovery were qualified.

Table 2 MRL Analysis Summary

Analysis Date	Analysis	MRL (µg/L)	MRL (mg/kg)	MRL %Recovery	Qualified samples @ <2xMRL	Validation Qualifiers
07/30/04	ICP	Various	Various	All within criteria	None	None
08/02/04	ICP	Various	Various	All within criteria	None	None
08/04/04	Hg	0.2	0.033	All within criteria	None	None

III-Blanks

Blanks (preparation and calibration blanks) are assessed to determine the existence and magnitude of contamination problems. No contaminants should be detected (i.e. <MDL) in any of the associated blanks. USACE Shell limits are < ½MRL for the method blank. Samples are qualified "B" when they are less than 5X the absolute value of the maximum blank concentration. **Table 3** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one, 100% solids, and were converted to soil values (soil conversion factors = 10 for ICP; 6 for Hg). The rinse blank breakout is as follows.

- Rinse blank 072004R3 applies to the northern burning ground ("NBG" prefix samples) surface soil ("A" suffix samples) and sediment ("SD") samples and was analyzed in SDG 0407135.

- Rinse blank 072004R1 applies to the northern burning ground ("NBG" prefix samples) subsurface soil samples ("B→D" suffix samples) and was analyzed in SDG 0407135.

Table 3 Blank Contamination Analysis Summary

Analysis Date	Analysis	QC Blank ID	Max Conc. mg/kg	Action Level mg/kg	B qualified samples
07/30/04	ICP-Al	ICB/CCBs	3.78B	18.9	None
07/30/04	ICP-Ba	ICB/CCBs	0.03B	0.15	None
07/30/04	ICP-Be	ICB/CCBs	0.02B	0.10	None
07/30/04	ICP-Cd	ICB/CCBs	0.04B	0.20	None
07/30/04	ICP-Ca	ICB/CCBs	11.6B	58.0	NBGSB22D, NBGSB23D
07/30/04	ICP-Cu	ICB/CCBs	0.11B	0.55	None
07/30/04	ICP-Fe	ICB/CCBs	5.21B	26.1	None
07/30/04	ICP-Mg	ICB/CCBs	10.7B	53.5	None
07/30/04	ICP-Mn	ICB/CCBs	0.03B	0.15	None
07/30/04	ICP-Ni	ICB/CCBs	0.11B	0.55	None
07/30/04	ICP-Tl	ICB/CCBs	0.42B	2.1	NBGSB22C, NBGSB22D
08/04/04	Hg	ICB/CCBs	<MRL	NA	None
08/02/04	ICP-Al	ICB/CCBs	3.79B	19.0	None
08/02/04	ICP-Na	ICB/CCBs	51.0B	255	NBGSB24A, NBGSB25A
07/30/04	ICP-Al	PBS	2.2B	11.0	None
07/30/04	ICP-Ba	PBS	0.050B	0.25	None
07/30/04	ICP-Cr	PBS	0.093B	0.47	None
07/30/04	ICP-Mg	PBS	2.1B	10.5	None
07/30/04	ICP-Mn	PBS	0.086B	0.43	None
07/30/04	ICP-Ni	PBS	0.25B	1.3	None
07/30/04	ICP-Na	PBS	42.3B	212	NBGSB22C, NBGSB22D, NBGSB23A, NBGSB23B, NBGSB23C, NBGSB23D, NBGSB24A, NBGSB24B, TMSB24B, NBGSB24C, NBGSB24D, NBGSB25A
08/04/04	Hg	PBS	<MRL	NA	None
08/05/04	ICP-Al	072004R3	2.51BN	12.6	None
08/05/04	ICP-Sb	072004R3	0.49B	2.45	NBGSB23A, NBGSB24A, NBGSB25A
08/05/04	ICP-Ca	072004R3	7.83B	39.2	None
08/05/04	ICP-Cr	072004R3	0.11B	0.55	None
08/05/04	ICP-Co	072004R3	0.064B	0.32	None
08/05/04	ICP-Pb	072004R3	0.18B	0.90	None
08/05/04	ICP-Mg	072004R3	1.42B	7.1	None
08/05/04	ICP-Mn	072004R3	0.16B	0.80	None
08/05/04	ICP-Ag	072004R3	0.073B	0.37	None
08/05/04	ICP-Na	072004R3	49.9B	250	NBGSB23A, NBGSB24A, NBGSB25A
08/05/04	Hg	072004R3	<MRL	NA	None
08/05/04	ICP-Ba	072004R1	0.042B	0.21	None
08/05/04	ICP-Ca	072004R1	10.8B	54.0	NBGSB22D
08/05/04	ICP-Cr	072004R1	0.12B	0.60	None
08/05/04	ICP-Mg	072004R1	2.61B	13.1	None
08/05/04	ICP-Mn	072004R1	0.18B	0.90	None
08/05/04	ICP-Ag	072004R1	0.12B	0.60	None
08/05/04	ICP-Na	072004R1	37.3B	189	NBGSB22C, NBGSB22D, NBGSB23B, NBGSB23C, NBGSB23D, NBGSB24B, TMSB24B, NBGSB24C, NBGSB24D
08/05/04	ICP-V	072004R1	0.089B	0.45	None
08/05/04	Hg	072004R1	<MRL	NA	None

B = Value is estimated <MRL and >MDL.
N = Laboratory spike sample recovery not within control limits.

IV-ICP Interference Check Sample (ICS)
The ICP interference check sample (ICS) verifies interelement and background correction factors. ICP Interference Check is performed at the beginning and end of each sample analysis run. Control limits are 80-120% (USACE limits 80-120%).

- All criteria were met. No qualifiers were applied.

V-Laboratory Control Samples (LCS)
The laboratory control sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. All soil LCS results must fall within the control limits of 80-120% for ICP metals and mercury. USACE Shell limits for metals are 80-120% (60-140% for sporadic marginal failures (SMF)).

- Sample BKS67915 was used as LCS for ICP metals analysis. All criteria were met. No qualifiers were applied.

- Sample BKS68060 was used as LCS for total mercury analysis. All criteria were met. No qualifiers were applied.

VI-Duplicate Sample Analysis
Duplicate sample determinations are used to demonstrate acceptable method precision by the laboratory at the time of analysis. Duplicate analysis generate data in order to determine the long-term precision of the analytical method on various matrices. RPDs must be within established control limits. USACE Shell limits for metals are 25% RPD for ICP metals and 20% RPD for mercury.

- Sample NBGSB22D (407146-002) was used as sample duplicate for ICP metals analysis. Antimony (28.9%), lead (72.4%), and thallium (59.8%) were outside criteria. Antimony and thallium were outside criteria due to low sample concentrations, therefore no qualifiers were applied based upon these outliers. Lead was qualified as estimated “J” for detects based upon the high RPD.

- Sample NBGSB22D (407146-002) was used as sample duplicate for mercury analysis. Mercury (56.8%) was outside criteria. Mercury was qualified as estimated “J” for detects based upon the high RPD.

VII-Matrix Spike
MS are generated to determine long-term accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. Specific criteria include the analyses of matrix spike and matrix spike duplicate samples at a frequency of one MS per 20 samples of similar matrix. MS recoveries and relative percent differences between MS recoveries should be within the specified limits. USACE Shell limits for metals are 75-125% for ICP metals and 80-120% for mercury. Post digestion spikes limits are 75-125% for ICP metals and 85-115% for mercury.

- Sample NBGSB22D (407146-002) was used for the MS analysis for ICP analysis. Aluminum (1679%), antimony (47.5%), and iron (131%) were outside of control limits. Post digestion spikes were within criteria for antimony. The sample concentration was >4 times the spike added for aluminum and iron, therefore no qualifiers were applied based upon this outlier. For antimony, the spiked sample was qualified bias low “L” based upon the low recovery.

- Sample NBGSB22D (407146-002) was used for the MS analysis for mercury analysis. All criteria were met. No qualifiers were applied.

VIII-ICP Serial Dilution

An ICP serial dilution is performed to determine whether significant physical or chemical interferences exist due to sample matrix at high concentrations. An analysis of a 5-fold dilution should agree within 10% difference of the original result when the concentration in sample is a factor of 50 above MDL.

- The serial dilution for the ICP was analyzed for sample NBGSB22D (407146-002). Antimony (100%), calcium (13.1%), sodium (100%), and thallium (100%) were outside of criteria limits. Sample concentrations were <50 times MDL for antimony, calcium, sodium, and thallium, therefore no qualifiers were applied based upon these outliers.

IX-Field Duplicate Sample Analysis

Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the solid samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field soil sample duplicate pair NBGSB24B (407146-008) and TMSB24B (407146-009) was collected. The field duplicate evaluation is noted in **Table 4.** If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. All criteria were met. No qualifiers were applied.

Table 4 Field Duplicate Analysis Summary

Sample ID	Lab ID	Compound	Original Result (mg/kg)	Duplicate Result (mg/kg)	%RPD	Qualifier
NBGSB24B	407146-008	Aluminum	13500	14100	4.4	None
NBGSB24B	407146-008	Antimony	0.53 BN	0.28 UN	NA	None
NBGSB24B	407146-008	Arsenic	7.2	5.7	23.3	None
NBGSB24B	407146-008	Barium	48.1	50.1	4.1	None
NBGSB24B	407146-008	Beryllium	0.54	0.52	3.8	None
NBGSB24B	407146-008	Calcium	777	804	3.4	None
NBGSB24B	407146-008	Chromium	26.0	20.4	24.1	None
NBGSB24B	407146-008	Cobalt	5.9	5.9	0.0	None
NBGSB24B	407146-008	Copper	8.5	8.9	4.6	None
NBGSB24B	407146-008	Iron	23400	16600	34.0	None
NBGSB24B	407146-008	Lead	27.4 *	29.2 *	6.4	None
NBGSB24B	407146-008	Magnesium	526	552	4.8	None
NBGSB24B	407146-008	Manganese	471	474	0.6	None
NBGSB24B	407146-008	Nickel	7.7	8.3	7.5	None
NBGSB24B	407146-008	Potassium	444	466	4.8	None
NBGSB24B	407146-008	Sodium	74.5 B	46.4 B	46.5	None
NBGSB24B	407146-008	Vanadium	42.3	34.2	21.2	None
NBGSB24B	407146-008	Zinc	34.8	39.8	13.4	None
NBGSB24B	407146-008	Mercury	0.038 *	0.038 *	0.0	None

B = Estimated value <MRL and >MDL.
N = Laboratory spike sample recovery not within control limits.
* = Laboratory duplicate not within control limits.
U = Value non-detect at MDL.
NA = Not Applicable

X-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value > MDL and < MRL or < 3*MDL (whichever was greater) was qualified as estimated, "J." The following calculations were performed for verification.

ICP Sample: NBGSB22C (407146-001), Total Barium

Conc. (mg/kg) = {(conc. μg/L)*(Final Volume L)*(DF)} / {(Weight Sample g)*(Fraction Solids)}

Conc. (mg/kg) = {(290.6167 μg/L)*(0.100 L)*(1)} / {(1.51 g)*(0.8070)} = 23.9 μg/g = 23.9 mg/kg

Reported concentration = 23.8 mg/kg
%D = 0.4%
Values were within 10% difference.

CVAA Sample: NBGSB22C (407146-001), Total Mercury

Conc. (mg/kg) = {(conc. μg/L)*(Final Volume L)*(DF)} / {(Weight Sample g)*(Fraction Solids)}

Conc. (mg/kg) = {(1.12 μg/L)*(0.100 L)*(1)} / {(0.69 g)*(0.8070)} = 0.20 μg/g = 0.20 mg/kg

Reported concentration = 0.20 mg/kg
%D = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – PCBs
GPL Laboratories, Inc., SDG 407146

DATE: December 7, 2004

The purpose of this memorandum is to present the data validation report for the samples collected for the New River WI at the RFAAP on July 20, 2004. Samples were analyzed for PCBs using USEPA Method 3540C/8082. A total of twelve soil samples were analyzed and validated for PCBs. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
NBGSB22C	407146-001	NBGSB24A	407146-007
NBGSB22D	407146-002	NBGSB24B	407146-008
NBGSB23A	407146-003	TMSB24B	407146-009
NBGSB23B	407146-004	NBGSB24C	407146-010
NBGSB23C	407146-005	NBGSB24D	407146-011
NBGSB23D	407146-006	NBGSB25A	407146-012

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements* (USACE, February 2001), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (USEPA, September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	System Monitoring Compounds
	X	Laboratory Control Samples
	X	Matrix Spike/Spike Duplicate
	X	Field Sample Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable.

_____ _____

Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
PCB REVIEW
SDG 407146

I-Holding Times
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For PCB soil samples, cooled @4°C ±2°C, the maximum holding time is 14 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis (USEPA criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For samples collected on 07/20/04, cooler was received by the laboratory at 4.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The samples were collected 07/20/04 for PCB compounds. They were extracted on 07/26/04 and analyzed for PCBs on 07/30/04 and 07/31/04 within criteria guidelines. The actual extraction and analysis dates for each sample may be found on the attached form 1s to this report. No qualifiers were applied.

II-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. The initial 5-point calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run. The percent relative standard deviation (%RSD) for all single peak target analytes, and aroclors 1016 and 1260 must be $< 20\%$ or the mean %RSD for all analytes in the standard must be $\leq 20\%$. If linear regression is used, the correlation coefficient must be ≥ 0.990 (USEPA and USACE criteria).

- For the PCB initial calibration performed on 07/29/04 on instrument GC-L, all compounds were determined using calibration factors for PCB 1016 and PCB 1260. All criteria were met, except for the following. For PCB 1260 signal #2, PCB 1260 #1 (20.7%), PCB 1260 #2 (21.5%), and PCB 1260 #5 (21.8%) were above criteria limits. The average %RSD for PCB 1260 for signal #2 (20.4%) was within criteria. All associated samples were non-detect for PCB 1260. No qualifiers were applied based upon these outliers. Samples NBGSB22C (407146-001), NBGSB22D (407146-002), NBGSB23A (407146-003), NBGSB23B (407146-004), NBGSB23C (407146-005), NBGSB23D (407146-006), NBGSB24A (407146-007), NBGSB24B (407146-008), TMSB24B (407146-009), NBGSB24C (407146-010), NBGSB24D (407146-011), and NBGSB25A (407146-012) apply to this initial calibration.

III-Continuing Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for PCB target compounds. Continuing calibration standards containing both target compounds and surrogates are analyzed at the beginning of each 12-hour analytical shift and after every 20 samples. The percent difference (%D) or the mean %RSD for all analytes in the standard from the initial calibration should be no greater than $\pm$ 15%.

- For PCB continuing calibration performed on 07/30/04 @13:23 on instrument GC-L, all criteria were met on column #1 and column #2 for all target compounds arochlor 1016 and arochlor 1260. No qualifiers were applied. Samples NBGSB22C (407146-001), NBGSB22D (407146-002), NBGSB23A (407146-003), and NBGSB23B (407146-004) apply to his continuing calibration.

- For PCB continuing calibration performed on 07/30/04 @18:13 on instrument GC-L, all criteria were met on column #1 and column #2 for all target compounds arochlor 1016 and arochlor 1260. No qualifiers were applied. Samples NBGSB23C (407146-005), NBGSB23D (407146-006), NBGSB24B (407146-008), TMSB24B (407146-009), NBGSB24C (407146-010), and NBGSB24D (407146-011) apply to his continuing calibration.

- For PCB continuing calibration performed on 07/30/04 @22:34 on instrument GC-L, all criteria were met on column #1 and column #2 for all target compounds arochlor 1016 and arochlor 1260. No qualifiers were applied. No samples reported apply to his continuing calibration.

- For PCB continuing calibration performed on 07/31/04 @10:39 on instrument GC-L, all criteria were met on column #1 and column #2 for all target compounds arochlor 1221 and arochlor 1254. No qualifiers were applied. Samples NBGSB24A (407146-007) and NBGSB25A (407146-012) apply to his continuing calibration.

- For PCB continuing calibration performed on 07/31/04 @15:29 on instrument GC-L, all criteria were met on column #1 and column #2 for all target compounds arochlor 1221 and arochlor 1254. No qualifiers were applied. No samples reported apply to his continuing calibration.

IV-Blank Analysis

The purpose of laboratory or field blank analyses is to determine the existence and magnitude of contamination problems resulting from laboratory or field activities. One method blank per analytical batch must be run on each instrument used to analyze samples. No contaminants should be present in the blanks > MDL or MRL (USEPA criteria) or all target compounds < one-half the MRL (USACE criteria). **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one, 100% solids, and were converted to soil values (soil conversion factor = 30). The rinse blank breakout is as follows.

- Rinse blank 072004R3 applies to the northern burning ground ("NBG" prefix samples) surface soil ("A" suffix samples) and NBG sediment ("SD") samples and was analyzed in SDG 0407135.

- Rinse blank 072004R1 applies to the northern burning ground ("NBG" prefix samples) subsurface soil samples ("B→D" suffix samples) and was analyzed in SDG 0407135.

Table 2 Blank Contamination Analysis Summary

Parameter	Analysis Date	QC Blank ID	Compound	Max Conc. µg/kg	Action Level µg/kg	B qualified samples
PCBs	07/30/04	BLK67934	All < MRL	NA	NA	None
PCBs	07/28/04	072004R3	All < MRL	NA	NA	None
PCBs	07/28/04	072004R1	All < MRL	NA	NA	None

V-System Monitoring Compound (Surrogates)

Laboratory performance on individual samples is established by means of spiking activities. The percent recovery (%R) for all samples and blanks must be within the specified laboratory control limits.

Criteria: Decachlorobiphenyl: PCBs: 47-161% (USACE criteria 50-130%)
Tetrachloro-m-xylene: PCBs: 54-168% (USACE criteria 50-130%)

- For PCB analysis for sample NBGSB22D (407146-002), surrogate decachlorobiphenyl (43%, 41%) was outside USACE and/or lab criteria due to sample matrix effects. Since surrogate tetrachloro-m-xylene was within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample NBGSB23C (407146-005), surrogate decachlorobiphenyl (132%) was outside USACE and/or lab criteria due to sample matrix effects. Since surrogate tetrachloro-m-xylene was within criteria, no qualifiers were applied based upon this outlier.

- For all other samples, all criteria were met. No qualifiers were applied.

VI-Laboratory Control Samples
Laboratory control samples (LCS) are used to monitor long-term precision and accuracy of the analytical method. The analysis is performed at a frequency of 1 per analytical batch. The percent recoveries (%Rs) must be within the specified control limits. USACE Shell limits for PCBs are 50-130% (30-150% for sporadic marginal failures (SMF)).

- Sample BKS67934 was used for the LCS for PCBs. All criteria were met. No qualifiers were applied. Samples NBGSB22C (407146-001), NBGSB22D (407146-002), NBGSB23A (407146-003), NBGSB23B (407146-004), NBGSB23C (407146-005), NBGSB23D (407146-006), NBGSB24A (407146-007), NBGSB24B (407146-008), TMSB24B (407146-009), NBGSB24C (407146-010), NBGSB24D (407146-011), and NBGSB25A (407146-012) apply to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. USACE Shell limits for PCBs are 40-140%; RPD<50%.

- Sample NBGSB22D (407146-002) was used for the MS/MSD analysis for PCB compounds. PCB 1016 (256%, 251%) was outside USACE and/or lab criteria. All RPDs and LCS recoveries were within criteria. Since all samples were non-detect for this PCB, no qualifiers were applied based upon this outlier.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. The project precision control criterion was established at 50% RPD for the solid samples.

- Field soil sample duplicate pair NBGSB24B (407146-008) and TMSB24B (407146-009) was collected. The field duplicate evaluation is noted in **Table 3**. For where the duplicate pair was diluted due to high compound concentrations, was used in this assessment. If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. All criteria were met. No qualifiers were applied.

Table 3 Field Duplicate Analysis Summary NBGSB24B (407146-008) and TMSB24B (407146-009)

Sample ID	Lab ID	Compound	Original Result (μg/kg)	Duplicate Result (μg/kg)	%RPD	Qualifier
NBGSB24B	407146-008	All PCBs <MRL	NA	NA	NA	None

NA = Not Applicable

IX-Quantitation Verification

The accuracy of analytical results was verified through the calculation of several parameters. The difference between the calculated value and the reported value must be within 10% difference. All samples were non-detect for PCBs, therefore the quantification verification not included here. Any sample value > MDL and < MRL or < 3*MDL (whichever is greater) was qualified as estimated, "J." The difference between the primary column and the confirmatory column must be ≤ 40% difference (USEPA and USACE criteria).

- PCB 1254 was detected in samples NBGSB24A (407146-007) and NBGSB25A (407146-012). All confirmatory criteria were met. No qualifiers were applied. For all other samples, all PCBs were non-detect.

Sample: NBGSB25A (407146-012), Aroclor 1254

Conc. μg/kg = (Ax * Vt * DF) / (CF * Vi * Ws * D)

where: Conc. = Sample concentration in μg/kg
Ax = Area/response for compound being measured.
Vt = Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10000 μL.
CF = Ave calibration response factor for compound being measured from ICAL (Area/pg)
Vi = Volume of extract injected (mL).
W(s) = Weight of sample extracted or diluted in grams.
D = Percent dry weight (100 - % moisture in sample)/100 = 1.0 for Wet Weight
DF = Dilution factor

Signal #1
Conc1 μg/kg = (117290Area*10000μL*2) / (229.8Area/pg*(1000 pg/ng)*1 μL*30g*0.9070) = 375.16 μg/kg
Conc2 μg/kg = (162020Area*10000μL*2) / (184.7Area/pg*(1000 pg/ng)*1 μL*30g*0.9070) = 644.77 μg/kg
Conc3 μg/kg = (286306Area*10000μL*2) / (398.8Area/pg*(1000 pg/ng)*1 μL*30g*0.9070) = 527.69 μg/kg
Conc4 μg/kg = (200250Area*10000μL*2) / (273.2Area/pg*(1000 pg/ng)*1 μL*30g*0.9070) = 538.76 μg/kg
Conc5 μg/kg = (425564Area*10000μL*2) / (440.8Area/pg*(1000 pg/ng)*1 μL*30g*0.9070) = 709.62 μg/kg
Average concentration = 560 μg/kg

Signal #2
Conc1 μg/kg = (721084Area*10000μL*2) / (1332Area/pg*(1000 pg/ng)*1 μL*30g*0.9070) = 397.91 μg/kg
Conc2 μg/kg = (761518Area*10000μL*2) / (856.1Area/pg*(1000 pg/ng)*1 μL*30g*0.9070) = 653.82 μg/kg
Conc3 μg/kg = (1368248Area*10000μL*2) / (1998Area/pg*(1000 pg/ng)*1 μL*30g*0.9070) = 503.35 μg/kg
Conc4 μg/kg = (816590Area*10000μL*2) / (1142Area/pg*(1000 pg/ng)*1 μL*30g*0.9070) = 525.58 μg/kg
Conc5 μg/kg = (1727928Area*10000μL*2) / (1882Area/pg*(1000 pg/ng)*1 μL*30g*0.9070) = 674.85 μg/kg
Average concentration = 550 μg/kg

Reported Value = 560 μg/kg (signal #1)
% Difference = 0.0%

Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – TAL Metals
GPL Laboratories, Inc., SDG 407170

DATE: January 4, 2005

The purpose of this memorandum is to present the data validation report for the samples collected for the New River Unit WI at the RFAAP on July 19-23, 2004. Samples were analyzed for target analyte list (TAL) metals using USEPA SW-846 3050B/6010B for ICP metals and USEPA SW-846 7471A for mercury. A total of three soil samples and six sediment samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
WBGSB50B	407170-001	WBGSD19	407170-006
WBGSB51B	407170-002	WBGSD20	407170-007
WBGSB52B	407170-003	WBGSD21	407170-008
WBGSD17	407170-004	WBGSD22	407170-009
WBGSD18	407170-005		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements* (USACE, February 2001), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Inorganic Data Review* (April, 1993). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times and Preservation
X		Initial and Continuing Calibration
X		Blank Analysis
	X	ICP Interference Check Sample (ICS)
	X	Laboratory Control Sample (LCS)
	X	Lab Sample Duplicate
X		Matrix Spike
	X	ICP Serial Dilution
	X	Field Sample Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

_____ _____

Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
TAL METALS REVIEW
SDG 407170

I-Holding Times and Preservation

The primary objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample analysis. The soil samples are received and stored cool @4 °C ± 2 °C, with a maximum holding time of 180 days for ICP metals and 28 days for mercury from collection (USEPA criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For samples collected on 07/19/04, 07/22/04, and 07/23/04, cooler was received by the laboratory at 3.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The samples were collected on 07/19/04, 07/22/04, and 07/23/04. They were digested on 07/28/04 and analyzed for ICP metals on 08/06-07/04 and 08/08/04. Samples were digested on 08/05/04 for mercury and were analyzed for mercury on 08/06/04. All holding time criteria were met. No qualifiers were applied.

II-Initial and Continuing Calibration

Requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of the analysis run, and continuing calibration verification documents that the initial calibration is still valid.

ICP:	1- blank (USACE <MDL)	Hg:	1 – blank (USACE <MDL)
	3 – standards (r≥0.995)		5 – standards (r≥0.995)
	ICV/CCV (90-110%) (USACE 90-110%)		ICV/CCV (80-120%) (USACE ICV 90-110% / CCV 80-120%)
	MRL (70-130%) (USACE 80-120%)		MRL (80-120%)

- The samples were analyzed for ICP metals on 08/06-07/04 and 08/08/04. Mercury was analyzed on 08/06/04 with a correlation coefficient of 0.9999. All ICV/CCV standards were within criteria. No qualifiers were applied. **Table 2** summarizes the MRL standard analysis for metals. Samples with concentrations detected less than two times the MRL with out of criteria MRL recovery were qualified.

Table 2 MRL Analysis Summary

Analysis Date	Analysis	MRL (µg/L)	MRL (mg/kg)	MRL %Recovery	Qualified samples @ <2xMRL	Validation Qualifiers
08/06/04	ICP-Ag	3.0	0.3	79.2	WBGSB50B, WBGSB51B, WBGSB52B, WBGSD17, WBGSD18, WBGSD19, WBGSD20, WBGSD21, WBGSD22	UL
08/07/04	ICP	Various	Various	All within criteria	None	None
08/12/04	Hg	0.2	0.033	All within criteria	None	None

III-Blanks

Blanks (preparation and calibration blanks) are assessed to determine the existence and magnitude of contamination problems. No contaminants should be detected (i.e. <MDL) in any of the associated blanks. USACE Shell limits are < ½MRL for the method blank. Samples are qualified "B" when they are less than 5X the absolute value of the maximum blank concentration. **Table 3** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one, 100% solids, and were converted to soil values (soil conversion factors = 10 for ICP; 6 for Hg). The rinse blank breakout is as follows.

- Rinse blank 072304R applies to the western burning ground ("WBG" prefix samples) sediment samples ("SD" samples) and was analyzed in SDG 0407170.
- Rinse blank 071904R1 applies to the western burning ground ("WBG" prefix samples) subsurface soil samples ("B→C" suffix samples) and was analyzed in SDG 0407135.

Table 3 Blank Contamination Analysis Summary

Analysis Date	Analysis	QC Blank ID	Max Conc. mg/kg	Action Level mg/kg	B qualified samples
08/06/04	ICP-Al	ICB/CCBs	3.26B	16.3	None
08/06/04	ICP-Ba	ICB/CCBs	0.03B	0.15	None
08/06/04	ICP-Be	ICB/CCBs	0.03B	0.15	None
08/06/04	ICP-Cd	ICB/CCBs	0.04B	0.20	WBGSB51B, WBGSD17, WBGSD18, WBGSD19, WBGSD20, WBGSD21
08/06/04	ICP-Ca	ICB/CCBs	8.37B	41.9	None
08/06/04	ICP-Pb	ICB/CCBs	0.14B	0.70	None
08/06/04	ICP-Mg	ICB/CCBs	5.39B	27.0	None
08/06/04	ICP-Mn	ICB/CCBs	0.03B	0.15	None
08/06/04	ICP-Ni	ICB/CCBs	0.09B	0.45	None
08/06/04	ICP-Tl	ICB/CCBs	0.40B	2.0	None
08/07/04	ICP-Sb	ICB/CCBs	3.6B	18.0	WBGSB51B, WBGSB52B, WBGSD19, WBGSD20, WBGSD22
08/07/04	ICP-Ba	ICB/CCBs	0.03B	0.15	None
08/07/04	ICP-Cr	ICB/CCBs	0.6B	3.0	None
08/07/04	ICP-Mn	ICB/CCBs	0.03B	0.15	None
08/06/04	Hg	ICB/CCBs	<MRL	NA	None
08/07/04	ICP-Ba	PBS	0.049B	0.25	None
08/07/04	ICP-Be	PBS	0.013B	0.07	None
08/07/04	ICP-Ca	PBS	11.0B	55.0	None
08/07/04	ICP-Cr	PBS	0.11B	0.55	None
08/07/04	ICP-Fe	PBS	3.4B	17.0	None
08/07/04	ICP-Mg	PBS	1.8B	9.0	None
08/07/04	ICP-Mn	PBS	0.11B	0.55	None
08/07/04	ICP-Ni	PBS	0.16B	0.80	None
08/07/04	ICP-Na	PBS	71.5B	358	None
08/12/04	Hg	PBS	<MRL	NA	None
08/05/04	ICP-Ba	072304R	0.054B	0.27	None
08/05/04	ICP-Ca	072304R	23.2B	116	None
08/05/04	ICP-Fe	072304R	3.98B	19.9	None
08/05/04	ICP-Mg	072304R	4.20B	21.0	None
08/05/04	ICP-Mn	072304R	0.14B	0.70	None
08/05/04	ICP-Ni	072304R	0.11B	0.55	None
08/05/04	ICP-K	072304R	4.63B	23.2	None
08/05/04	ICP-Na	072304R	55.7B	279	WBGSD17, WBGSD18, WBGSD19, WBGSD20, WBGSD21, WBGSD22
08/05/04	ICP-Zn	072304R	0.49B	2.5	None
08/06/04	Hg	072304R	<MRL	NA	None

Table 3 Blank Contamination Analysis Summary, Continued

Analysis Date	Analysis	QC Blank ID	Max Conc. mg/kg	Action Level mg/kg	B qualified samples
08/05/04	ICP-Al	071904R1	2.07BN	10.4	None
08/05/04	ICP-Sb	071904R1	0.69B	3.5	WBGSB51B, WBGSB52B
08/05/04	ICP-Ba	071904R1	0.024B	0.12	None
08/05/04	ICP-Co	071904R1	0.13B	0.65	None
08/05/04	ICP-Mg	071904R1	2.42B	12.1	None
08/05/04	ICP-Mn	071904R1	0.074B	0.37	None
08/05/04	ICP-Na	071904R1	56.7B	284	WBGSB50B, WBGSB51B, WBGSB52B
08/05/04	ICP-V	071904R1	0.13B	0.65	None
08/05/04	Hg	071904R1	<MRL	NA	None

B = Value is estimated <MRL and >MDL.
N = Laboratory spike sample recovery not within control limits.

IV-ICP Interference Check Sample (ICS)
The ICP interference check sample (ICS) verifies interelement and background correction factors. ICP Interference Check is performed at the beginning and end of each sample analysis run. Control limits are 80-120% (USACE limits 80-120%).

- All criteria were met. No qualifiers were applied.

V-Laboratory Control Samples (LCS)
The laboratory control sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. All soil LCS results must fall within the control limits of 80-120% for ICP metals and mercury. USACE Shell limits for metals are 80-120% (60-140% for sporadic marginal failures (SMF)).

- Sample BKS67954 was used as LCS for ICP metals analysis dated 8/07/04. All criteria were met. No qualifiers were applied.

- Sample BKS68110 was used as LCS for total mercury analysis dated 8/06/04. All criteria were met. No qualifiers were applied.

VI-Duplicate Sample Analysis
Duplicate sample determinations are used to demonstrate acceptable method precision by the laboratory at the time of analysis. Duplicate analysis generate data in order to determine the long-term precision of the analytical method on various matrices. RPDs must be within established control limits. USACE Shell limits for metals are 25% RPD for ICP metals and 20% RPD for mercury.

- Sample WBGSD18 (407170-005) was used as sample duplicate for ICP metals analysis. Selenium (200%) was outside criteria. Selenium was outside criteria due to low sample concentration, therefore no qualifiers were applied based upon these outliers.

- Sample WBGSD18 (407170-005) was used as sample duplicate for mercury analysis. All criteria were met. No qualifiers were applied.

VII-Matrix Spike
MS are generated to determine long-term accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. Specific criteria include the analyses of matrix spike and matrix spike duplicate samples at a frequency of one MS per 20 samples of similar matrix. MS recoveries and relative percent differences between MS recoveries should be within the specified limits. USACE Shell limits for metals are 75-125% for ICP metals and 80-120% for mercury. Post digestion spikes limits are 75-125% for ICP metals and 85-115% for mercury.

- Sample WBGSD18 (407170-005) was used for the MS analysis for ICP analysis. Aluminum (976%), antimony (57.0%), calcium (19.8%), iron (135%), and potassium (133%) were outside of control limits. Post digestion spikes were within criteria for antimony and potassium. The sample concentration was >4 times the spike added for aluminum, calcium, and iron, therefore no qualifiers were applied based upon this outlier. For antimony, the spiked sample was qualified bias low non-detect "UL" based upon the low recovery. For potassium, the spiked sample was qualified bias high "K" based upon the high recovery.

- Sample WBGSD18 (407170-005) was used for the MS analysis for mercury analysis. All criteria were met. No qualifiers were applied.

VIII-ICP Serial Dilution
An ICP serial dilution is performed to determine whether significant physical or chemical interferences exist due to sample matrix at high concentrations. An analysis of a 5-fold dilution should agree within 10% difference of the original result when the concentration in sample is a factor of 50 above MDL.

- The serial dilution for the ICP was analyzed for sample WBGSD18 (407170-005). Beryllium (13.3%) and sodium (24.9%) were outside of criteria limits. Sample concentrations were <50 times MDL for beryllium and sodium, therefore no qualifiers were applied based upon these outliers.

IX-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the solid samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No field duplicates were analyzed in this SDG.

X-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value > MDL and < MRL or < 3*MDL (whichever was greater) was qualified as estimated, "J." The following calculations were performed for verification.

ICP Sample: WBGSB50B (407170-001), Total Barium

Conc. (mg/kg) = {(conc. μg/L)*(Final Volume L)*(DF)} / {(Weight Sample g)*(Fraction Solids)}

Conc. (mg/kg) = {(157.2493 μg/L)*(0.100 L)*(2)} / {(1.38 g)*(0.7941)} = 28.7 μg/g = 28.7 mg/kg

Reported concentration = 28.7 mg/kg
%D = 0.0%
Values were within 10% difference.

CVAA Sample: WBGSB50B (407170-001), Total Mercury

Conc. (mg/kg) = {(conc. μg/L)*(Final Volume L)*(DF)} / {(Weight Sample g)*(Fraction Solids)}

Conc. (mg/kg) = {(0.264 μg/L)*(0.100 L)*(1)} / {(0.74 g)*(0.7941)} = 0.045 μg/g = 0.045 mg/kg

Reported concentration = 0.045 mg/kg
%D = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – PCBs
GPL Laboratories, Inc., SDG 407170

DATE: January 3, 2005

The purpose of this memorandum is to present the data validation report for the samples collected for the New River WI at the RFAAP on July 19-23, 2004. Samples were analyzed for PCBs using USEPA Method 3540C/8082. A total of three soil samples and six sediment samples were analyzed and validated for PCBs. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
WBGSB50B	407170-001	WBGSD19	407170-006
WBGSB51B	407170-002	WBGSD20	407170-007
WBGSB52B	407170-003	WBGSD21	407170-008
WBGSD17	407170-004	WBGSD22	407170-009
WBGSD18	407170-005		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements* (USACE, February 2001), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (USEPA, September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
X		System Monitoring Compounds
	X	Laboratory Control Samples
	X	Matrix Spike/Spike Duplicate
	X	Field Sample Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifiers.

_____ _____

Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
PCB REVIEW
SDG 407170

I-Holding Times
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For PCB soil and sediment samples, cooled @4°C ±2°C, the maximum holding time is 14 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis (USEPA criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For samples collected on 07/19/04, 07/22/04, and 07/23/04, cooler was received by the laboratory at 3.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The samples were collected on 07/19/04, 07/22/04, and 07/23/04 for PCB compounds. They were extracted on 07/27/04 and analyzed for PCBs on 07/31/04 within criteria guidelines. The actual extraction and analysis dates for each sample may be found on the attached form 1s to this report. No qualifiers were applied.

II-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. The initial 5-point calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run. The percent relative standard deviation (%RSD) for all single peak target analytes, and aroclors 1016 and 1260 must be $< 20\%$ or the mean %RSD for all analytes in the standard must be $\leq 20\%$. If linear regression is used, the correlation coefficient must be ≥ 0.990 (USEPA and USACE criteria).

- For the PCB initial calibration performed on 07/29/04 on instrument GC-L, all compounds were determined using calibration factors for PCB 1016 and PCB 1260. All criteria were met, except for the following. For PCB 1260 signal #2, PCB 1260 #1 (20.7%), PCB 1260 #2 (21.5%), and PCB 1260 #5 (21.8%) were above criteria limits. The average %RSD for PCB 1260 for signal #2 (20.4%) was within criteria. All associated samples were non-detect for PCB 1260. No qualifiers were applied based upon these outliers. Samples WBGSB50B (407170-001), WBGSB51B (407170-002), WBGSB52B (407170-003), WBGSD17 (407170-004), WBGSD18 (407170-005), WBGSD19 (407170-006), WBGSD20 (407170-007), WBGSD21 (407170-008), and WBGSD22 (407170-009) apply to this initial calibration.

III-Continuing Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for PCB target compounds. Continuing calibration standards containing both target compounds and surrogates are analyzed at the beginning of each 12-hour analytical shift and after every 20 samples. The percent difference (%D) or the mean %RSD for all analytes in the standard from the initial calibration should be no greater than $\pm$ 15%.

- For PCB continuing calibration performed on 07/30/04 @23:03 on instrument GC-L, all criteria were met on column #1 and column #2 for all target compounds arochlor 1016 and arochlor 1260. No qualifiers were applied. Samples WBGSB50B (407170-001), WBGSB51B (407170-002), WBGSB52B (407170-003), WBGSD17 (407170-004), WBGSD18 (407170-005), WBGSD19 (407170-006), and WBGSD20 (407170-007) apply to his continuing calibration.

- For PCB continuing calibration performed on 07/31/04 @04:22 on instrument GC-L, all criteria were met on column #1 and column #2 for all target compounds arochlor 1016 and arochlor 1260. No qualifiers were applied. Samples WBGSD21 (407170-008) and WBGSD22 (407170-009) apply to his continuing calibration.

- For PCB continuing calibration performed on 07/31/04 @10:10 on instrument GC-L, all criteria were met on column #1 and column #2 for all target compounds arochlor 1016 and arochlor 1260. No qualifiers were applied. No samples reported apply to his continuing calibration.

- For PCB continuing calibration performed on 07/31/04 @15:29 on instrument GC-L, all criteria were met on column #1 and column #2 for all target compounds arochlor 1221 and arochlor 1254. No qualifiers were applied. No samples reported apply to his continuing calibration.

- For PCB continuing calibration performed on 07/31/04 @10:39 on instrument GC-L, all criteria were met on column #1 and column #2 for all target compounds arochlor 1221 and arochlor 1254. No qualifiers were applied. No samples reported apply to his continuing calibration.

IV-Blank Analysis

The purpose of laboratory or field blank analyses is to determine the existence and magnitude of contamination problems resulting from laboratory or field activities. One method blank per analytical batch must be run on each instrument used to analyze samples. No contaminants should be present in the blanks > MDL or MRL (USEPA criteria) or all target compounds < one-half the MRL (USACE criteria). **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one, 100% solids, and were converted to soil values (soil conversion factor = 30). The rinse blank breakout is as follows.

- Rinse blank 072304R applies to the western burning ground ("WBG" prefix samples) sediment samples ("SD" samples) and was analyzed in SDG 0407170.

- Rinse blank 071904R1 applies to the western burning ground ("WBG" prefix samples) subsurface soil samples ("B→C" suffix samples) and was analyzed in SDG 0407135.

Table 2 Blank Contamination Analysis Summary

Parameter	Analysis Date	QC Blank ID	Compound	Max Conc. µg/kg	Action Level µg/kg	B qualified samples
PCBs	07/30/04	BLK67957	All < MRL	NA	NA	None
PCBs	07/28/04	072304R	All < MRL	NA	NA	None
PCBs	07/28/04	071904R1	All < MRL	NA	NA	None

V-System Monitoring Compound (Surrogates)

Laboratory performance on individual samples is established by means of spiking activities. The percent recovery (%R) for all samples and blanks must be within the specified laboratory control limits.

Criteria: Decachlorobiphenyl: PCBs: 47-161% (USACE criteria 50-130%)
Tetrachloro-m-xylene: PCBs: 54-168% (USACE criteria 50-130%)

- For PCB analysis for sample WBGSD17 (407170-004), surrogates decachlorobiphenyl (35%, 44%) and tetrachloro-m-xylene (44%) were outside USACE and/or lab criteria. This sample was qualified non-detect estimated bias low "UL" based upon the low recoveries on primary and secondary columns.

- For PCB analysis for sample WBGSD18 (407170-005), surrogate decachlorobiphenyl (49%; signal #1) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene (signals #1 and #2) and decachlorobiphenyl (signal #2) were within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample WBGSD19 (407170-006), surrogate decachlorobiphenyl (43%; signal #2) and tetrachloro-m-xylene (51%; signal #2) were outside USACE and/or lab criteria. Since surrogates decachlorobiphenyl (signal #1) and tetrachloro-m-xylene (signal #1) were within criteria, no qualifiers were applied based upon these outliers.

- For PCB analysis for sample WBGSD20 (407170-007), surrogates decachlorobiphenyl (43%, 155%) and tetrachloro-m-xylene (37%, 43%) were outside USACE and/or lab criteria. This sample was qualified non-detect estimated "UJ" based upon the low/high recoveries on primary and secondary columns.

- For PCB analysis for sample WBGSD21 (407170-008), surrogate tetrachloro-m-xylene (133%; signal #1) was outside USACE and/or lab criteria. Since surrogate decachlorobiphenyl (signals #1 and #2) and tetrachloro-m-xylene (signal #2) were within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample WBGSD22 (407170-009), surrogate decachlorobiphenyl (46%; signal #2) and tetrachloro-m-xylene (52%; signal #2) were outside USACE and/or lab criteria. Since surrogates decachlorobiphenyl (signal #1) and tetrachloro-m-xylene (signal #1) were within criteria, no qualifiers were applied based upon these outliers.

- For all other samples, all criteria were met. No qualifiers were applied.

VI-Laboratory Control Samples
Laboratory control samples (LCS) are used to monitor long-term precision and accuracy of the analytical method. The analysis is performed at a frequency of 1 per analytical batch. The percent recoveries (%Rs) must be within the specified control limits. USACE Shell limits for PCBs are 50-130% (30-150% for sporadic marginal failures (SMF)).

- Sample BKS67957 was used for the LCS for PCBs. All criteria were met. No qualifiers were applied. Samples WBGSB50B (407170-001), WBGSB51B (407170-002), WBGSB52B (407170-003), WBGSD17 (407170-004), WBGSD18 (407170-005), WBGSD19 (407170-006), WBGSD20 (407170-007), WBGSD21 (407170-008), and WBGSD22 (407170-009) apply to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. USACE Shell limits for PCBs are 40-140%; RPD<50%.

- Sample WBGSD18 (407170-005) was used for the MS/MSD analysis for PCB compounds. All criteria were met. No qualifiers were applied.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. The project precision control criterion was established at 50% RPD for the solid samples.

- No field duplicates were analyzed in this SDG.

IX-Quantitation Verification
The accuracy of analytical results was verified through the calculation of several parameters. The difference between the calculated value and the reported value must be within 10% difference. All samples were non-detect for PCBs, therefore the quantification verification not included here. Any sample value > MDL and < MRL or < 3*MDL (whichever is greater) was qualified as estimated, "J." The difference between the primary column and the confirmatory column must be ≤ 40% difference (USEPA and USACE criteria).

- All PCBs were non-detect for associated soil and sediment samples in this SDG.

Sample: WBGSD18MS (407170-005MS), Aroclor 1260

Conc. μg/kg = (Ax * Vt * DF) / (CF * Vi * Ws * D)

where: Conc. = Sample concentration in μg/kg
Ax = Area/response for compound being measured.
Vt = Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10000 μL.
CF = Ave calibration response factor for compound being measured from ICAL (Area/pg)
Vi = Volume of extract injected (mL).
W(s) = Weight of sample extracted or diluted in grams.
D = Percent dry weight (100 - % moisture in sample)/100 = 1.0 for Wet Weight
DF = Dilution factor

Signal #1
Conc1 μg/kg = (114834Area*10000μL*1) / (394.5Area/pg*(1000 pg/ng)*1 μL*30g*0.4225) = 229.65 μg/kg
Conc2 μg/kg = (178684Area*10000μL*1) / (561.8Area/pg*(1000 pg/ng)*1 μL*30g*0.4225) = 250.93 μg/kg
Conc3 μg/kg = (210860Area*10000μL*1) / (650.6Area/pg*(1000 pg/ng)*1 μL*30g*0.4225) = 255.70 μg/kg
Conc4 μg/kg = (82000Area*10000μL*1) / (285.6Area/pg*(1000 pg/ng)*1 μL*30g*0.4225) = 226.52 μg/kg
Conc5 μg/kg = (248668Area*10000μL*1) / (835.2Area/pg*(1000 pg/ng)*1 μL*30g*0.4225) = 234.90 μg/kg
Average concentration = 240 μg/kg

Signal #2
Conc1 μg/kg = (534612Area*10000μL*1) / (2067Area/pg*(1000 pg/ng)*1 μL*30g*0.4225) = 204.06 μg/kg
Conc2 μg/kg = (662586Area*10000μL*1) / (2260Area/pg*(1000 pg/ng)*1 μL*30g*0.4225) = 231.31 μg/kg
Conc3 μg/kg = (906364Area*10000μL*1) / (3052Area/pg*(1000 pg/ng)*1 μL*30g*0.4225) = 234.30 μg/kg
Conc4 μg/kg = (475258Area*10000μL*1) / (1759Area/pg*(1000 pg/ng)*1 μL*30g*0.4225) = 213.16 μg/kg
Conc5 μg/kg = (903048Area*10000μL*1) / (3399Area/pg*(1000 pg/ng)*1 μL*30g*0.4225) = 209.61 μg/kg
Average concentration = 220 μg/kg

Reported Value = 240 μg/kg (signal #1)
% Difference = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – Percent Lipids
GPL Laboratories, Inc., SDG 407171

DATE: January 12, 2005

The purpose of this memorandum is to present the data validation report for the tissue samples collected for the New River Unit WI at the RFAAP on July 21, 2004. Samples were analyzed for percent lipids using GPL SOPs. A total of sixteen tissue samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
WBGTS08	407171-001	WBGTS16	407171-009
WBGTS22	407171-002	WBGTS07	407171-010
WBGTS18	407171-003	WBGTS06	407171-011
WBGTS15	407171-004	WBGTS05	407171-012
WBGTS21	407171-005	WBGTS04	407171-013
WBGTS20	407171-006	WBGTS03	407171-014
WBGTS19	407171-007	WBGTS02	407171-015
WBGTS17	407171-008	WBGTS01	407171-016

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements* (USACE, February 2001), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Inorganic Data Review* (April, 1993). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times and Preservation
	X	Lab Sample Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable.

_____ _____

Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
PERCENT LIPIDS REVIEW
SDG 407171

I-HOLDING TIMES AND PRESERVATION

The primary objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample analysis. The tissue samples are received and stored cool @4 °C ± 2 °C, and should be analyzed when other associated analysis is performed.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For tissue samples collected on 07/21/04, cooler was received by the laboratory at 2.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The samples were collected on 07/21/04. They were analyzed for percent lipids on 08/03/04. All holding time criteria were met. No qualifiers were applied.

II-LAB DUPLICATE SAMPLE ANALYSIS

Duplicate sample determinations are used to demonstrate acceptable method precision by the laboratory at the time of analysis. Duplicate analysis generate data in order to determine the long-term precision of the analytical method on various matrices. RPDs must be within established control limits (≤20%RPD).

- The laboratory performed a sample duplicate on sample WBGTS01 (407171-016) for percent lipids. The RPD between the sample and duplicate analysis (RPD=9.4%) was within the 20% RPD criteria. All criteria were met. No qualifiers were applied.

III-CALCULATION VERIFICATION

The following calculations were performed for verification. All calculation verifications were within the 10% difference criteria.

$$\% = \frac{(\text{Net Dry Weight g} - \text{Tare weight g})*(100)}{(\text{Sample volume mL} / 10\text{mL})*(\text{Sample weight g})}$$

Sample: WBGTS08 (407171-001), Percent Lipids

$$\% = \frac{(2.2801-2.2196\text{g})*(100)}{(0.5\text{mL}/10\text{mL})*20\text{g}} = 6.1\%$$

Reported Value = 6.1
% Difference = 0.0%

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – TAL Metals
GPL Laboratories, Inc., SDG 407171

DATE: January 7, 2005

The purpose of this memorandum is to present the data validation report for the tissue samples collected for the New River Unit WI at the RFAAP on July 21, 2004. Samples were analyzed for target analyte list (TAL) metals using USEPA SW-846 3050B/6010B for ICP metals and USEPA SW-846 7471A for mercury. A total of sixteen tissue samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
WBGTS08	407171-001	WBGTS16	407171-009
WBGTS22	407171-002	WBGTS07	407171-010
WBGTS18	407171-003	WBGTS06	407171-011
WBGTS15	407171-004	WBGTS05	407171-012
WBGTS21	407171-005	WBGTS04	407171-013
WBGTS20	407171-006	WBGTS03	407171-014
WBGTS19	407171-007	WBGTS02	407171-015
WBGTS17	407171-008	WBGTS01	407171-016

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements* (USACE, February 2001), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Inorganic Data Review* (April, 1993). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times and Preservation
	X	Initial and Continuing Calibration
	X	Blank Analysis
	X	ICP Interference Check Sample (ICS)
	X	Laboratory Control Sample (LCS)
	X	Lab Sample Duplicate
X		Matrix Spike and Matrix Spike Duplicate
X		ICP Serial Dilution
	X	Field Sample Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

_____ _____

Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
TAL METALS REVIEW
SDG 407171

I-Holding Times and Preservation

The primary objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample analysis. The tissue samples are received and stored cool @4 °C ± 2 °C, with a maximum holding time of 180 days for ICP metals and 28 days for mercury from collection (USEPA criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For tissue samples collected on 07/21/04, cooler was received by the laboratory at 2.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The samples were collected on 07/21/04. They were digested on 08/03/04 and analyzed for ICP metals on 08/06/04 and 08/10/04 for potassium. Samples were digested on 08/07/04 for mercury and were analyzed for mercury on 08/08/04. All holding time criteria were met. No qualifiers were applied.

II-Initial and Continuing Calibration

Requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of the analysis run, and continuing calibration verification documents that the initial calibration is still valid.

ICP:	1- blank (USACE <MDL)	Hg:	1 – blank (USACE <MDL)
	3 – standards (r≥0.995)		5 – standards (r≥0.995)
	ICV/CCV (90-110%) (USACE 90-110%)		ICV/CCV (80-120%) (USACE ICV 90-110% / CCV 80-120%)
	MRL (70-130%) (USACE 80-120%)		MRL (80-120%)

- The samples were analyzed for ICP metals on 08/06/04 and 08/10/04 for potassium. Mercury was analyzed on 08/08/04 with a correlation coefficient of 0.9999. All ICV/CCV standards were within criteria. No qualifiers were applied. **Table 2** summarizes the MRL standard analysis for metals. Samples with concentrations detected less than two times the MRL with out of criteria MRL recovery were qualified.

Table 2 MRL Analysis Summary

Analysis Date	Analysis	MRL (µg/L)	MRL (mg/kg)	MRL %Recovery	Qualified samples @ <2xMRL	Validation Qualifiers
08/05/04	ICP-Ag	3.0	0.11	138	None	K
08/08/04	Hg	0.2	0.02	All within criteria	None	None

III-Blanks
Blanks (preparation and calibration blanks) are assessed to determine the existence and magnitude of contamination problems. No contaminants should be detected (i.e. <MDL) in any of the associated blanks. USACE Shell limits are < ½MRL for the method blank. Samples are qualified "B" when they are less than 5x the absolute value of the maximum blank concentration. **Table 3** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one and were converted to solid values. There was no rinse blank associated with the tissue samples (directly collected using electroshock techniques). Fillets were performed at lab.

Table 3 Blank Contamination Analysis Summary

Analysis Date	Analysis	QC Blank ID	Max Conc. mg/kg	Action Level mg/kg	B qualified samples
08/06/04	ICP	ICB/CCBs	<MRL	NA	None
08/10/04	ICP-K	ICB/CCBs	<MRL	NA	None
08/08/04	Hg	ICB/CCBs	<MRL	NA	None
08/06/04	ICP	PBS	<MRL	NA	None
08/08/04	Hg	PBS	<MRL	NA	None

IV-ICP Interference Check Sample (ICS)
The ICP interference check sample (ICS) verifies interelement and background correction factors. ICP Interference Check is performed at the beginning and end of each sample analysis run. Control limits are 80-120% (USACE limits 80-120%).

- All criteria were met. No qualifiers were applied.

V-Laboratory Control Samples (LCS)
The laboratory control sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. All solid LCS results must fall within the control limits of 80-120% for ICP metals and mercury. USACE Shell limits for metals are 80-120% (60-140% for sporadic marginal failures (SMF)).

- Sample BKS68044 was used as LCS for ICP metals analysis dated 8/06/04. All criteria were met. No qualifiers were applied.

- Sample BKS68148 was used as LCS for total mercury analysis dated 8/08/04. All criteria were met. No qualifiers were applied.

VI-Duplicate Sample Analysis
Duplicate sample determinations are used to demonstrate acceptable method precision by the laboratory at the time of analysis. Duplicate analysis generate data in order to determine the long-term precision of the analytical method on various matrices. RPDs must be within established control limits. USACE Shell limits for metals are 25% RPD for ICP metals and 20% RPD for mercury.

- No sample duplicates were performed. Lab precision was measured using matrix spike duplicates (Section VII).

VII-Matrix Spike and Matrix Spike Duplicate
MS and MSD are generated to determine long-term accuracy and precision of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. Specific criteria include the analyses of matrix spike and matrix spike duplicate samples at a frequency of one MS per 20 samples of similar matrix. MS recoveries and relative percent differences between MS recoveries should be within the specified limits. USACE Shell limits for metals are 75-125%; 25%RPD for ICP metals and 80-120%; 20%RPD for mercury. Post digestion spikes limits are 75-125% for ICP metals and 85-115% for mercury.

- Sample WBGTS22 (407171-002) was used for the MS analysis for ICP analysis. Calcium (17.6%, -12.1%) and potassium (150%) were outside of control limits. Post digestion spikes were within criteria for calcium (91.8%). The sample concentration was >4 times the spike added for potassium, therefore no qualifiers were applied based upon this outlier. For calcium, the spiked sample was qualified bias low non-detect "L" based upon the low recovery.

- Sample WBGTS08 (407171-001) was used for the MS analysis for mercury analysis. All criteria were met. No qualifiers were applied.

VIII-ICP Serial Dilution
An ICP serial dilution is performed to determine whether significant physical or chemical interferences exist due to sample matrix at high concentrations. An analysis of a 5-fold dilution should agree within 10% difference of the original result when the concentration in sample is a factor of 50 above MDL.

- The serial dilution for the ICP was analyzed for sample WBGTS22 (407171-002). Copper (100%), iron (100%), potassium (14.1%), and sodium (13.9%) were outside of criteria limits. Sample concentrations were <50 times MDL for copper and iron, therefore no qualifiers were applied based upon these outliers. Potassium and sodium were qualified estimated "J" based upon the high %Ds.

IX-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the solid samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No field duplicates were analyzed for fish tissue.

X-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%.

ICP Sample: WBGTS08 (407171-001), Total Barium

Conc. (mg/kg) = {(conc. μg/L)*(Final Volume L)*(DF)} / {(Weight Sample g)}

Conc. (mg/kg) = {(401.2395 μg/L)*(0.100 L)*(1)} / {(2.70 g)} = 14.9 μg/g = 14.9 mg/kg

Reported concentration = 14.9 mg/kg
%D = 0.0%

Values were within 10% difference.

CVAA Sample: WBGTS08 (407171-001), Total Mercury

Conc. (mg/kg) = {(conc. μg/L)*(Final Volume L)*(DF)} / {(Weight Sample g)}

Conc. (mg/kg) = {(0.246 μg/L)*(0.100 L)*(1)} / {(1.02 g)} = 0.024 μg/g = 0.024 mg/kg

Reported concentration = 0.024 mg/kg
%D = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – PCBs
GPL Laboratories, Inc., SDG 407171

DATE: January 7, 2005

The purpose of this memorandum is to present the data validation report for the tissue samples collected for the New River Unit WI at the RFAAP on July 21, 2004. Samples were analyzed for PCBs using USEPA Method 3540C/8082. A total of sixteen tissue samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
WBGTS08	407171-001	WBGTS16	407171-009
WBGTS22	407171-002	WBGTS07	407171-010
WBGTS18	407171-003	WBGTS06	407171-011
WBGTS15	407171-004	WBGTS05	407171-012
WBGTS21	407171-005	WBGTS04	407171-013
WBGTS20	407171-006	WBGTS03	407171-014
WBGTS19	407171-007	WBGTS02	407171-015
WBGTS17	407171-008	WBGTS01	407171-016

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements* (USACE, February 2001), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (USEPA, September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
X		System Monitoring Compounds
	X	Laboratory Control Samples
	X	Matrix Spike/Spike Duplicate
	X	Field Sample Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifiers.

_____ _____

Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
PCB REVIEW
SDG 407171

I-Holding Times
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For PCB tissue samples, cooled @4°C ±2°C, the maximum holding time is 14 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis (USEPA criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For tissue samples collected on 07/21/04, cooler was received by the laboratory at 2.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The samples were collected on 07/21/04 for PCB compounds. They were extracted on 08/02/04 and analyzed for PCBs on 08/04/04 within criteria guidelines. The actual extraction and analysis dates for each sample may be found on the attached form 1s to this report. No qualifiers were applied.

II-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. The initial 5-point calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run. The percent relative standard deviation (%RSD) for all single peak target analytes, and aroclors 1016 and 1260 must be $< 20\%$ or the mean %RSD for all analytes in the standard must be $\leq 20\%$. If linear regression is used, the correlation coefficient must be ≥ 0.990 (USEPA and USACE criteria).

- For the PCB initial calibration performed on 07/29/04 on instrument GC-L, all compounds were determined using calibration factors for PCB 1016 and PCB 1260. All criteria were met, except for the following. For PCB 1260 signal #2, PCB 1260 #1 (20.7%), PCB 1260 #2 (21.5%), and PCB 1260 #5 (21.8%) were above criteria limits. The average %RSD for PCB 1260 for signal #2 (20.4%) was within criteria. All associated samples were non-detect for PCB 1260. No qualifiers were applied based upon these outliers. Samples WBGTS08 (407171-001), WBGTS22 (407171-002), WBGTS18 (407171-003), WBGTS15 (407171-004), WBGTS21 (407171-005), WBGTS20 (407171-006), WBGTS19 (407171-007), WBGTS17 (407171-008), WBGTS16 (407171-009), WBGTS07 (407171-010), WBGTS06 (407171-011), WBGTS05 (407171-012), WBGTS04 (407171-013), WBGTS03 (407171-014), WBGTS02 (407171-015), and WBGTS01 (407171-016) apply to this initial calibration.

III-Continuing Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for PCB target compounds. Continuing calibration standards containing both target compounds and surrogates are analyzed at the beginning of each 12-hour analytical shift and after every 20 samples. The percent difference (%D) or the mean %RSD for all analytes in the standard from the initial calibration should be no greater than $\pm$ 15%.

- For PCB continuing calibration performed on 08/04/04 @08:19 on instrument GC-L, all criteria were met on column #1 and column #2 for all target compounds arochlor 1016 and arochlor 1260. No qualifiers were applied. Samples WBGTS08 (407171-001), WBGTS22 (407171-002), WBGTS18 (407171-003), WBGTS15 (407171-004), WBGTS21 (407171-005), and WBGTS20 (407171-006) apply to his continuing calibration.

- For PCB continuing calibration performed on 08/04/04 @14:23 on instrument GC-L, all criteria were met on column #2 for all target compounds arochlor 1016 and arochlor 1260. For column #1, arochlor 1016 #2 (16.7%) was outside criteria. The average of the peaks for arochlor 1016 (8.0%) was within criteria and all associated samples were non-detect. Arochlor 1260 was within criteria limits for column #1. No qualifiers were applied. Samples WBGTS19 (407171-007), WBGTS17 (407171-008), WBGTS16 (407171-009), WBGTS07 (407171-010), WBGTS06 (407171-011), WBGTS05 (407171-012), WBGTS04 (407171-013), WBGTS03 (407171-014), WBGTS02 (407171-015), and WBGTS01 (407171-016) apply to his continuing calibration.

- For PCB continuing calibration performed on 08/04/04 @20:11 on instrument GC-L, all criteria were met on column #1 and column #2 for all target compounds arochlor 1016 and arochlor 1260. No qualifiers were applied. No samples reported apply to his continuing calibration.

IV-Blank Analysis

The purpose of laboratory or field blank analyses is to determine the existence and magnitude of contamination problems resulting from laboratory or field activities. One method blank per analytical batch must be run on each instrument used to analyze samples. No contaminants should be present in the blanks > MDL or MRL (USEPA criteria) or all target compounds < one-half the MRL (USACE criteria). **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one and were converted to solid values. There was no rinse blank associated with the tissue samples (directly collected using electroshock techniques). Fillets were performed at lab.

Table 2 Blank Contamination Analysis Summary

Parameter	Analysis Date	QC Blank ID	Compound	Max Conc. µg/kg	Action Level µg/kg	B qualified samples
PCBs	08/04/04	BLK68061	All < MRL	NA	NA	None

V-System Monitoring Compound (Surrogates)

Laboratory performance on individual samples is established by means of spiking activities. The percent recovery (%R) for all samples and blanks must be within the specified laboratory control limits.

Criteria: Decachlorobiphenyl: PCBs: 21-155% (USACE criteria 50-130%)
Tetrachloro-m-xylene: PCBs: 19-191% (USACE criteria 50-130%)

- For PCB analysis for sample WBGTS20 (407171-006), surrogate tetrachloro-m-xylene (176%; signal #2) was outside USACE and/or lab criteria. Since surrogate decachlorobiphenyl (signals #1 and #2) and tetrachloro-m-xylene (signal #1) were within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample WBGTS19 (407171-007), surrogate tetrachloro-m-xylene (157%; signal #2) was outside USACE and/or lab criteria. Since surrogate decachlorobiphenyl (signals #1 and #2) and tetrachloro-m-xylene (signal #1) were within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample WBGTS15 (407171-004), surrogate decachlorobiphenyl (43%; signal #2) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene (signals #1 and #2) and decachlorobiphenyl (signal #1) were within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample WBGTS16 (407171-009), surrogate decachlorobiphenyl (41%; signal #1) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene (signals #1 and #2) and decachlorobiphenyl (signal #2) were within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample WBGTS18 (407171-003), surrogate decachlorobiphenyl (32%, 40%) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene (signals #1 and #2) were within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample WBGTS19 (407171-007), surrogates decachlorobiphenyl (154%) and tetrachloro-m-xylene (143%, 158%) were outside USACE and/or lab criteria. This sample was qualified non-detect estimated bias "UJ" based upon the high recoveries on primary and secondary columns.

- For PCB analysis for sample WBGTS21 (407171-005), surrogate decachlorobiphenyl (49%; signal #1) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene (signals #1 and #2) and decachlorobiphenyl (signal #2) were within criteria, no qualifiers were applied based upon this outlier.

- For all other samples, all criteria were met. No qualifiers were applied.

VI-Laboratory Control Samples
Laboratory control samples (LCS) are used to monitor long-term precision and accuracy of the analytical method. The analysis is performed at a frequency of 1 per analytical batch. The percent recoveries (%Rs) must be within the specified control limits. USACE Shell limits for PCBs are 50-130% (30-150% for sporadic marginal failures (SMF)).

- Sample BKS68061 was used for the LCS for PCBs. All criteria were met. No qualifiers were applied. Samples WBGTS08 (407171-001), WBGTS22 (407171-002), WBGTS18 (407171-003), WBGTS15 (407171-004), WBGTS21 (407171-005), WBGTS20 (407171-006), WBGTS19 (407171-007), WBGTS17 (407171-008), WBGTS16 (407171-009), WBGTS07 (407171-010), WBGTS06 (407171-011), WBGTS05 (407171-012), WBGTS04 (407171-013), WBGTS03 (407171-014), WBGTS02 (407171-015), and WBGTS01 (407171-016) apply to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. USACE Shell limits for PCBs are 40-140%; RPD<50%.

- Sample WBGTS22 (407171-002) was used for the MS/MSD analysis for PCB compounds. All criteria were met. No qualifiers were applied.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. The project precision control criterion was established at 50% RPD for the solid samples.

- No field duplicates were analyzed for fish tissue.

IX-Quantitation Verification

The accuracy of analytical results was verified through the calculation of several parameters. The difference between the calculated value and the reported value must be within 10% difference. All samples were non-detect for PCBs, therefore the quantification verification not included here. The difference between the primary column and the confirmatory column must be ≤ 40% difference (USEPA and USACE criteria).

- All PCBs were non-detect for associated tissue samples in this SDG.

Sample: WBGTS22MS (407171-002MS), Aroclor 1260

Conc. μg/kg = (Ax * Vt * DF) / (CF * Vi * Ws)

where: Conc. = Sample concentration in μg/kg
Ax = Area/response for compound being measured.
Vt = Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10000 μL.
CF = Ave calibration response factor for compound being measured from ICAL (Area/pg)
Vi = Volume of extract injected (mL).
W(s) = Weight of sample extracted or diluted in grams.
DF = Dilution factor

Signal #1
Conc1 μg/kg = (199482Area*10000μL*1) / (394.5Area/pg*(1000 pg/ng)*1 μL*20g) = 252.83 μg/kg
Conc2 μg/kg = (325662Area*10000μL*1) / (561.8Area/pg*(1000 pg/ng)*1 μL*20g) = 289.84 μg/kg
Conc3 μg/kg = (282326Area*10000μL*1) / (650.6Area/pg*(1000 pg/ng)*1 μL*20g) = 216.97 μg/kg
Conc4 μg/kg = (105322Area*10000μL*1) / (285.6Area/pg*(1000 pg/ng)*1 μL*20g) = 184.39 μg/kg
Conc5 μg/kg = (281320Area*10000μL*1) / (835.2Area/pg*(1000 pg/ng)*1 μL*20g) = 168.41 μg/kg
Average concentration = 220 μg/kg

Signal #2
Conc1 μg/kg = (808354Area*10000μL*1) / (2067Area/pg*(1000 pg/ng)*1 μL*20g) = 195.54 μg/kg
Conc2 μg/kg = (1085876Area*10000μL*1) / (2260Area/pg*(1000 pg/ng)*1 μL*20g) = 240.24 μg/kg
Conc3 μg/kg = (501276Area*10000μL*1) / (3052Area/pg*(1000 pg/ng)*1 μL*20g) = 82.12 μg/kg
Conc4 μg/kg = (444454Area*10000μL*1) / (1759Area/pg*(1000 pg/ng)*1 μL*20g) = 126.34 μg/kg
Conc5 μg/kg = (767000Area*10000μL*1) / (3399Area/pg*(1000 pg/ng)*1 μL*20g) = 112.83 μg/kg
Average concentration = 150 μg/kg

Reported Value = 220 μg/kg (Signal #1)
% Difference = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – PAHs
GPL Laboratories, Inc., SDG 407172

DATE: August 30, 2004

The purpose of this memorandum is to present the data validation report for the samples collected for the New River WI at the RFAAP on July 23, 2004. Sample was analyzed for polynuclear aromatic hydrocarbons (PAHs) using USEPA SW846 Methods 3550B/8270C low level. A total of one soil sample was validated. The sample Id is:

Field Sample ID	Lab Sample ID
DTSB89A	407172-001

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements*, method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times
	X	Instrument Performance Check
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	Surrogate Spikes
	X	Internal Standards
	X	Laboratory Control Standard
X		Matrix Spike/Spike Duplicate
	X	Field Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

_____ _____

Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
POLYNUCLEAR AROMATIC HYDROCARBONS REVIEW
SDG 407172

I-Holding Times
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For polynuclear aromatic hydrocarbons (PAHs) soil samples cooled @ 4°C ± 2°C; the maximum holding time is the maximum holding time is 14 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For samples collected on 07/23/04, cooler was received by the laboratory at 3.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The soil sample was collected on 07/23/04, extracted on 07/26/04, and analyzed for PAHs on 07/27/04. The actual extraction and analysis dates for each sample may be found on the attached form 1 to this report. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check
GC/MS instrument performance checks are performed to ensure mass resolution, identification and, to some degree, sensitivity. The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, decafluorotriphenylphosphine (DFTPP), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for PAH compounds by GC/MS low level. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.99. The minimum relative response factor (RRF) criteria must be ≥ 0.05. Initial calibration percent relative standard deviation (%RSD) must be ≤ 15% on the average for all compounds (< 30% for CCCs). All detects are qualified as estimated “J” for where there were exceeding %RSDs, and all non-detects are qualified as estimated “UJ” for where there were grossly exceeding recoveries, unless determined to be unusable “R”. Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated “J” and non-detects are rejected “R”.

- Initial calibration for the PAHs by USEPA SW-846 8270C low level was performed on 07/19/04 on instrument GC/MS-P. All RRFs were ≥ 0.05. All criteria were met. No qualifiers were applied. Sample DTSB89A (407172-001) applies to this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Continuing calibration standards containing both target and surrogates compounds are analyzed at the beginning of each 12-hour analysis period following the analysis of the instrument performance check and prior to the analysis of blanks and samples. The minimum relative response factors (RRF) for semivolatile target compounds and surrogates must be $\geq$ 0.05. The percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within $\pm$ 20% for all target compounds. Grossly exceeding is defined where %D>40%. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For continuing calibration for the PAHs by USEPA SW-846 8270C low level performed on 07/27/04 @13:13 on instrument GC/MS-P, all target compounds were within criteria. No qualifiers were applied. Sample DTSB89A (407172-001) applies to this continuing calibration.

V-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. A method blank analysis must be performed after the calibration standards and once every 12-hour time period beginning with the injection of DFTPP. No contaminants should be detected in any of the associated blanks > the MDL. USACE Shell criteria specifies all concentrations should be less than one-half MRL (<MRL for common laboratory contaminants phthalate esters). Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is $\leq$ 10 times (10x) the maximum amount in any blank for the common laboratory contaminants phthalate esters, or 5 times (5X) the maximum amount for other semivolatile target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one, 100% solids, and were converted to soil values (soil conversion factor = 33). Rinse blanks 071304R1 (407077-001) and 071304R2 (407077-002) apply to the surface soil samples ("A" fraction samples) and was analyzed in SDG 0407077. Rinse blank 072004R2 (407140-001) applies to the subsurface soil samples ("B" fraction samples) and was analyzed in SDG 0407140.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/kg	Action Level µg/kg	B qualified samples
07/27/04	BLK67936	All compounds < MRL	NA	NA	None
07/20/04	071304R1	All compounds < MRL	NA	NA	None
07/20/04	071304R2	All compounds < MRL	NA	NA	None
07/26/04	072004R2	All compounds < MRL	NA	NA	None

VI-Surrogate Spikes

Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Surrogate spikes are added to all samples and blanks to measure their recovery in sample and blank matrices. The percent recoveries (%Rs) must be within the specified control limits.

Criteria: Nitrobenzene-d5 (29-140%) – S1 (USACE Shell Criteria: 45-135%)
2-Fluorobiphenyl (31-125%) – S2 (USACE Shell Criteria: 45-135%)
Terphenyl – d14 (26-160%) – S3 (USACE Shell Criteria: 45-135%)

- All criteria were met. No qualifiers were applied.

VII-Internal Standards
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Internal standard area counts for samples and blanks must not vary by more than a factor of two (- 50% to + 100%) from the associated calibration standard. The retention time of the internal standards in samples and blanks must not vary by more than ± 30 seconds from the retention time of the associated calibration standard.

- All criteria were met. No qualifiers were applied.

VIII-Laboratory Control Samples
Laboratory control samples (LCS) are used to monitor laboratory accuracy by calculating the percent recoveries of the spiked compounds. All LCS percent recoveries must be within the specified control limits. USACE Shell limits for PAHs by 8270C low level are 45-135% (25-150% for sporadic marginal failures (SMF)).

- Sample BKS67936 was used as the LCS for PAHs by USEPA SW-846 8270C low level analyzed 07/27/04. All criteria were met. No qualifiers were applied. Sample DTSB89A (407172-001) applies to this LCS.

IX-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. USACE Shell limits are 45-135%; RPD ≤ 60% (15-150%; RPD ≤ 60% for sporadic marginal failures (SMF)).

- Sample DTSB80A (407137-015) was used for the MS/MSD analysis for PAHs. The spiked sample was analyzed in SDG 407137. Compounds benzo(a)anthracene (148%, 158%), benzo(a)pyrene (143%, 153%), benzo(b)fluoranthene (155%, 170%), benzo(k)fluoroanthene (141%, 141%), chrysene (133%, 148%), dibenz(a,h)anthracene (125%), fluoranthene (210%, 225%), indeno(1,2,3-cd)pyrene (132%, 127%), phenanthrene (159%, 174%), and pyrene (153%, 173%) were outside USACE and/or lab criteria. The high recoveries were due to large amount of organic compounds detected in the spiked sample. All detects were qualified "K" estimated high for the spiked sample and non-detects no qualifier for the noted compounds based upon these outliers.

X-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the soil samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No field soil sample duplicate pair was analyzed in this SDG.

XI-Quantitation Verification

The accuracy of analytical results was verified through the calculation of several parameters. Percent difference (%D) between the calculated and reported values must be ≤10%. Any sample value > MDL and < MRL or < 3*MDL (whichever is greater) was qualified as estimated, "J." Any tentatively identified compounds found were qualified as estimated "J".

Sample: DTSB89A (407172-001), pyrene

Conc. μg/kg = (Ax * Is * Vt * DF) / (Ais * RRF * Vi * Ws * D)

where:
- Conc. = Sample concentration in μg/kg
- Ax = Area of characteristic ion for compound being measured.
- Is = Amount of internal standard injected (ng).
- Vt = Volume of total extract (μL).
- Ais = Area of characteristic ion for the internal standard.
- RRF = Average relative response factor for compound being measured (from ICAL)
- Vi = Volume of extract injected (μL).
- W(s) = Weight of sample extracted or diluted in grams.
- D = Percent dry weight (100 - % moisture in sample)/100
- DF = Dilution factor

Conc. μg/kg = (1614108 * 4 * 1000 * 1) / (1260394 * 1.503 * 1 * 30 * 0.9051) = 130 μg/kg
Reported Value = 130 μg/kg
% Difference = 0.0%
Values were within 10% difference

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – PCBs
GPL Laboratories, Inc., SDG 407172

DATE: August 30, 2004

The purpose of this memorandum is to present the data validation report for the samples collected for the New River WI at the RFAAP on July 23, 2004. Samples were analyzed for PCBs using USEPA Methods 3540C/8082. A total of one soil sample was analyzed and validated for PCBs. The sample Id is:

Field Sample ID	Lab Sample ID
DTSB89A	407172-001

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements* (USACE, February 2001), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (USEPA, September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	System Monitoring Compounds
	X	Laboratory Control Samples
	X	Matrix Spike/Spike Duplicate
	X	Field Sample Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable.

_____ _____

Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
PCB REVIEW
SDG 407172

I-Holding Times
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For PCB soil samples, cooled @4°C ±2°C, the maximum holding time is 14 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis (USEPA criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For samples collected on 07/23/04, cooler was received by the laboratory at 3.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The sample was collected 07/23/04 for PCB compounds. It was extracted on 07/27/04 and analyzed for PCBs on 07/31/04 within criteria guidelines. The actual extraction and analysis dates for each sample may be found on the attached form 1 to this report. No qualifiers were applied for these samples.

II-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. The initial 5-point calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run. The percent relative standard deviation (%RSD) for all single peak target analytes, and aroclors 1016 and 1260 must be $< 20\%$ or the mean %RSD for all analytes in the standard must be $\leq 20\%$. If linear regression is used, the correlation coefficient must be ≥ 0.990 (USEPA and USACE criteria).

- For the PCB initial calibration performed on 07/29/04 on instrument GC-L, all compounds were determined using calibration factors for PCB 1016 and PCB 1260. All criteria were met, except for the following. For PCB 1260 signal #2, PCB 1260 #1 (20.7%), PCB 1260 #2 (21.5%), and PCB 1260 #5 (21.8%) were above criteria limits. The average %RSD for PCB 1260 for signal #2 (20.4%) was within criteria. All associated samples were non-detect for PCB 1260. No qualifiers were applied based upon these outliers. Sample DTSB89A (407172-001) applies to this initial calibration.

III-Continuing Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for PCB target compounds. Continuing calibration standards containing both target compounds and surrogates are analyzed at the beginning of each 12-hour analytical shift and after every 20 samples. The percent difference (%D) or the mean %RSD for all analytes in the standard from the initial calibration should be no greater than $\pm$ 15%.

- For PCB continuing calibration performed on 07/30/04 @23:03 on instrument GC-L, the following %Ds were determined. All criteria were met. No qualifiers were applied. No sample reported applies to this continuing calibration.

- For PCB continuing calibration performed on 07/31/04 @04:22 on instrument GC-L, the following %Ds were determined. All criteria were met. No qualifiers were applied. Sample DTSB89A (407172-001) applies to this continuing calibration.

- For PCB continuing calibration performed on 07/31/04 @10:10 on instrument GC-L, the following %Ds were determined. All criteria were met. No qualifiers were applied. No sample reported applies to this continuing calibration.

IV-Blank Analysis
The purpose of laboratory or field blank analyses is to determine the existence and magnitude of contamination problems resulting from laboratory or field activities. One method blank per analytical batch must be run on each instrument used to analyze samples. No contaminants should be present in the blanks > MDL or MRL (USEPA criteria) or all target compounds < one-half the MRL (USACE criteria). **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one, 100% solids, and were converted to soil values (soil conversion factor = 30). Rinse blanks 071304R1 (407077-001) and 071304R2 (407077-002) apply to the surface soil samples ("A" fraction samples) and was analyzed in SDG 0407077. Rinse blank 072004R2 (407140-001) applies to the subsurface soil samples ("B" fraction samples) and was analyzed in SDG 0407140.

Table 2 Blank Contamination Analysis Summary

Parameter	Analysis Date	QC Blank ID	Compound	Max Conc. µg/kg	Action Level µg/kg	B qualified samples
PCBs	07/30/04	BLK67957	All < MRL	NA	NA	None
PCBs	07/20/04	071304R1	All < MRL	NA	NA	None
PCBs	07/20/04	071304R2	All < MRL	NA	NA	None
PCBs	07/28/04	072004R2	All < MRL	NA	NA	None

V-System Monitoring Compound (Surrogates)
Laboratory performance on individual samples is established by means of spiking activities. The percent recovery (%R) for all samples and blanks must be within the specified laboratory control limits.

Criteria: Decachlorobiphenyl: PCBs: 47-161% (USACE criteria 50-130%)
Tetrachloro-m-xylene: PCBs: 54-168% (USACE criteria 50-130%)

- All criteria were met. No qualifiers were applied.

VI-Laboratory Control Samples
Laboratory control samples (LCS) are used to monitor long-term precision and accuracy of the analytical method. The analysis is performed at a frequency of 1 per analytical batch. The percent recoveries (%Rs) must be within the specified control limits. USACE Shell limits for PCBs are 50-130% (30-150% for sporadic marginal failures (SMF)).

- Sample BKS67957 was used for the LCS for PCBs. All criteria were met. No qualifiers were applied. Sample DTSB89A (407172-001) applies to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. USACE Shell limits for PCBs are 40-140%; RPD<50%.

- Sample WBGSD18 (407170-005) was used for the MS/MSD analysis for PCB compounds. The spiked sample was analyzed in SDG 407170. All criteria were met. No qualifiers were applied.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. The project precision control criterion was established at 50% RPD for the solid samples.

- No field soil sample duplicate pair was analyzed in this SDG.

IX-Quantitation Verification
The accuracy of analytical results was verified through the calculation of several parameters. The difference between the calculated value and the reported value must be within 10% difference. All samples were non-detect for PCBs, therefore the quantification verification not included here. Any sample value > MDL and < MRL or < 3*MDL (whichever is greater) was qualified as estimated, "J." The difference between the primary column and the confirmatory column must be ≤ 40% difference (USEPA and USACE criteria).

- For this SDG, all PCBs were non-detect for all samples. No qualifiers were applied.

Sample: WBGSD18MS (407170-005MS), Aroclor 1260

Conc. μg/kg = (Ax * Vt * DF) / (CF * Vi * Ws * D)

where: Conc. = Sample concentration in μg/kg
Ax = Area/response for compound being measured.
Vt = Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10000 μL.
CF = Ave calibration response factor for compound being measured from ICAL (Area/pg)
Vi = Volume of extract injected (mL).
W(s) = Weight of sample extracted or diluted in grams.
D = Percent dry weight (100 - % moisture in sample)/100 = 1.0 for Wet Weight
DF = Dilution factor

Signal #1
Conc1 μg/kg = (114834Area*10000μL*1) / (394.5Area/pg*(1000 pg/ng)*1 μL*30g*0.4225) = 229.65 μg/kg
Conc2 μg/kg = (178684Area*10000μL*1) / (561.8Area/pg*(1000 pg/ng)*1 μL*30g*0.4225) = 250.93 μg/kg
Conc3 μg/kg = (210860Area*10000μL*1) / (650.6Area/pg*(1000 pg/ng)*1 μL*30g*0.4225) = 255.70 μg/kg
Conc4 μg/kg = (82000Area*10000μL*1) / (285.6Area/pg*(1000 pg/ng)*1 μL*30g*0.4225) = 226.52 μg/kg
Conc5 μg/kg = (248668Area*10000μL*1) / (835.2Area/pg*(1000 pg/ng)*1 μL*30g*0.4225) = 234.90 μg/kg
Average concentration = 240 μg/kg

Signal #2
Conc1 μg/kg = (534612Area*10000μL*1) / (2067Area/pg*(1000 pg/ng)*1 μL*30g*0.4225) = 204.06 μg/kg
Conc2 μg/kg = (662586Area*10000μL*1) / (2260Area/pg*(1000 pg/ng)*1 μL*30g*0.4225) = 231.31 μg/kg
Conc3 μg/kg = (906364Area*10000μL*1) / (3052Area/pg*(1000 pg/ng)*1 μL*30g*0.4225) = 234.30 μg/kg
Conc4 μg/kg = (475258Area*10000μL*1) / (1759Area/pg*(1000 pg/ng)*1 μL*30g*0.4225) = 213.16 μg/kg
Conc5 μg/kg = (903048Area*10000μL*1) / (3399Area/pg*(1000 pg/ng)*1 μL*30g*0.4225) = 209.61 μg/kg
Average concentration = 220 μg/kg

Reported Value = 240 μg/kg (signal #1)
% Difference = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – TAL Metals
GPL Laboratories, Inc., SDG 407173

DATE: November 17, 2004

The purpose of this memorandum is to present the data validation report for the samples collected for the New River Unit WI at the RFAAP on July 19-22, 2004. Samples were analyzed for target analyte list (TAL) metals using USEPA SW-846 3050B/6010B for ICP metals and USEPA SW-846 7471A for mercury. A total of twenty soil samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
NBGSB32A	407173-001	TMSB49B	407173-011
NBGSB26A	407173-002	WBGSB29A	407173-012
NBGSB27A	407173-003	WBGSB30A	407173-013
NBGSB29A	407173-004	WBGSB31A	407173-014
NBGSB31A	407173-005	WBGSB32A	407173-015
NBGSB28A	407173-006	WBGSB33A	407173-016
NBGSB33A	407173-007	WBGSB34A	407173-017
NBGSB30A	407173-008	WBGSB35A	407173-018
TMSB27A	407173-009	WBGSB36A	407173-019
TMSB43A	407173-010	WBGSB37A	407173-020

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements* (USACE, February 2001), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Inorganic Data Review* (April, 1993). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times and Preservation
	X	Initial and Continuing Calibration
X		Blank Analysis
	X	ICP Interference Check Sample (ICS)
	X	Laboratory Control Sample (LCS)
X		Lab Sample Duplicate
X		Matrix Spike
	X	ICP Serial Dilution
X		Field Sample Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

_____ _____

Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
TAL METALS REVIEW
SDG 407173

I-Holding Times and Preservation

The primary objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample analysis. The soil samples are received and stored cool @4 °C ± 2 °C, with a maximum holding time of 180 days for ICP metals and 28 days for mercury from collection (USEPA criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For samples collected on 07/19/04, 07/20/04, 07/21/04, and 07/22/04, cooler was received by the laboratory at 2.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: Samples were collected on 07/19/04, 07/20/04, 07/21/04, and 07/22/04. They were digested on 07/29/04 and analyzed for ICP metals on 07/30/04 and 08/12-13/04. Samples were digested on 08/11/04 for mercury and were analyzed for mercury on 08/12/04. All holding time criteria were met. No qualifiers were applied.

II-Initial and Continuing Calibration

Requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of the analysis run, and continuing calibration verification documents that the initial calibration is still valid.

ICP:	1- blank (USACE <MDL)	Hg:	1 – blank (USACE <MDL)
	3 – standards (r≥0.995)		5 – standards (r≥0.995)
	ICV/CCV (90-110%) (USACE 90-110%)		ICV/CCV (80-120%) (USACE ICV 90-110% / CCV 80-120%)
	MRL (70-130%) (USACE 80-120%)		MRL (80-120%)

- The samples were analyzed for ICP metals on 07/30/04 and 08/12-13/04. Mercury was analyzed on 08/12/04 with a correlation coefficient of 0.9999. All ICV/CCV standards were within criteria. No qualifiers were applied. **Table 2** summarizes the MRL standard analysis for metals. Samples with concentrations detected less than two times the MRL with out of criteria MRL recovery were qualified.

Table 2 MRL Analysis Summary

Analysis Date	Analysis	MRL (µg/L)	MRL (mg/kg)	MRL %Recovery	Qualified samples @ <2xMRL	Validation Qualifiers
07/30/04	ICP	Various	Various	All within criteria	None	None
08/12/04	ICP	Various	Various	All within criteria	None	None
08/13/04	ICP	Various	Various	All within criteria	None	None
08/12/04	Hg	0.2	0.033	All within criteria	None	None

III-Blanks

Blanks (preparation and calibration blanks) are assessed to determine the existence and magnitude of contamination problems. No contaminants should be detected (i.e. <MDL) in any of the associated blanks. USACE Shell limits are < ½MRL for the method blank. Samples are qualified "B" when they are less than 5X the absolute value of the maximum blank concentration. **Table 3** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one, 100% solids, and were converted to soil values (soil conversion factors = 10 for ICP; 6 for Hg). The rinse blank breakout is as follows.

- Rinse blank 072004R3 applies to the northern burning ground ("NBG" prefix samples) surface soil ("A" suffix samples) and sediment ("SD") samples and was analyzed in SDG 0407135.
- Rinse blank 072004R1 applies to the northern burning ground ("NBG" prefix samples) subsurface soil samples ("B→D" suffix samples) and was analyzed in SDG 0407135.
- Rinse blanks 071904R2 (for July samples) and 091304R (for September samples) apply to the western burning ground ("WBG" prefix samples) surface soil samples ("A" suffix samples) and was analyzed in SDG 0407135 and SDG 0409105, respectively.
- Rinse blank 071904R1 applies to the western burning ground ("WBG" prefix samples) subsurface soil samples ("B→C" suffix samples) and was analyzed in SDG 0407135.

Table 3 Blank Contamination Analysis Summary

Analysis Date	Analysis	QC Blank ID	Max Conc. mg/kg	Action Level mg/kg	B qualified samples
07/30/04	ICP-Al	ICB/CCBs	6.25B	31.3	None
07/30/04	ICP-Ba	ICB/CCBs	0.03B	0.15	None
07/30/04	ICP-Be	ICB/CCBs	0.02B	0.10	None
07/30/04	ICP-Cd	ICB/CCBs	0.04B	0.20	WBGSB35A
07/30/04	ICP-Ca	ICB/CCBs	11.6B	58.0	None
07/30/04	ICP-Cu	ICB/CCBs	0.11B	0.55	None
07/30/04	ICP-Fe	ICB/CCBs	5.21B	26.1	None
07/30/04	ICP-Mg	ICB/CCBs	10.7B	53.5	None
07/30/04	ICP-Mn	ICB/CCBs	0.03B	0.15	None
07/30/04	ICP-Ni	ICB/CCBs	0.11B	0.55	None
07/30/04	ICP-Tl	ICB/CCBs	0.5B	2.5	None
08/12/04	ICP-Al	ICB/CCBs	3.7B	18.5	None
08/12/04	ICP-Sb	ICB/CCBs	1.1B	5.5	NBGSB32A, NBGSB26A, NBGSB27A, NBGSB29A, NBGSB31A, NBGSB28A, NBGSB33A, NBGSB30A, TMSB27A , TMSB43A, TMSB49B, WBGSB29A, WBGSB30A, WBGSB31A, WBGSB32A, WBGSB33A, WBGSB34A, WBGSB36A
08/12/04	ICP-As	ICB/CCBs	0.41B	2.1	NBGSB29A
08/12/04	ICP-Ba	ICB/CCBs	0.07B	0.35	None
08/12/04	ICP-Be	ICB/CCBs	0.02B	0.10	None
08/12/04	ICP-Cr	ICB/CCBs	0.28B	1.4	None
08/12/04	ICP-Co	ICB/CCBs	0.27B	1.4	None
08/12/04	ICP-Cu	ICB/CCBs	0.16B	0.80	None
08/12/04	ICP-Fe	ICB/CCBs	4.27B	21.4	None
08/12/04	ICP-Pb	ICB/CCBs	0.15B	0.75	None
08/12/04	ICP-Mg	ICB/CCBs	5.09B	25.5	None
08/12/04	ICP-Mn	ICB/CCBs	0.06B	0.30	None
08/12/04	ICP-Ni	ICB/CCBs	0.08B	0.40	None
08/12/04	ICP-K	ICB/CCBs	3.53B	17.7	None
08/12/04	ICP-Ag	ICB/CCBs	0.29B	1.5	None
08/12/04	ICP-Na	ICB/CCBs	44.4B	22.0	None
08/12/04	ICP-Tl	ICB/CCBs	0.51B	2.6	None
08/12/04	ICP-V	ICB/CCBs	0.17B	0.85	None
08/13/04	ICP-Ca	ICB/CCBs	9.89B	49.5	None
08/13/04	ICP-Mg	ICB/CCBs	5.24B	26.2	None
08/12/04	Hg	ICB/CCBs	<MRL	NA	None

Table 3 Blank Contamination Analysis Summary, Continued

Analysis Date	Analysis	QC Blank ID	Max Conc. mg/kg	Action Level mg/kg	B qualified samples
07/30/04	ICP-Ba	PBS	0.049B	0.25	None
07/30/04	ICP-Be	PBS	0.016B	0.08	None
07/30/04	ICP-Ca	PBS	15.7B	78.5	None
07/30/04	ICP-Cr	PBS	0.10B	0.50	None
07/30/04	ICP-Mg	PBS	2.3B	11.5	None
07/30/04	ICP-Mn	PBS	0.12B	0.60	None
07/30/04	ICP-Ni	PBS	0.26B	1.30	None
07/30/04	ICP-K	PBS	3.9B	19.5	None
07/30/04	ICP-Na	PBS	63.9B	320	None
07/30/04	ICP-Tl	PBS	0.55B	2.75	None
07/30/04	ICP-V	PBS	0.085B	0.43	None
08/13/04	ICP-Sb	PBS	0.37B	1.85	NBGSB32A, NBGSB26A, NBGSB29A, NBGSB31A, NBGSB28A, NBGSB33A, NBGSB30A, TMSB27A , TMSB43A, TMSB49B, WBGSB29A, WBGSB30A, WBGSB31A, WBGSB32A, WBGSB33A, WBGSB34A, WBGSB36A
08/13/04	ICP-Ba	PBS	0.069B	0.35	None
08/13/04	ICP-Ca	PBS	9.0B	45.0	None
08/13/04	ICP-Cr	PBS	0.10B	0.50	None
08/13/04	ICP-Cu	PBS	0.099B	0.50	None
08/13/04	ICP-Mg	PBS	1.6B	8.0	None
08/13/04	ICP-Mn	PBS	0.12B	0.60	None
08/13/04	ICP-Ni	PBS	0.30B	1.5	None
08/13/04	ICP-K	PBS	4.0B	20.0	None
08/13/04	ICP-Na	PBS	60.5B	303	NBGSB32A, NBGSB26A, NBGSB27A, NBGSB29A, NBGSB31A, NBGSB28A, NBGSB33A, NBGSB30A, TMSB27A , TMSB43A, TMSB49B, WBGSB29A, WBGSB30A, WBGSB31A, WBGSB32A, WBGSB33A, WBGSB34A, WBGSB36A
08/13/04	ICP-Tl	PBS	0.42B	2.10	None
08/12/04	Hg	PBS	<MRL	NA	None
08/05/04	ICP-Al	072004R3	2.51BN	12.6	None
08/05/04	ICP-Sb	072004R3	0.49B	2.45	NBGSB32A, NBGSB26A, NBGSB29A, NBGSB31A, NBGSB28A, NBGSB33A, NBGSB30A, TMSB27A
08/05/04	ICP-Ca	072004R3	7.83B	39.2	None
08/05/04	ICP-Cr	072004R3	0.11B	0.55	None
08/05/04	ICP-Co	072004R3	0.064B	0.32	None
08/05/04	ICP-Pb	072004R3	0.18B	0.90	None
08/05/04	ICP-Mg	072004R3	1.42B	7.1	None
08/05/04	ICP-Mn	072004R3	0.16B	0.80	None
08/05/04	ICP-Ag	072004R3	0.073B	0.37	None
08/05/04	ICP-Na	072004R3	49.9B	250	NBGSB32A, NBGSB26A, NBGSB27A, NBGSB29A, NBGSB31A, NBGSB28A, NBGSB33A, NBGSB30A, TMSB27A
08/05/04	Hg	072004R3	<MRL	NA	None
08/05/04	ICP-Ba	072004R1	0.042B	0.21	None
08/05/04	ICP-Ca	072004R1	10.8B	54.0	None
08/05/04	ICP-Cr	072004R1	0.12B	0.60	None
08/05/04	ICP-Mg	072004R1	2.61B	13.1	None
08/05/04	ICP-Mn	072004R1	0.18B	0.90	None
08/05/04	ICP-Ag	072004R1	0.12B	0.60	None
08/05/04	ICP-Na	072004R1	37.3B	189	None
08/05/04	ICP-V	072004R1	0.089B	0.45	None
08/05/04	Hg	072004R1	<MRL	NA	None

Table 3 Blank Contamination Analysis Summary, Continued

Analysis Date	Analysis	QC Blank ID	Max Conc. mg/kg	Action Level mg/kg	B qualified samples
08/05/04	ICP-Al	071904R2	2.14BN	10.7	None
08/05/04	ICP-Ba	071904R2	0.048B	0.24	None
08/05/04	ICP-Ca	071904R2	10.3B	51.5	None
08/05/04	ICP-Co	071904R2	0.085B	0.43	None
08/05/04	ICP-Cu	071904R2	0.51B	2.6	None
08/05/04	ICP-Fe	071904R2	2.64B	13.2	None
08/05/04	ICP-Mg	071904R2	3.59B	18.0	None
08/05/04	ICP-Mn	071904R2	0.14B	0.70	None
08/05/04	ICP-K	071904R2	4.40B	22.0	None
08/05/04	ICP-Se	071904R2	0.44B	2.2	WBGSB29A, WBGSB30A, WBGSB31A, WBGSB34A, WBGSB36A, WBGSB37A
08/05/04	ICP-Ag	071904R2	0.12B	0.60	None
08/05/04	Hg	071904R2	<MRL	NA	None
08/05/04	ICP-Al	071904R1	2.07BN	10.4	None
08/05/04	ICP-Sb	071904R1	0.69B	3.5	TMSB49B
08/05/04	ICP-Ba	071904R1	0.024B	0.12	None
08/05/04	ICP-Co	071904R1	0.13B	0.65	None
08/05/04	ICP-Mg	071904R1	2.42B	12.1	None
08/05/04	ICP-Mn	071904R1	0.074B	0.37	None
08/05/04	ICP-Na	071904R1	56.7B	284	TMSB49B
08/05/04	ICP-V	071904R1	0.13B	0.65	None
08/05/04	Hg	071904R1	<MRL	NA	None
09/22/04	ICP-Al	091304R	2.92B	14.6	None
09/22/04	ICP-Mg	091304R	1.29B	6.5	None
09/22/04	ICP-Na	091304R	69.5B	348	None
09/22/04	ICP-Zn	091304R	0.50B	2.5	None

B = Value is estimated <MRL and >MDL.
N = Laboratory spike sample recovery not within control limits.

IV-ICP Interference Check Sample (ICS)
The ICP interference check sample (ICS) verifies interelement and background correction factors. ICP Interference Check is performed at the beginning and end of each sample analysis run. Control limits are 80-120% (USACE limits 80-120%).

- All criteria were met. No qualifiers were applied.

V-Laboratory Control Samples (LCS)
The laboratory control sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. All soil LCS results must fall within the control limits of 80-120% for ICP metals and mercury. USACE Shell limits for metals are 80-120% (60-140% for sporadic marginal failures (SMF)).

- Sample BKS68056 was used as LCS for ICP metals analysis dated 7/30/04. All criteria were met. No qualifiers were applied.

- Sample BKS68299 was used as LCS for ICP metals analysis dated 8/13/04. All criteria were met. No qualifiers were applied.

- Sample BKS68234 was used as LCS for total mercury analysis dated 8/12/04. All criteria were met. No qualifiers were applied.

VI-Duplicate Sample Analysis
Duplicate sample determinations are used to demonstrate acceptable method precision by the laboratory at the time of analysis. Duplicate analysis generate data in order to determine the long-term precision of the analytical method on various matrices. RPDs must be within established control limits. USACE Shell limits for metals are 25% RPD for ICP metals and 20% RPD for mercury.

- Sample NBGSB27A (407173-003) was used as sample duplicate for ICP metals analysis. Antimony (200%) and iron (26.1%) were outside criteria. Antimony was outside criteria due to low sample concentrations, therefore no qualifiers were applied based upon these outliers. Iron was qualified as estimated "J" for detects for the "NBG" samples analyzed 8/13/04 based upon the high RPD.

- Sample NBGSB27A (407173-003) was used as sample duplicate for mercury analysis. All criteria were met. No qualifiers were applied.

- Sample WBGSB36A (407173-019) was used as sample duplicate for ICP metals analysis. Calcium (35.2%) was outside criteria. Calcium was qualified as estimated "J" for detects for the "WBG" samples analyzed 8/13/04 based upon the high RPD.

- Sample WBGSB36A (407173-019) was used as sample duplicate for mercury analysis. All criteria were met. No qualifiers were applied.

- Sample WBGSB43A (407174-006) was used as sample duplicate for ICP metals analysis. Antimony (200%), chromium (83.9%), and sodium (40.6%) were outside criteria. Antimony and sodium were outside criteria due to low sample concentrations, therefore no qualifiers were applied based upon these outliers. Chromium was qualified as estimated "J" for detects for the "WBG" samples analyzed 7/30/04 based upon the high RPD.

VII-Matrix Spike
MS are generated to determine long-term accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. Specific criteria include the analyses of matrix spike and matrix spike duplicate samples at a frequency of one MS per 20 samples of similar matrix. MS recoveries and relative percent differences between MS recoveries should be within the specified limits. USACE Shell limits for metals are 75-125% for ICP metals and 80-120% for mercury. Post digestion spikes limits are 75-125% for ICP metals and 85-115% for mercury.

- Sample NBGSB27A (407173-003) was used for the MS analysis for ICP analysis. Aluminum (871%), antimony (68.5%), barium (127%), iron (272%), magnesium (128%), manganese (149%), and potassium (146%) were outside of control limits. Post digestion spikes were within criteria for antimony, barium, magnesium, and potassium, but not manganese. The sample concentration was >4 times the spike added for aluminum and iron, therefore no qualifiers were applied based upon this outlier. For antimony, the spiked sample was qualified bias low non-detect "UL" based upon the low recovery. For barium, magnesium, manganese, and potassium, the spiked sample was qualified bias high "K" based upon the high recovery. Sample TMSB27A was a field duplicate and also qualified.

- Sample NBGSB27A (407173-003) was used for the MS analysis for mercury analysis. All criteria were met. No qualifiers were applied.

- Sample WBGSB36A (407173-019) was used for the MS analysis for ICP analysis. Aluminum (1471%), antimony (32.7%), calcium (0%), iron (322%), and magnesium (139%) were outside of control limits. Post digestion spikes were within criteria for antimony. The sample concentration was >4 times the spike added for aluminum, calcium, iron, and magnesium, therefore no qualifiers were applied based upon this outlier. For antimony, the spiked sample was qualified bias low detect "L" based upon the low recovery.

- Sample WBGSB36A (407173-019) was used for the MS analysis for mercury analysis. All criteria were met. No qualifiers were applied.

- Sample WBGSB43A (407174-006) was used for the MS analysis for ICP analysis. This sample was reported in SDG 407174. Aluminum (940%), antimony (45.4%), calcium (44.8%), chromium (0%), iron (174%), magnesium (145%), manganese (29.7%), and potassium (128%) were outside of control limits. Post digestion spikes were within criteria for antimony, chromium, and potassium. The sample concentration was >4 times the spike added for aluminum, calcium, iron, magnesium, and manganese, therefore no qualifiers were applied based upon this outlier. For antimony and chromium, the spiked sample was qualified bias low detect "L" based upon the low recovery. For potassium, the spiked sample was qualified bias high "K" based upon the high recovery. Sample TMSB43A was a field duplicate and also qualified.

VIII-ICP Serial Dilution

An ICP serial dilution is performed to determine whether significant physical or chemical interferences exist due to sample matrix at high concentrations. An analysis of a 5-fold dilution should agree within 10% difference of the original result when the concentration in sample is a factor of 50 above MDL.

- The serial dilution for the ICP was analyzed for sample NBGSB27A (407173-003). Cadmium (100%) and sodium (100%) were outside of criteria limits. Sample concentrations were <50 times MDL for cadmium and sodium, therefore no qualifiers were applied based upon these outliers.

- The serial dilution for the ICP was analyzed for sample WBGSB36A (407173-019). Antimony (100%), cadmium (42.5%), selenium (100%), and sodium (100%) were outside of criteria limits. Sample concentrations were <50 times MDL for antimony, cadmium, selenium, and sodium, therefore no qualifiers were applied based upon these outliers.

- The serial dilution for the ICP was analyzed for sample WBGSB43A (407174-006). Antimony (100%), arsenic (13.5%), cadmium (100%), and sodium (100%) were outside of criteria limits. Sample concentrations were <50 times MDL for antimony, arsenic, cadmium, and sodium, therefore no qualifiers were applied based upon these outliers.

IX-Field Duplicate Sample Analysis

Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the solid samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field soil sample duplicate pair NBGSB27A (407173-003) and TMSB27A (407173-009) was collected. The field duplicate evaluation is noted in **Table 4.** If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. Data qualifiers were applied as noted for the duplicate pair.

Table 4 Field Duplicate Analysis Summary

Sample ID	Lab ID	Compound	Original Result (mg/kg)	Duplicate Result (mg/kg)	%RPD	Qualifier
NBGSB27A	407173-003	Aluminum	10500	11000	4.7	None
NBGSB27A	407173-003	Antimony	0.36 UN	0.41 BN	NA	None
NBGSB27A	407173-003	Arsenic	4.0	3.8	5.1	None
NBGSB27A	407173-003	Barium	52.8 N	55.7 N	5.4	None
NBGSB27A	407173-003	Beryllium	0.47	0.48	2.1	None
NBGSB27A	407173-003	Cadmium	0.086 B	0.15 B	***54.2***	J
NBGSB27A	407173-003	Calcium	1450 *	1420 *	2.1	None
NBGSB27A	407173-003	Chromium	21.7	31.8	37.8	None
NBGSB27A	407173-003	Cobalt	7.5	7.9	5.2	None
NBGSB27A	407173-003	Copper	8.9	8.9	0.0	None
NBGSB27A	407173-003	Iron	11700 *	11400 *	2.6	None
NBGSB27A	407173-003	Lead	110	172	44.0	None
NBGSB27A	407173-003	Magnesium	983 N	950 N	3.4	None
NBGSB27A	407173-003	Manganese	252 N	280 N	10.5	None
NBGSB27A	407173-003	Nickel	7.2	7.3	1.4	None
NBGSB27A	407173-003	Potassium	509 N	523 N	2.7	None
NBGSB27A	407173-003	Sodium	79.9 B	65.0 B	20.6	None
NBGSB27A	407173-003	Vanadium	23.8	24.0	0.8	None
NBGSB27A	407173-003	Zinc	99.5	107	7.3	None
NBGSB27A	407173-003	Mercury	0.048	0.039	20.7	None

B = Estimated value <MRL and >MDL.
N = Laboratory spike sample recovery not within control limits.
* = Laboratory duplicate not within control limits.
U = Value non-detect at MDL.
NA = Not Applicable

- Field soil sample duplicate pair WBGSB43A (407174-006) and TMSB43A (407173-010) was collected. Sample WBGSB43A (407174-006) was analyzed in SDG 407174. The field duplicate evaluation is noted in **Table 5.** If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. Data qualifiers were applied as noted for the duplicate pair.

Table 5 Field Duplicate Analysis Summary

Sample ID	Lab ID	Compound	Original Result (mg/kg)	Duplicate Result (mg/kg)	%RPD	Qualifier
WBGSB43A	407174-006	Aluminum	17500	16500	5.9	None
WBGSB43A	407174-006	Antimony	0.53 BN	0.58 BN	9.0	None
WBGSB43A	407174-006	Arsenic	4.5	4.7	4.4	None
WBGSB43A	407174-006	Barium	90.0	93.9 N	4.2	None
WBGSB43A	407174-006	Beryllium	1.3	1.2	8.0	None
WBGSB43A	407174-006	Cadmium	0.066 B	0.22 B	***108***	J
WBGSB43A	407174-006	Calcium	3860	3760 *	2.6	None
WBGSB43A	407174-006	Chromium	102 N*	33.3	***102***	J
WBGSB43A	407174-006	Cobalt	11.0	11.4	3.6	None
WBGSB43A	407174-006	Copper	12.9	12.7	1.6	None
WBGSB43A	407174-006	Iron	19300	17900 *	7.5	None

Table 5 Field Duplicate Analysis Summary, Continued

Sample ID	Lab ID	Compound	Original Result (mg/kg)	Duplicate Result (mg/kg)	%RPD	Qualifier
WBGSB43A	407174-006	Lead	19.4	19.7	1.5	None
WBGSB43A	407174-006	Magnesium	5340	5130 N	4.0	None
WBGSB43A	407174-006	Manganese	416	430 N	3.3	None
WBGSB43A	407174-006	Nickel	20.4	14.6	33.1	None
WBGSB43A	407174-006	Potassium	929 N	925 N	0.4	None
WBGSB43A	407174-006	Sodium	58.1 B	81.8 B	33.9	None
WBGSB43A	407174-006	Vanadium	46.9	39.3	17.6	None
WBGSB43A	407174-006	Zinc	41.9	44.0	4.9	None
WBGSB43A	407174-006	Mercury	0.032 B	0.030 B	6.5	None

B = Estimated value <MRL and >MDL.
N = Laboratory spike sample recovery not within control limits.
* = Laboratory duplicate not within control limits.

- Field soil sample duplicate pair WBGSB49B (407174-015) and TMSB49B (407173-011) was collected. Sample WBGSB49B (407174-015) was analyzed in SDG 407174. The field duplicate evaluation is noted in **Table 6.** If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. Data qualifiers were applied as noted for the duplicate pair.

Table 6 Field Duplicate Analysis Summary

Sample ID	Lab ID	Compound	Original Result (mg/kg)	Duplicate Result (mg/kg)	%RPD	Qualifier
WBGSB49B	407174-015	Aluminum	23800	24000	0.8	None
WBGSB49B	407174-015	Antimony	0.39 BN	0.65 BN	50.0	None
WBGSB49B	407174-015	Arsenic	9.9	9.2	7.3	None
WBGSB49B	407174-015	Barium	27.0	29.8 N	9.9	None
WBGSB49B	407174-015	Beryllium	0.88	0.98	10.8	None
WBGSB49B	407174-015	Cadmium	0.030 U	0.20 B	NA	None
WBGSB49B	407174-015	Calcium	733	691 *	5.9	None
WBGSB49B	407174-015	Chromium	35.6 N*	34.6	2.9	None
WBGSB49B	407174-015	Cobalt	7.2	9.1	23.3	None
WBGSB49B	407174-015	Copper	18.1	18.2	0.6	None
WBGSB49B	407174-015	Iron	35000	33200 *	5.3	None
WBGSB49B	407174-015	Lead	18.6	21.8	15.8	None
WBGSB49B	407174-015	Magnesium	758	807 N	6.3	None
WBGSB49B	407174-015	Manganese	127	176 N	32.3	None
WBGSB49B	407174-015	Nickel	16.1	16.9	4.9	None
WBGSB49B	407174-015	Potassium	990 N	1020 N	3.0	None
WBGSB49B	407174-015	Selenium	0.84 B	0.95 B	12.3	None
WBGSB49B	407174-015	Sodium	53.9 B	88.4 B	48.5	None
WBGSB49B	407174-015	Vanadium	68.5	64.5	6.0	None
WBGSB49B	407174-015	Zinc	31.3	30.6	2.3	None
WBGSB49B	407174-015	Mercury	0.11	0.057	***63.5***	J

B = Estimated value <MRL and >MDL.
N = Laboratory spike sample recovery not within control limits.
* = Laboratory duplicate not within control limits.
U = Value non-detect at MDL.

X-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value > MDL and < MRL or < 3*MDL (whichever was greater) was qualified as estimated, "J." The following calculations were performed for verification.

ICP Sample: NBGSB32A (407173-001), Total Barium

Conc. (mg/kg) = {(conc. μg/L)*(Final Volume L)*(DF)} / {(Weight Sample g)*(Fraction Solids)}

Conc. (mg/kg) = {(453.0943 μg/L)*(0.100 L)*(1)} / {(1.21 g)*(0.7973)} = 47.0 μg/g = 47.0 mg/kg

Reported concentration = 47.0 mg/kg
%D = 0.0%
Values were within 10% difference.

CVAA Sample: NBGSB32A (407173-001), Total Mercury

Conc. (mg/kg) = {(conc. μg/L)*(Final Volume L)*(DF)} / {(Weight Sample g)*(Fraction Solids)}

Conc. (mg/kg) = {(0.581 μg/L)*(0.100 L)*(1)} / {(0.75 g)*(0.7973)} = 0.097 μg/g = 0.097 mg/kg

Reported concentration = 0.097 mg/kg
%D = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – PCBs
GPL Laboratories, Inc., SDG 407173

DATE: November 18, 2004

The purpose of this memorandum is to present the data validation report for the samples collected for the New River WI at the RFAAP on July 19-22, 2004. Samples were analyzed for PCBs using USEPA Method 3540C/8082. A total of twenty soil samples were analyzed and validated for PCBs. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
NBGSB32A	407173-001	TMSB49B	407173-011
NBGSB26A	407173-002	WBGSB29A	407173-012
NBGSB27A	407173-003	WBGSB30A	407173-013
NBGSB29A	407173-004	WBGSB31A	407173-014
NBGSB31A	407173-005	WBGSB32A	407173-015
NBGSB28A	407173-006	WBGSB33A	407173-016
NBGSB33A	407173-007	WBGSB34A	407173-017
NBGSB30A	407173-008	WBGSB35A	407173-018
TMSB27A	407173-009	WBGSB36A	407173-019
TMSB43A	407173-010	WBGSB37A	407173-020

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements* (USACE, February 2001), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (USEPA, September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	System Monitoring Compounds
	X	Laboratory Control Samples
	X	Matrix Spike/Spike Duplicate
	X	Field Sample Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable.

_____ _____

Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
PCB REVIEW
SDG 407173

I-Holding Times
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For PCB soil samples, cooled @4°C ±2°C, the maximum holding time is 14 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis (USEPA criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For samples collected on 07/19/04, 07/20/04, 07/21/04, and 07/22/04, cooler was received by the laboratory at 2.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The samples were collected on 07/19/04, 07/20/04, 07/21/04, and 07/22/04 for PCB compounds. They were extracted on 07/29/04 and analyzed for PCBs on 07/31/04 and 08/01/04 within criteria guidelines. The actual extraction and analysis dates for each sample may be found on the attached form 1s to this report. No qualifiers were applied.

II-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. The initial 5-point calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run. The percent relative standard deviation (%RSD) for all single peak target analytes, and aroclors 1016 and 1260 must be $< 20\%$ or the mean %RSD for all analytes in the standard must be $\leq 20\%$. If linear regression is used, the correlation coefficient must be ≥ 0.990 (USEPA and USACE criteria).

- For the PCB initial calibration performed on 07/29/04 on instrument GC-L, all compounds were determined using calibration factors for PCB 1016 and PCB 1260. All criteria were met, except for the following. For PCB 1260 signal #2, PCB 1260 #1 (20.7%), PCB 1260 #2 (21.5%), and PCB 1260 #5 (21.8%) were above criteria limits. The average %RSD for PCB 1260 for signal #2 (20.4%) was within criteria. All associated samples were non-detect for PCB 1260. No qualifiers were applied based upon these outliers. Samples NBGSB32A (407173-001), NBGSB26A (407173-002), NBGSB27A (407173-003), NBGSB29A (407173-004), NBGSB31A (407173-005), NBGSB28A (407173-006), NBGSB33A (407173-007), NBGSB30A (407173-008), TMSB27A (407173-009), TMSB43A (407173-010), TMSB49B (407173-011), WBGSB29A (407173-012), WBGSB30A (407173-013), WBGSB31A (407173-014), WBGSB32A (407173-015), WBGSB33A (407173-016), WBGSB34A (407173-017), WBGSB35A (407173-018), WBGSB36A (407173-019), and WBGSB37A (407173-020) apply to this initial calibration.

III-Continuing Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for PCB target compounds. Continuing calibration standards containing both target compounds and surrogates are analyzed at the beginning of each 12-hour analytical shift and after every 20 samples. The percent difference (%D) or the mean %RSD for all analytes in the standard from the initial calibration should be no greater than $\pm$ 15%.

- For PCB continuing calibration performed on 07/31/04 @17:17 on instrument GC-L, all criteria were met on column #1 for all target compounds arochlor 1016 and arochlor 1260. For column #2, arochlor 1016 #5 (18.9%) was outside criteria. The average of the peaks for arochlor 1016 (9.2%) was within criteria and all associated samples were non-detect. Arochlor 1260 was within criteria limits for column #2. No qualifiers were applied. Samples NBGSB32A (407173-001), NBGSB26A (407173-002), NBGSB27A (407173-003), NBGSB29A (407173-004), NBGSB31A (407173-005), and NBGSB28A (407173-006) apply to his continuing calibration.

- For PCB continuing calibration performed on 07/31/04 @22:36 on instrument GC-L, all criteria were met on column #1 and column #2 for all target compounds arochlor 1016 and arochlor 1260. No qualifiers were applied. Samples (407173-007), NBGSB30A (407173-008), TMSB27A (407173-009), TMSB43A (407173-010), TMSB49B (407173-011), WBGSB29A (407173-012), WBGSB30A (407173-013), WBGSB31A (407173-014), WBGSB32A (407173-015), and WBGSB33A (407173-016) apply to his continuing calibration.

- For PCB continuing calibration performed on 08/01/04 @04:24 on instrument GC-L, all criteria were met on column #1 and column #2 for all target compounds arochlor 1016 and arochlor 1260. No qualifiers were applied. Samples WBGSB34A (407173-017), WBGSB35A (407173-018), WBGSB36A (407173-019), and WBGSB37A (407173-020) apply to his continuing calibration.

- For PCB continuing calibration performed on 08/01/04 @08:16 on instrument GC-L, the following %Ds were determined. For column #1, all criteria were met for arochlor 1016 and arochlor 1260. For column #2, arochlor 1260 #1 (19.1%) and arochlor 1260 #2 (18.3%) were outside criteria. The average of the peaks for arochlor 1260 (14.4%) was within criteria and all samples were non-detect. Arochlor 1016 was within criteria for column #2. No qualifiers were applied. No samples reported apply to this continuing calibration.

IV-Blank Analysis

The purpose of laboratory or field blank analyses is to determine the existence and magnitude of contamination problems resulting from laboratory or field activities. One method blank per analytical batch must be run on each instrument used to analyze samples. No contaminants should be present in the blanks > MDL or MRL (USEPA criteria) or all target compounds < one-half the MRL (USACE criteria). **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one, 100% solids, and were converted to soil values (soil conversion factor = 30). The rinse blank breakout is as follows.

- Rinse blank 072004R3 applies to the northern burning ground ("NBG" prefix samples) surface soil ("A" suffix samples) and NBG sediment ("SD") samples and was analyzed in SDG 0407135.

- Rinse blank 072004R1 applies to the northern burning ground ("NBG" prefix samples) subsurface soil samples ("B→D" suffix samples) and was analyzed in SDG 0407135.

- Rinse blank 071904R2 applies to the western burning ground ("WBG" prefix samples) surface soil samples ("A" suffix samples) and was analyzed in SDG 0407135.

- Rinse blank 071904R1 applies to the western burning ground ("WBG" prefix samples) subsurface soil samples ("B→C" suffix samples) and was analyzed in SDG 0407135.

Table 2 Blank Contamination Analysis Summary

Parameter	Analysis Date	QC Blank ID	Compound	Max Conc. µg/kg	Action Level µg/kg	B qualified samples
PCBs	07/31/04	BLK67975	All < MRL	NA	NA	None
PCBs	07/28/04	072004R3	All < MRL	NA	NA	None
PCBs	07/28/04	072004R1	All < MRL	NA	NA	None
PCBs	07/28/04	071904R2	All < MRL	NA	NA	None
PCBs	07/28/04	071904R1	All < MRL	NA	NA	None

V-System Monitoring Compound (Surrogates)
Laboratory performance on individual samples is established by means of spiking activities. The percent recovery (%R) for all samples and blanks must be within the specified laboratory control limits.

Criteria: Decachlorobiphenyl: PCBs: 47-161% (USACE criteria 50-130%)
Tetrachloro-m-xylene: PCBs: 54-168% (USACE criteria 50-130%)

- For PCB analysis for sample NBGSB27A (407173-003), surrogate decachlorobiphenyl (49%, 38%) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene (signals #1 and #2) was within criteria, no qualifiers were applied based upon these outliers.

- For PCB analysis for sample NBGSB28A (407173-006), surrogate decachlorobiphenyl (49%; signal #2) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene (signals #1 and #2) and decachlorobiphenyl (signal #1) were within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample NBGSB29A (407173-004), surrogate decachlorobiphenyl (44%, 38%) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene (signals #1 and #2) was within criteria, no qualifiers were applied based upon these outliers.

- For PCB analysis for sample TMSB43A (407173-003), surrogate decachlorobiphenyl (44%; signal #1) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene (signals #1 and #2) and decachlorobiphenyl (signal #2) were within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample WBGSB32A (407173-015), surrogate decachlorobiphenyl (40%; signal #2) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene (signals #1 and #2) and decachlorobiphenyl (signal #1) were within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample WBGSB33A (407173-016), surrogate decachlorobiphenyl (33%, 48%) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene (signals #1 and #2) was within criteria, no qualifiers were applied based upon these outliers.

- For PCB analysis for sample WBGSB35A (407173-018), surrogate decachlorobiphenyl (43%; signal #1) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene (signals #1 and #2) and decachlorobiphenyl (signal #2) were within criteria, no qualifiers were applied based upon this outlier.

- For PCB analysis for sample WBGSB36A (407173-019), surrogate decachlorobiphenyl (42%; signal #1) was outside USACE and/or lab criteria. Since surrogate tetrachloro-m-xylene (signals #1 and #2) and decachlorobiphenyl (signal #2) were within criteria, no qualifiers were applied based upon this outlier.

- For all other samples, all criteria were met. No qualifiers were applied.

VI-Laboratory Control Samples
Laboratory control samples (LCS) are used to monitor long-term precision and accuracy of the analytical method. The analysis is performed at a frequency of 1 per analytical batch. The percent recoveries (%Rs) must be within the specified control limits. USACE Shell limits for PCBs are 50-130% (30-150% for sporadic marginal failures (SMF)).

- Sample BKS67975 was used for the LCS for PCBs. All criteria were met. No qualifiers were applied. Samples NBGSB32A (407173-001), NBGSB26A (407173-002), NBGSB27A (407173-003), NBGSB29A (407173-004), NBGSB31A (407173-005), NBGSB28A (407173-006), NBGSB33A (407173-007), NBGSB30A (407173-008), TMSB27A (407173-009), TMSB43A (407173-010), TMSB49B (407173-011), WBGSB29A (407173-012), WBGSB30A (407173-013), WBGSB31A (407173-014), WBGSB32A (407173-015), WBGSB33A (407173-016), WBGSB34A (407173-017), WBGSB35A (407173-018), WBGSB36A (407173-019), and WBGSB37A (407173-020) apply to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. USACE Shell limits for PCBs are 40-140%; RPD<50%.

- Sample NBGSB27A (407173-003) was used for the MS/MSD analysis for PCB compounds. PCB 1260 (RPD=17%) was outside lab criteria and within USACE criteria limits. All MS/MSD/LCS recoveries were within criteria. No qualifiers were applied based upon this outlier.

- Sample WBGSB36A (407173-019) was used for the MS/MSD analysis for PCB compounds. All criteria were met. No qualifiers were applied.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. The project precision control criterion was established at 50% RPD for the solid samples.

- Field soil sample duplicate pair NBGSB27A (407173-003) and TMSB27A (407173-009) was collected. The field duplicate evaluation is noted in **Table 3**. If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. All criteria were met. No qualifiers were applied.

Table 3 Field Duplicate Analysis Summary NBGSB27A (407173-003) and TMSB27A (407173-009)

Sample ID	Lab ID	Compound	Original Result (µg/kg)	Duplicate Result (µg/kg)	%RPD	Qualifier
NBGSB27A	407173-003	All PCBs <MRL	NA	NA	NA	None

NA = Not Applicable

- Field soil sample duplicate pair WBGSB43A (407174-006) and TMSB43A (407173-010) was collected. Sample WBGSB43A (407174-006) was analyzed in SDG 407174. The field duplicate evaluation is noted in **Table 4**. If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. All criteria were met. No qualifiers were applied.

Table 4 Field Duplicate Analysis Summary WBGSB43A (407174-006) and TMSB43A (407173-010)

Sample ID	Lab ID	Compound	Original Result (μg/kg)	Duplicate Result (μg/kg)	%RPD	Qualifier
NBGSB22B	407138-011	All PCBs <MRL	NA	NA	NA	None

NA = Not Applicable

IX-Quantitation Verification

The accuracy of analytical results was verified through the calculation of several parameters. The difference between the calculated value and the reported value must be within 10% difference. All samples were non-detect for PCBs, therefore the quantification verification not included here. Any sample value > MDL and < MRL or < 3*MDL (whichever is greater) was qualified as estimated, "J." The difference between the primary column and the confirmatory column must be ≤ 40% difference (USEPA and USACE criteria).

- All PCBs were non-detect for associated samples in this SDG.

Sample: NBGSB27AMS (407173-003MS), Aroclor 1260

Conc. μg/kg = (Ax * Vt * DF) / (CF * Vi * Ws * D)

where: Conc. = Sample concentration in μg/kg
Ax = Area/response for compound being measured.
Vt = Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10000 μL.
CF = Ave calibration response factor for compound being measured from ICAL (Area/pg)
Vi = Volume of extract injected (mL).
W(s) = Weight of sample extracted or diluted in grams.
D = Percent dry weight (100 - % moisture in sample)/100 = 1.0 for Wet Weight
DF = Dilution factor

Signal #1
Conc1 μg/kg = (120712Area*10000μL*1) / (394.5Area/pg*(1000 pg/ng)*1 μL*30g*0.7672) = 132.95 μg/kg
Conc2 μg/kg = (190456Area*10000μL*1) / (561.8Area/pg*(1000 pg/ng)*1 μL*30g*0.7672) = 147.29 μg/kg
Conc3 μg/kg = (232840Area*10000μL*1) / (650.6Area/pg*(1000 pg/ng)*1 μL*30g*0.7672) = 155.49 μg/kg
Conc4 μg/kg = (71286Area*10000μL*1) / (285.6Area/pg*(1000 pg/ng)*1 μL*30g*0.7672) = 108.45 μg/kg
Conc5 μg/kg = (229973Area*10000μL*1) / (835.2Area/pg*(1000 pg/ng)*1 μL*30g*0.7672) = 119.63 μg/kg
Average concentration = 130 μg/kg

Signal #2
Conc1 μg/kg = (620188Area*10000μL*1) / (2067Area/pg*(1000 pg/ng)*1 μL*30g*0.7672) = 130.36 μg/kg
Conc2 μg/kg = (649686Area*10000μL*1) / (2260Area/pg*(1000 pg/ng)*1 μL*30g*0.7672) = 124.90 μg/kg
Conc3 μg/kg = (940420Area*10000μL*1) / (3052Area/pg*(1000 pg/ng)*1 μL*30g*0.7672) = 133.88 μg/kg
Conc4 μg/kg = (532464Area*10000μL*1) / (1759Area/pg*(1000 pg/ng)*1 μL*30g*0.7672) = 131.52 μg/kg
Conc5 μg/kg = (829990Area*10000μL*1) / (3399Area/pg*(1000 pg/ng)*1 μL*30g*0.7672) = 106.09 μg/kg
Average concentration = 125 μg/kg

Reported Value = 130 μg/kg (signal #1)
% Difference = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – TAL Metals
GPL Laboratories, Inc., SDG 407174

DATE: January 12, 2005

The purpose of this memorandum is to present the data validation report for the samples collected for the New River Unit WI at the RFAAP on July 19, 2004. Samples were analyzed for target analyte list (TAL) metals using USEPA SW-846 3050B/6010B for ICP metals and USEPA SW-846 7471A for mercury. A total of fifteen soil samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
WBGSB38A	407174-001	WBGSB43B	407174-009
WBGSB39A	407174-002	WBGSB44B	407174-010
WBGSB40A	407174-003	WBGSB45B	407174-011
WBGSB41A	407174-004	WBGSB46C	407174-012
WBGSB42A	407174-005	WBGSB47C	407174-013
WBGSB43A	407174-006	WBGSB48C	407174-014
WBGSB44A	407174-007	WBGSB49B	407174-015
WBGSB45A	407174-008		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements* (USACE, February 2001), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Inorganic Data Review* (April, 1993). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times and Preservation
X		Initial and Continuing Calibration
X		Blank Analysis
	X	ICP Interference Check Sample (ICS)
	X	Laboratory Control Sample (LCS)
X		Lab Sample Duplicate
X		Matrix Spike
	X	ICP Serial Dilution
X		Field Sample Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

_____ _____

Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
TAL METALS REVIEW
SDG 407174

I-Holding Times and Preservation

The primary objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample analysis. The soil samples are received and stored cool @4 °C ± 2 °C, with a maximum holding time of 180 days for ICP metals and 28 days for mercury from collection (USEPA criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For samples collected on 07/19/04, cooler was received by the laboratory at 2.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: Samples were collected on 07/19/04. They were digested on 07/29/04 and analyzed for ICP metals on 07/30-31/04, 08/02/04 (silver for select samples) and 08/03/04 (silver for select samples). Samples were digested on 08/10/04 for mercury and were analyzed for mercury on 08/11/04. All holding time criteria were met. No qualifiers were applied.

II-Initial and Continuing Calibration

Requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of the analysis run, and continuing calibration verification documents that the initial calibration is still valid.

ICP:	1- blank (USACE <MDL)	Hg:	1 – blank (USACE <MDL)
	3 – standards (r≥0.995)		5 – standards (r≥0.995)
	ICV/CCV (90-110%) (USACE 90-110%)		ICV/CCV (80-120%) (USACE ICV 90-110% / CCV 80-120%)
	MRL (70-130%) (USACE 80-120%)		MRL (80-120%)

- The samples were analyzed for ICP metals on 07/30-31/04, 08/02/04 (silver for select samples) and 08/03/04 (silver for select samples). Mercury was analyzed on 08/11/04 with a correlation coefficient of 0.9999. All ICV/CCV standards were within criteria. No qualifiers were applied. **Table 2** summarizes the MRL standard analysis for metals. Samples with concentrations detected less than two times the MRL with out of criteria MRL recovery were qualified. Sample WBGSB46C (407174-012) was qualified non-detect bias low for the low MRL standard %R.

Table 2 MRL Analysis Summary

Analysis Date	Analysis	MRL (µg/L)	MRL (mg/kg)	MRL %Recovery	Qualified samples @ <2xMRL	Validation Qualifiers
07/30/04	ICP	Various	Various	All within criteria	None	None
08/02/04	ICP-Ag	3.0	0.3	All within criteria	None	None
08/03/04	ICP-Ag	3.0	0.3	46.8%	WBGSB46C	UL
08/11/04	Hg	0.2	0.033	All within criteria	None	None

III-Blanks

Blanks (preparation and calibration blanks) are assessed to determine the existence and magnitude of contamination problems. No contaminants should be detected (i.e. <MDL) in any of the associated blanks. USACE Shell limits are < ½MRL for the method blank. Samples are qualified "B" when they are less than 5X the absolute value of the maximum blank concentration. **Table 3** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one, 100% solids, and were converted to soil values (soil conversion factors = 10 for ICP; 6 for Hg). The rinse blank breakout is as follows.

- Rinse blanks 071904R2 (for July samples) and 091304R (for September samples) apply to the western burning ground ("WBG" prefix samples) surface soil samples ("A" suffix samples) and was analyzed in SDG 0407135 and SDG 0409105, respectively.

- Rinse blank 071904R1 applies to the western burning ground ("WBG" prefix samples) subsurface soil samples ("B→C" suffix samples) and was analyzed in SDG 0407135.

Table 3 Blank Contamination Analysis Summary

Analysis Date	Analysis	QC Blank ID	Max Conc. mg/kg	Action Level mg/kg	B qualified samples
07/30/04	ICP-Al	ICB/CCBs	6.25B	31.3	None
07/30/04	ICP-Ba	ICB/CCBs	0.03B	0.15	None
07/30/04	ICP-Be	ICB/CCBs	0.02B	0.10	None
07/30/04	ICP-Cd	ICB/CCBs	0.04B	0.20	WBGSB39A, WBGSB43A, WBGSB47C, WBGSB48C
07/30/04	ICP-Ca	ICB/CCBs	11.6B	58.0	None
07/30/04	ICP-Cu	ICB/CCBs	0.11B	0.55	None
07/30/04	ICP-Fe	ICB/CCBs	5.21B	26.1	None
07/30/04	ICP-Mg	ICB/CCBs	10.7B	53.5	None
07/30/04	ICP-Mn	ICB/CCBs	0.03B	0.15	None
07/30/04	ICP-Ni	ICB/CCBs	0.11B	0.55	None
07/30/04	ICP-Tl	ICB/CCBs	0.5B	2.5	None
08/02/04	ICP-Ag	ICB/CCBs	<MRL	NA	None
08/03/04	ICP-Ag	ICB/CCBs	<MRL	NA	None
08/12/04	Hg	ICB/CCBs	0.016	0.08	WBGSB38A, WBGSB39A, WBGSB40A, WBGSB41A, WBGSB42A, WBGSB43A, WBGSB44A, WBGSB45A, WBGSB43B, WBGSB44B, WBGSB45B, WBGSB46C, WBGSB47C, WBGSB48C, WBGSB49B
07/30/04	ICP-Ba	PBS	0.049B	0.25	None
07/30/04	ICP-Be	PBS	0.016B	0.08	None
07/30/04	ICP-Ca	PBS	15.7B	78.5	None
07/30/04	ICP-Cr	PBS	0.10B	0.50	None
07/30/04	ICP-Mg	PBS	2.3B	11.5	None
07/30/04	ICP-Mn	PBS	0.12B	0.60	None
07/30/04	ICP-Ni	PBS	0.26B	1.30	None
07/30/04	ICP-K	PBS	3.9B	19.5	None
07/30/04	ICP-Na	PBS	63.9B	320	WBGSB38A, WBGSB39A, WBGSB40A, WBGSB41A, WBGSB42A, WBGSB43A, WBGSB44A, WBGSB45A, WBGSB43B, WBGSB44B, WBGSB45B, WBGSB47C, WBGSB48C, WBGSB49B
07/30/04	ICP-Tl	PBS	0.55B	2.75	None
07/30/04	ICP-V	PBS	0.085B	0.43	None
08/12/04	Hg	PBS	<MRL	NA	None

Table 3 Blank Contamination Analysis Summary, Continued

Analysis Date	Analysis	QC Blank ID	Max Conc. mg/kg	Action Level mg/kg	B qualified samples
08/05/04	ICP-Al	071904R2	2.14BN	10.7	None
08/05/04	ICP-Ba	071904R2	0.048B	0.24	None
08/05/04	ICP-Ca	071904R2	10.3B	51.5	None
08/05/04	ICP-Co	071904R2	0.085B	0.43	None
08/05/04	ICP-Cu	071904R2	0.51B	2.6	None
08/05/04	ICP-Fe	071904R2	2.64B	13.2	None
08/05/04	ICP-Mg	071904R2	3.59B	18.0	None
08/05/04	ICP-Mn	071904R2	0.14B	0.70	None
08/05/04	ICP-K	071904R2	4.40B	22.0	None
08/05/04	ICP-Se	071904R2	0.44B	2.2	WBGSB41A, WBGSB45A
08/05/04	ICP-Ag	071904R2	0.12B	0.60	None
08/05/04	Hg	071904R2	<MRL	NA	None
08/05/04	ICP-Al	071904R1	2.07BN	10.4	None
08/05/04	ICP-Sb	071904R1	0.69B	3.5	WBGSB44B, WBGSB45B, WBGSB47C, WBGSB48C, WBGSB49B
08/05/04	ICP-Ba	071904R1	0.024B	0.12	None
08/05/04	ICP-Co	071904R1	0.13B	0.65	None
08/05/04	ICP-Mg	071904R1	2.42B	12.1	None
08/05/04	ICP-Mn	071904R1	0.074B	0.37	None
08/05/04	ICP-Na	071904R1	56.7B	284	WBGSB43B, WBGSB44B, WBGSB45B, WBGSB47C, WBGSB48C, WBGSB49B
08/05/04	ICP-V	071904R1	0.13B	0.65	None
08/05/04	Hg	071904R1	<MRL	NA	None
09/22/04	ICP-Al	091304R	2.92B	14.6	None
09/22/04	ICP-Mg	091304R	1.29B	6.5	None
09/22/04	ICP-Na	091304R	69.5B	348	None
09/22/04	ICP-Zn	091304R	0.50B	2.5	None

B = Value is estimated <MRL and >MDL.
N = Laboratory spike sample recovery not within control limits.

IV-ICP Interference Check Sample (ICS)
The ICP interference check sample (ICS) verifies interelement and background correction factors. ICP Interference Check is performed at the beginning and end of each sample analysis run. Control limits are 80-120% (USACE limits 80-120%).

- All criteria were met. No qualifiers were applied.

V-Laboratory Control Samples (LCS)
The laboratory control sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. All soil LCS results must fall within the control limits of 80-120% for ICP metals and mercury. USACE Shell limits for metals are 80-120% (60-140% for sporadic marginal failures (SMF)).

- Sample BKS68056 was used as LCS for ICP metals analysis dated 7/30/04. All criteria were met. No qualifiers were applied.

- Sample BKS68194 was used as LCS for total mercury analysis dated 8/11/04. All criteria were met. No qualifiers were applied.

VI-Duplicate Sample Analysis
Duplicate sample determinations are used to demonstrate acceptable method precision by the laboratory at the time of analysis. Duplicate analysis generate data in order to determine the long-term precision of the analytical method on various matrices. RPDs must be within established control limits. USACE Shell limits for metals are 25% RPD for ICP metals and 20% RPD for mercury.

- Sample WBGSB43A (407174-006) was used as sample duplicate for ICP metals analysis. Antimony (200%), chromium (83.9%), and sodium (40.6%) were outside criteria. Antimony and sodium were outside criteria due to low sample concentrations, therefore no qualifiers were applied based upon these outliers. Chromium was qualified as estimated "J" for detects for the "WBG" samples analyzed 7/30/04 based upon the high RPD.

- Sample WBGSB43A (407174-006) was used as sample duplicate for mercury analysis. All criteria were met. No qualifiers were applied.

VII-Matrix Spike
MS are generated to determine long-term accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. Specific criteria include the analyses of matrix spike and matrix spike duplicate samples at a frequency of one MS per 20 samples of similar matrix. MS recoveries and relative percent differences between MS recoveries should be within the specified limits. USACE Shell limits for metals are 75-125% for ICP metals and 80-120% for mercury. Post digestion spikes limits are 75-125% for ICP metals and 85-115% for mercury.

- Sample WBGSB43A (407174-006) was used for the MS analysis for ICP analysis. This sample was reported in SDG 407174. Aluminum (940%), antimony (45.4%), calcium (44.8%), chromium (0%), iron (174%), magnesium (145%), manganese (29.7%), and potassium (128%) were outside of control limits. Post digestion spikes were within criteria for antimony, chromium, and potassium. The sample concentration was >4 times the spike added for aluminum, calcium, iron, magnesium, and manganese, therefore no qualifiers were applied based upon this outlier. For antimony and chromium, the spiked sample was qualified bias low detect "L" based upon the low recovery. For potassium, the spiked sample was qualified bias high "K" based upon the high recovery. Sample TMSB43A was a field duplicate and also qualified.

- Sample WBGSB43A (407174-006) was used for the MS analysis for mercury analysis. All criteria were met. No qualifiers were applied.

VIII-ICP Serial Dilution

An ICP serial dilution is performed to determine whether significant physical or chemical interferences exist due to sample matrix at high concentrations. An analysis of a 5-fold dilution should agree within 10% difference of the original result when the concentration in sample is a factor of 50 above MDL.

- The serial dilution for the ICP was analyzed for sample WBGSB43A (407174-006). Antimony (100%), arsenic (13.5%), cadmium (100%), and sodium (100%) were outside of criteria limits. Sample concentrations were <50 times MDL for antimony, arsenic, cadmium, and sodium, therefore no qualifiers were applied based upon these outliers.

IX-Field Duplicate Sample Analysis

Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the solid samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field soil sample duplicate pair WBGSB43A (407174-006) and TMSB43A (407173-010) was collected. Sample TMSB43A (407173-010) was analyzed in SDG 407173. The field duplicate evaluation is noted in **Table 4.** If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. Data qualifiers were applied as noted for the duplicate pair.

Table 4 Field Duplicate Analysis Summary

Sample ID	Lab ID	Compound	Original Result (mg/kg)	Duplicate Result (mg/kg)	%RPD	Qualifier
WBGSB43A	407174-006	Aluminum	17500	16500	5.9	None
WBGSB43A	407174-006	Antimony	0.53 BN	0.58 BN	9.0	None
WBGSB43A	407174-006	Arsenic	4.5	4.7	4.4	None
WBGSB43A	407174-006	Barium	90.0	93.9 N	4.2	None
WBGSB43A	407174-006	Beryllium	1.3	1.2	8.0	None
WBGSB43A	407174-006	Cadmium	0.066 B	0.22 B	***108***	J
WBGSB43A	407174-006	Calcium	3860	3760 *	2.6	None
WBGSB43A	407174-006	Chromium	102 N*	33.3	***102***	J
WBGSB43A	407174-006	Cobalt	11.0	11.4	3.6	None
WBGSB43A	407174-006	Copper	12.9	12.7	1.6	None
WBGSB43A	407174-006	Iron	19300	17900 *	7.5	None
WBGSB43A	407174-006	Lead	19.4	19.7	1.5	None
WBGSB43A	407174-006	Magnesium	5340	5130 N	4.0	None
WBGSB43A	407174-006	Manganese	416	430 N	3.3	None
WBGSB43A	407174-006	Nickel	20.4	14.6	33.1	None
WBGSB43A	407174-006	Potassium	929 N	925 N	0.4	None
WBGSB43A	407174-006	Sodium	58.1 B	81.8 B	33.9	None
WBGSB43A	407174-006	Vanadium	46.9	39.3	17.6	None
WBGSB43A	407174-006	Zinc	41.9	44.0	4.9	None
WBGSB43A	407174-006	Mercury	0.032 B	0.030 B	6.5	None

B = Estimated value <MRL and >MDL.
N = Laboratory spike sample recovery not within control limits.
* = Laboratory duplicate not within control limits.

- Field soil sample duplicate pair WBGSB49B (407174-015) and TMSB49B (407173-011) was collected. Sample TMSB49B (407173-011) was analyzed in SDG 407173. The field duplicate evaluation is noted in **Table 5.** If one of the duplicate pair was non-detect and other <2MRL, then was not evaluated. Data qualifiers were applied as noted for the duplicate pair.

Table 5 Field Duplicate Analysis Summary

Sample ID	Lab ID	Compound	Original Result (mg/kg)	Duplicate Result (mg/kg)	%RPD	Qualifier
WBGSB49B	407174-015	Aluminum	23800	24000	0.8	None
WBGSB49B	407174-015	Antimony	0.39 BN	0.65 BN	50.0	None
WBGSB49B	407174-015	Arsenic	9.9	9.2	7.3	None
WBGSB49B	407174-015	Barium	27.0	29.8 N	9.9	None
WBGSB49B	407174-015	Beryllium	0.88	0.98	10.8	None
WBGSB49B	407174-015	Cadmium	0.030 U	0.20 B	NA	None
WBGSB49B	407174-015	Calcium	733	691 *	5.9	None
WBGSB49B	407174-015	Chromium	35.6 N*	34.6	2.9	None
WBGSB49B	407174-015	Cobalt	7.2	9.1	23.3	None
WBGSB49B	407174-015	Copper	18.1	18.2	0.6	None
WBGSB49B	407174-015	Iron	35000	33200 *	5.3	None
WBGSB49B	407174-015	Lead	18.6	21.8	15.8	None
WBGSB49B	407174-015	Magnesium	758	807 N	6.3	None
WBGSB49B	407174-015	Manganese	127	176 N	32.3	None
WBGSB49B	407174-015	Nickel	16.1	16.9	4.9	None
WBGSB49B	407174-015	Potassium	990 N	1020 N	3.0	None
WBGSB49B	407174-015	Selenium	0.84 B	0.95 B	12.3	None
WBGSB49B	407174-015	Sodium	53.9 B	88.4 B	48.5	None
WBGSB49B	407174-015	Vanadium	68.5	64.5	6.0	None
WBGSB49B	407174-015	Zinc	31.3	30.6	2.3	None
WBGSB49B	407174-015	Mercury	0.11	0.057	***63.5***	J

B = Estimated value <MRL and >MDL.
N = Laboratory spike sample recovery not within control limits.
* = Laboratory duplicate not within control limits.
U = Value non-detect at MDL.

X-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value > MDL and < MRL or < 3*MDL (whichever was greater) was qualified as estimated, "J." The following calculations were performed for verification.

ICP Sample: WBGSB38A (407174-001), Total Barium

Conc. (mg/kg) = {(conc. μg/L)*(Final Volume L)*(DF)} / {(Weight Sample g)*(Fraction Solids)}

Conc. (mg/kg) = {(474.0627 μg/L)*(0.100 L)*(1)} / {(1.33 g)*(0.8189)} = 43.5 μg/g = 43.5 mg/kg

Reported concentration = 43.5 mg/kg
%D = 0.0%
Values were within 10% difference.

CVAA Sample: WBGSB38A (407174-001), Total Mercury

Conc. (mg/kg) = {(conc. μg/L)*(Final Volume L)*(DF)} / {(Weight Sample g)*(Fraction Solids)}

Conc. (mg/kg) = {(0.517 μg/L)*(0.100 L)*(1)} / {(0.83 g)*(0.8189)} = 0.076 μg/g = 0.076 mg/kg

Reported concentration = 0.076 mg/kg
%D = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – PCBs
GPL Laboratories, Inc., SDG 407174

DATE: January 11, 2005

The purpose of this memorandum is to present the data validation report for the samples collected for the New River WI at the RFAAP on July 19, 2004. Samples were analyzed for PCBs using USEPA Method 3540C/8082. A total of fifteen soil samples were analyzed and validated for PCBs. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
WBGSB38A	407174-001	WBGSB43B	407174-009
WBGSB39A	407174-002	WBGSB44B	407174-010
WBGSB40A	407174-003	WBGSB45B	407174-011
WBGSB41A	407174-004	WBGSB46C	407174-012
WBGSB42A	407174-005	WBGSB47C	407174-013
WBGSB43A	407174-006	WBGSB48C	407174-014
WBGSB44A	407174-007	WBGSB49B	407174-015
WBGSB45A	407174-008		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *USACE Shell for Analytical Chemistry Requirements* (USACE, February 2001), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (USEPA, September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	**No**	
	X	Holding Times
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	System Monitoring Compounds
	X	Laboratory Control Samples
	X	Matrix Spike/Spike Duplicate
	X	Field Sample Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable.

_____ _____

Eric Malarek, Chemist Date

RFAAP VALIDATION REPORT
PCB REVIEW
SDG 407174

I-Holding Times
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For PCB soil samples, cooled @4°C ±2°C, the maximum holding time is 14 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis (USEPA criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the lab upon receipt. For samples collected on 07/19/04, cooler was received by the laboratory at 2.0°C. All criteria were met. No qualifiers were applied.

- Holding Time Review: The samples were collected on 07/19/04 for PCB compounds. They were extracted on 07/30/04 and analyzed for PCBs on 08/01/04 within criteria guidelines. The actual extraction and analysis dates for each sample may be found on the attached form 1s to this report. No qualifiers were applied.

II-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. The initial 5-point calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run. The percent relative standard deviation (%RSD) for all single peak target analytes, and aroclors 1016 and 1260 must be $< 20\%$ or the mean %RSD for all analytes in the standard must be $\leq 20\%$. If linear regression is used, the correlation coefficient must be ≥ 0.990 (USEPA and USACE criteria).

- For the PCB initial calibration performed on 07/29/04 on instrument GC-L, all compounds were determined using calibration factors for PCB 1016 and PCB 1260. All criteria were met, except for the following. For PCB 1260 signal #2, PCB 1260 #1 (20.7%), PCB 1260 #2 (21.5%), and PCB 1260 #5 (21.8%) were above criteria limits. The average %RSD for PCB 1260 for signal #2 (20.4%) was within criteria. All associated samples were non-detect for PCB 1260. No qualifiers were applied based upon these outliers. Samples WBGSB38A (407174-001), WBGSB39A (407174-002), WBGSB40A (407174-003), WBGSB41A (407174-004), WBGSB42A (407174-005), WBGSB43A (407174-006), WBGSB44A (407174-007), WBGSB45A (407174-008), WBGSB43B (407174-009), WBGSB44B (407174-010), WBGSB45B (407174-011), WBGSB46C (407174-012), WBGSB47C (407174-013), WBGSB48C (407174-014), and WBGSB49B (407174-015) apply to this initial calibration.

III-Continuing Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for PCB target compounds. Continuing calibration standards containing both target compounds and surrogates are analyzed at the beginning of each 12-hour analytical shift and after every 20 samples. The percent difference (%D) or the mean %RSD for all analytes in the standard from the initial calibration should be no greater than $\pm$ 15%.

- For PCB continuing calibration performed on 08/01/04 @12:22 on instrument GC-L, all criteria were met on column #1 and column #2 for all target compounds arochlor 1016 and arochlor 1260. No qualifiers were applied. Samples WBGSB38A (407174-001), WBGSB39A (407174-002), WBGSB40A (407174-003), WBGSB41A (407174-004), WBGSB42A (407174-005), and WBGSB43A (407174-006) apply to his continuing calibration.

- For PCB continuing calibration performed on 08/01/04 @18:24 on instrument GC-L, all criteria were met on column #1 and column #2 for all target compounds arochlor 1016 and arochlor 1260. No qualifiers were applied. Samples WBGSB44A (407174-007), WBGSB45A (407174-008), WBGSB43B (407174-009), WBGSB44B (407174-010), WBGSB45B (407174-011), WBGSB46C (407174-012), WBGSB47C (407174-013), WBGSB48C (407174-014), and WBGSB49B (407174-015) apply to his continuing calibration.

- For PCB continuing calibration performed on 08/02/04 @00:13 on instrument GC-L, all criteria were met on column #1 and column #2 for all target compounds arochlor 1016 and arochlor 1260. No qualifiers were applied. No samples reported apply to his continuing calibration.

IV-Blank Analysis

The purpose of laboratory or field blank analyses is to determine the existence and magnitude of contamination problems resulting from laboratory or field activities. One method blank per analytical batch must be run on each instrument used to analyze samples. No contaminants should be present in the blanks > MDL or MRL (USEPA criteria) or all target compounds < one-half the MRL (USACE criteria). **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one, 100% solids, and were converted to soil values (soil conversion factor = 30). The rinse blank breakout is as follows.

- Rinse blank 071904R2 applies to the western burning ground ("WBG" prefix samples) surface soil samples ("A" suffix samples) and was analyzed in SDG 0407135.

- Rinse blank 071904R1 applies to the western burning ground ("WBG" prefix samples) subsurface soil samples ("B→C" suffix samples) and was analyzed in SDG 0407135.

Table 2 Blank Contamination Analysis Summary

Parameter	Analysis Date	QC Blank ID	Compound	Max Conc. µg/kg	Action Level µg/kg	B qualified samples
PCBs	08/01/04	BLK68009	All < MRL	NA	NA	None
PCBs	07/28/04	071904R2	All < MRL	NA	NA	None
PCBs	07/28/04	071904R1	All < MRL	NA	NA	None

V-System Monitoring Compound (Surrogates)

Laboratory performance on individual samples is established by means of spiking activities. The percent recovery (%R) for all samples and blanks must be within the specified laboratory control limits.

Criteria: Decachlorobiphenyl: PCBs: 47-161% (USACE criteria 50-130%)
Tetrachloro-m-xylene: PCBs: 54-168% (USACE criteria 50-130%)

- For PCB analysis for sample WBGSB39A (407174-002), surrogate decachlorobiphenyl (39%; signal #1) was outside USACE and/or lab criteria. Since surrogates tetrachloro-m-xylene (signals #1 and #2) and decachlorobiphenyl (signal #2) were within criteria, no qualifiers were applied based upon this outlier.

- For all other samples, all criteria were met. No qualifiers were applied.

VI-Laboratory Control Samples
Laboratory control samples (LCS) are used to monitor long-term precision and accuracy of the analytical method. The analysis is performed at a frequency of 1 per analytical batch. The percent recoveries (%Rs) must be within the specified control limits. USACE Shell limits for PCBs are 50-130% (30-150% for sporadic marginal failures (SMF)).

- Sample BKS68009 was used for the LCS for PCBs. All criteria were met. No qualifiers were applied. Samples WBGSB38A (407174-001), WBGSB39A (407174-002), WBGSB40A (407174-003), WBGSB41A (407174-004), WBGSB42A (407174-005), WBGSB43A (407174-006), WBGSB44A (407174-007), WBGSB45A (407174-008), WBGSB43B (407174-009), WBGSB44B (407174-010), WBGSB45B (407174-011), WBGSB46C (407174-012), WBGSB47C (407174-013), WBGSB48C (407174-014), and WBGSB49B (407174-015) apply to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. USACE Shell limits for PCBs are 40-140%; RPD<50%.

- Sample WBGSB43A (407174-006) was used for the MS/MSD analysis for PCB compounds. All criteria were met. No qualifiers were applied.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. The project precision control criterion was established at 50% RPD for the solid samples.

- No field soil sample duplicate pair was analyzed with this SDG.

IX-Quantitation Verification
The accuracy of analytical results was verified through the calculation of several parameters. The difference between the calculated value and the reported value must be within 10% difference. All samples were non-detect for PCBs, therefore the quantification verification not included here. Any sample value > MDL and < MRL or < 3*MDL (whichever is greater) was qualified as estimated, “J.” The difference between the primary column and the confirmatory column must be ≤ 40% difference (USEPA and USACE criteria).

- All PCBs were non-detect for associated samples in this SDG.

Sample: WBGSB43AMS (407174-006MS), Aroclor 1260

Conc. μg/kg = (Ax * Vt * DF) / (CF * Vi * Ws * D)

where: Conc. = Sample concentration in μg/kg
Ax = Area/response for compound being measured.
Vt = Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10000 μL.
CF = Ave calibration response factor for compound being measured from ICAL (Area/pg)
Vi = Volume of extract injected (mL).
W(s) = Weight of sample extracted or diluted in grams.
D = Percent dry weight (100 - % moisture in sample)/100 = 1.0 for Wet Weight
DF = Dilution factor

Signal #1
Conc1 μg/kg = (160034Area*10000μL*1) / (394.5Area/pg*(1000 pg/ng)*1 μL*30g*0.8215) = 164.60 μg/kg
Conc2 μg/kg = (249164Area*10000μL*1) / (561.8Area/pg*(1000 pg/ng)*1 μL*30g*0.8215) = 179.96 μg/kg
Conc3 μg/kg = (290482Area*10000μL*1) / (650.6Area/pg*(1000 pg/ng)*1 μL*30g*0.8215) = 181.17 μg/kg
Conc4 μg/kg = (102316Area*10000μL*1) / (285.6Area/pg*(1000 pg/ng)*1 μL*30g*0.8215) = 145.36 μg/kg
Conc5 μg/kg = (317714Area*10000μL*1) / (835.2Area/pg*(1000 pg/ng)*1 μL*30g*0.8215) = 154.35 μg/kg
Average concentration = 170 μg/kg

Signal #2
Conc1 μg/kg = (763473Area*10000μL*1) / (2067Area/pg*(1000 pg/ng)*1 μL*30g*0.8215) = 149.87 μg/kg
Conc2 μg/kg = (856666Area*10000μL*1) / (2260Area/pg*(1000 pg/ng)*1 μL*30g*0.8215) = 153.81 μg/kg
Conc3 μg/kg = (1255038Area*10000μL*1) / (3052Area/pg*(1000 pg/ng)*1 μL*30g*0.8215) = 166.86 μg/kg
Conc4 μg/kg = (667970Area*10000μL*1) / (1759Area/pg*(1000 pg/ng)*1 μL*30g*0.8215) = 154.09 μg/kg
Conc5 μg/kg = (1196986Area*10000μL*1) / (3399Area/pg*(1000 pg/ng)*1 μL*30g*0.8215) = 142.89 μg/kg
Average concentration = 150 μg/kg

Reported Value = 170 μg/kg (signal #1)
% Difference = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Analytical Report For 407075

for

Shaw Environmental & Infrastructure

Project Manager : Eric Malarek

Project Name : Radford

August 5, 2004

GPL

Laboratories

GPL Laboratories, LLLP Certifies that the test results meet all requirements of the NELAC Standards unless otherwise noted.

Reviewed by, Project Manager	Approved by, Laboratory Director

7210A Corporate CT Frederick, MD 21703 Phone (301) 694-5310 Fax: (301) 620-0731
www.gplab.com

Summary of Analytical Results

Client ID: DTSB48A
GPL ID: 407075-001-005-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/14/2004
Time Analyzed: 16:30
Analysis Batch: 69442

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	83	1.0	%		1

Summary of Analytical Results

Client ID: TMSB48A
GPL ID: 407075-002-006-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/14/2004
Time Analyzed: 16:30
Analysis Batch: 69442

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	83	1.0	%		1

Summary of Analytical Results

Client ID: DTSB50A
GPL ID: 407075-004-008-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/19/2004
Time Analyzed: 21:30
Analysis Batch: 69569

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	77	1.0	%		1

Summary of Analytical Results

Client ID: DTSB51A
GPL ID: 407075-005-009-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/14/2004
Time Analyzed: 16:30
Analysis Batch: 69442

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	81	1.0	%		1

Summary of Analytical Results

Client ID: DTSB52A
GPL ID: 407075-006-010-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/19/2004
Time Analyzed: 21:30
Analysis Batch: 69569

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	77	1.0	%		1

Summary of Analytical Results

Client ID: DTSB54A
GPL ID: 407075-008-012-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/14/2004
Time Analyzed: 16:30
Analysis Batch: 69442

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	74	1.0	%		1

Summary of Analytical Results

Client ID: DTSB55A
GPL ID: 407075-009-013-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/14/2004
Time Analyzed: 16:30
Analysis Batch: 69442

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	78	1.0	%		1

Summary of Analytical Results

Client ID: DTSB56A
GPL ID: 407075-010-014-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/14/2004
Time Analyzed: 16:30
Analysis Batch: 69442

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	74	1.0	%		1

Summary of Analytical Results

Client ID: DTSB57A
GPL ID: 407075-011-015-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/19/2004
Time Analyzed: 21:30
Analysis Batch: 69569

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	75	1.0	%		1

Summary of Analytical Results

Client ID: DTSB58A
GPL ID: 407075-012-016-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/14/2004
Time Analyzed: 16:30
Analysis Batch: 69442

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	64	1.0	%		1

Summary of Analytical Results

Client ID: DTSB59A
GPL ID: 407075-013-017-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/14/2004
Time Analyzed: 16:30
Analysis Batch: 69442

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	77	1.0	%		1

Summary of Analytical Results

Client ID: TMSB59A
GPL ID: 407075-014-018-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/14/2004
Time Analyzed: 16:30
Analysis Batch: 69442

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	78	1.0	%		1

Summary of Analytical Results

Client ID: DTSB60A
GPL ID: 407075-015-019-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/14/2004
Time Analyzed: 16:30
Analysis Batch: 69442

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	58	1.0	%		1

Summary of Analytical Results

Client ID: DTSB62A
GPL ID: 407075-017-021-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/14/2004
Time Analyzed: 16:30
Analysis Batch: 69442

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	73	1.0	%		1

Summary of Analytical Results

Client ID: DTSB63A
GPL ID: 407075-018-022-1/2
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/14/2004
Time Analyzed: 16:30
Analysis Batch: 69442

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	77	1.0	%		1

Summary of Analytical Results

Client ID: DTSB64A
GPL ID: 407075-019-024-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/21/2004
Time Analyzed: 16:00
Analysis Batch: 69651

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	66	1.0	%		1

Summary of Analytical Results

Client ID: DTSB65A
GPL ID: 407075-020-025-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/19/2004
Time Analyzed: 21:30
Analysis Batch: 69569

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	66	1.0	%		1

Summary of Analytical Results

Client ID: DTSB66A
GPL ID: 407075-021-001-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/14/2004
Time Analyzed: 16:30
Analysis Batch: 69442

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	79	1.0	%		1

Summary of Analytical Results

Client ID: DTSB67A
GPL ID: 407075-022-002-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/14/2004
Time Analyzed: 16:30
Analysis Batch: 69442

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	76	1.0	%		1

Summary of Analytical Results

Client ID: DTSB68A
GPL ID: 407075-023-003-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/14/2004
Time Analyzed: 16:30
Analysis Batch: 69442

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	73	1.0	%		1

Summary of Analytical Results

Client ID: DTSB69A
GPL ID: 407075-024-004-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/19/2004
Time Analyzed: 21:30
Analysis Batch: 69569

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	79	1.0	%		1

Summary of Analytical Results

Client ID: DTSB48A
GPL ID: 407075-001-005-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67785

Analytical Method: SW8082
Date Analyzed: 07/21/2004
Time Analyzed: 06:55
Analysis Batch: 69785

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	120	ug/kg	U	1
PCB-1221	BQL	120	ug/kg	U	1
PCB-1232	BQL	120	ug/kg	U	1
PCB-1242	BQL	120	ug/kg	U	1
PCB-1248	BQL	120	ug/kg	U	1
PCB-1254	BQL	120	ug/kg	U	1
PCB-1260	BQL	120	ug/kg	U	1

Summary of Analytical Results

Client ID: TMSB48A
GPL ID: 407075-002-006-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67785

Analytical Method: SW8082
Date Analyzed: 07/21/2004
Time Analyzed: 07:24
Analysis Batch: 69785

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	120	ug/kg	U	1
PCB-1221	BQL	120	ug/kg	U	1
PCB-1232	BQL	120	ug/kg	U	1
PCB-1242	BQL	120	ug/kg	U	1
PCB-1248	BQL	120	ug/kg	U	1
PCB-1254	BQL	120	ug/kg	U	1
PCB-1260	BQL	120	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB50A
GPL ID: 407075-004-008-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67785

Analytical Method: SW8082
Date Analyzed: 07/20/2004
Time Analyzed: 22:13
Analysis Batch: 69785

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	130	ug/kg	U	1
PCB-1221	BQL	130	ug/kg	U	1
PCB-1232	BQL	130	ug/kg	U	1
PCB-1242	BQL	130	ug/kg	U	1
PCB-1248	BQL	130	ug/kg	U	1
PCB-1254	BQL	130	ug/kg	U	1
PCB-1260	BQL	130	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB51A
GPL ID: 407075-005-009-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67785

Analytical Method: SW8082
Date Analyzed: 07/21/2004
Time Analyzed: 07:53
Analysis Batch: 69785

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	120	ug/kg	U	1
PCB-1221	BQL	120	ug/kg	U	1
PCB-1232	BQL	120	ug/kg	U	1
PCB-1242	BQL	120	ug/kg	U	1
PCB-1248	BQL	120	ug/kg	U	1
PCB-1254	BQL	120	ug/kg	U	1
PCB-1260	BQL	120	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB52A
GPL ID: 407075-006-010-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67785

Analytical Method: SW8082
Date Analyzed: 07/20/2004
Time Analyzed: 22:42
Analysis Batch: 69785

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	130	ug/kg	U	1
PCB-1221	BQL	130	ug/kg	U	1
PCB-1232	BQL	130	ug/kg	U	1
PCB-1242	BQL	130	ug/kg	U	1
PCB-1248	BQL	130	ug/kg	U	1
PCB-1254	BQL	130	ug/kg	U	1
PCB-1260	BQL	130	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB54A
GPL ID: 407075-008-012-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67785

Analytical Method: SW8082
Date Analyzed: 07/20/2004
Time Analyzed: 23:11
Analysis Batch: 69785

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	140	ug/kg	U	1
PCB-1221	BQL	140	ug/kg	U	1
PCB-1232	BQL	140	ug/kg	U	1
PCB-1242	BQL	140	ug/kg	U	1
PCB-1248	BQL	140	ug/kg	U	1
PCB-1254	BQL	140	ug/kg	U	1
PCB-1260	BQL	140	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB55A
GPL ID: 407075-009-013-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67785

Analytical Method: SW8082
Date Analyzed: 07/21/2004
Time Analyzed: 08:22
Analysis Batch: 69785

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	130	ug/kg	U	1
PCB-1221	BQL	130	ug/kg	U	1
PCB-1232	BQL	130	ug/kg	U	1
PCB-1242	BQL	130	ug/kg	U	1
PCB-1248	BQL	130	ug/kg	U	1
PCB-1254	BQL	130	ug/kg	U	1
PCB-1260	BQL	130	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB56A
GPL ID: 407075-010-014-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67785

Analytical Method: SW8082
Date Analyzed: 07/21/2004
Time Analyzed: 08:51
Analysis Batch: 69785

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	140	ug/kg	U	1
PCB-1221	BQL	140	ug/kg	U	1
PCB-1232	BQL	140	ug/kg	U	1
PCB-1242	BQL	140	ug/kg	U	1
PCB-1248	BQL	140	ug/kg	U	1
PCB-1254	BQL	140	ug/kg	U	1
PCB-1260	BQL	140	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB57A
GPL ID: 407075-011-015-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67785

Analytical Method: SW8082
Date Analyzed: 07/20/2004
Time Analyzed: 23:40
Analysis Batch: 69785

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	130	ug/kg	U	1
PCB-1221	BQL	130	ug/kg	U	1
PCB-1232	BQL	130	ug/kg	U	1
PCB-1242	BQL	130	ug/kg	U	1
PCB-1248	BQL	130	ug/kg	U	1
PCB-1254	BQL	130	ug/kg	U	1
PCB-1260	BQL	130	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB58A
GPL ID: 407075-012-016-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67785

Analytical Method: SW8082
Date Analyzed: 07/21/2004
Time Analyzed: 00:09
Analysis Batch: 69785

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	160	ug/kg	U	1
PCB-1221	BQL	160	ug/kg	U	1
PCB-1232	BQL	160	ug/kg	U	1
PCB-1242	BQL	160	ug/kg	U	1
PCB-1248	BQL	160	ug/kg	U	1
PCB-1254	BQL	160	ug/kg	U	1
PCB-1260	BQL	160	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB59A
GPL ID: 407075-013-017-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67785

Analytical Method: SW8082
Date Analyzed: 07/21/2004
Time Analyzed: 09:20
Analysis Batch: 69785

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	130	ug/kg	U	1
PCB-1221	BQL	130	ug/kg	U	1
PCB-1232	BQL	130	ug/kg	U	1
PCB-1242	BQL	130	ug/kg	U	1
PCB-1248	BQL	130	ug/kg	U	1
PCB-1254	BQL	130	ug/kg	U	1
PCB-1260	BQL	130	ug/kg	U	1

Summary of Analytical Results

Client ID: TMSB59A
GPL ID: 407075-014-018-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67785

Analytical Method: SW8082
Date Analyzed: 07/21/2004
Time Analyzed: 09:49
Analysis Batch: 69785

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	130	ug/kg	U	1
PCB-1221	BQL	130	ug/kg	U	1
PCB-1232	BQL	130	ug/kg	U	1
PCB-1242	BQL	130	ug/kg	U	1
PCB-1248	BQL	130	ug/kg	U	1
PCB-1254	BQL	130	ug/kg	U	1
PCB-1260	BQL	130	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB60A
GPL ID: 407075-015-019-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67785

Analytical Method: SW8082
Date Analyzed: 07/21/2004
Time Analyzed: 00:38
Analysis Batch: 69785

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	170	ug/kg	U	1
PCB-1221	BQL	170	ug/kg	U	1
PCB-1232	BQL	170	ug/kg	U	1
PCB-1242	BQL	170	ug/kg	U	1
PCB-1248	BQL	170	ug/kg	U	1
PCB-1254	BQL	170	ug/kg	U	1
PCB-1260	BQL	170	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB62A
GPL ID: 407075-017-021-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67785

Analytical Method: SW8082
Date Analyzed: 07/21/2004
Time Analyzed: 01:07
Analysis Batch: 69785

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	140	ug/kg	U	1
PCB-1221	BQL	140	ug/kg	U	1
PCB-1232	BQL	140	ug/kg	U	1
PCB-1242	BQL	140	ug/kg	U	1
PCB-1248	BQL	140	ug/kg	U	1
PCB-1254	BQL	140	ug/kg	U	1
PCB-1260	BQL	140	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB63A
GPL ID: 407075-018-022-1/2
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67785

Analytical Method: SW8082
Date Analyzed: 07/21/2004
Time Analyzed: 01:36
Analysis Batch: 69785

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	130	ug/kg	U	1
PCB-1221	BQL	130	ug/kg	U	1
PCB-1232	BQL	130	ug/kg	U	1
PCB-1242	BQL	130	ug/kg	U	1
PCB-1248	BQL	130	ug/kg	U	1
PCB-1254	BQL	130	ug/kg	U	1
PCB-1260	BQL	130	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB65A
GPL ID: 407075-020-025-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67785

Analytical Method: SW8082
Date Analyzed: 07/21/2004
Time Analyzed: 04:01
Analysis Batch: 69785

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	150	ug/kg	U	1
PCB-1221	BQL	150	ug/kg	U	1
PCB-1232	BQL	150	ug/kg	U	1
PCB-1242	BQL	150	ug/kg	U	1
PCB-1248	BQL	150	ug/kg	U	1
PCB-1254	BQL	150	ug/kg	U	1
PCB-1260	BQL	150	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB66A
GPL ID: 407075-021-001-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67785

Analytical Method: SW8082
Date Analyzed: 07/21/2004
Time Analyzed: 04:30
Analysis Batch: 69785

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	130	ug/kg	U	1
PCB-1221	BQL	130	ug/kg	U	1
PCB-1232	BQL	130	ug/kg	U	1
PCB-1242	BQL	130	ug/kg	U	1
PCB-1248	BQL	130	ug/kg	U	1
PCB-1254	BQL	130	ug/kg	U	1
PCB-1260	BQL	130	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB67A
GPL ID: 407075-022-002-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67785

Analytical Method: SW8082
Date Analyzed: 07/21/2004
Time Analyzed: 10:18
Analysis Batch: 69785

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	130	ug/kg	U	1
PCB-1221	BQL	130	ug/kg	U	1
PCB-1232	BQL	130	ug/kg	U	1
PCB-1242	BQL	130	ug/kg	U	1
PCB-1248	BQL	130	ug/kg	U	1
PCB-1254	BQL	130	ug/kg	U	1
PCB-1260	BQL	130	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB68A
GPL ID: 407075-023-003-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67785

Analytical Method: SW8082
Date Analyzed: 07/21/2004
Time Analyzed: 04:59
Analysis Batch: 69785

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	140	ug/kg	U	1
PCB-1221	BQL	140	ug/kg	U	1
PCB-1232	BQL	140	ug/kg	U	1
PCB-1242	BQL	140	ug/kg	U	1
PCB-1248	BQL	140	ug/kg	U	1
PCB-1254	BQL	140	ug/kg	U	1
PCB-1260	BQL	140	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB69A
GPL ID: 407075-024-004-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67785

Analytical Method: SW8082
Date Analyzed: 07/21/2004
Time Analyzed: 05:28
Analysis Batch: 69785

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	130	ug/kg	U	1
PCB-1221	BQL	130	ug/kg	U	1
PCB-1232	BQL	130	ug/kg	U	1
PCB-1242	BQL	130	ug/kg	U	1
PCB-1248	BQL	130	ug/kg	U	1
PCB-1254	BQL	130	ug/kg	U	1
PCB-1260	BQL	130	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB48A
GPL ID: 407075-001-005-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/14/2004
Time Analyzed: 22:57
Analysis Batch: 69450

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	92	8.1	ug/kg		1
Acenaphthene	680	8.1	ug/kg	E	1
Acenaphthylene	150	8.1	ug/kg		1
Anthracene	1000	8.1	ug/kg	E	1
Benzo(a)anthracene	3700	8.1	ug/kg	E	1
Benzo(a)pyrene	2100	8.1	ug/kg	E	1
Benzo(b)fluoranthene	3100	8.1	ug/kg	E	1
Benzo(g,h,i)perylene	1400	8.1	ug/kg	E	1
Benzo(k)fluoranthene	660	8.1	ug/kg	E	1
Chrysene	2200	8.1	ug/kg	E	1
Dibenz(a,h)Anthracene	480	8.1	ug/kg	E	1
Fluoranthene	2500	8.1	ug/kg	E	1
Fluorene	680	8.1	ug/kg	E	1
Indeno(1,2,3-c,d)Pyrene	1400	8.1	ug/kg	E	1
Naphthalene	400	8.1	ug/kg	E	1
Phenanthrene	1600	8.1	ug/kg	E	1
Pyrene	2600	8.1	ug/kg	E	1

Summary of Analytical Results

Client ID: DTSB48ADL
GPL ID: 407075-001-005-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/15/2004
Time Analyzed: 18:50
Analysis Batch: 69473

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	320	ug/kg	U	40
Acenaphthene	730	320	ug/kg		40
Acenaphthylene	BQL	320	ug/kg	U	40
Anthracene	1600	320	ug/kg		40
Benzo(a)anthracene	3700	320	ug/kg		40
Benzo(a)pyrene	2800	320	ug/kg		40
Benzo(b)fluoranthene	4700	320	ug/kg		40
Benzo(g,h,i)perylene	1500	320	ug/kg		40
Benzo(k)fluoranthene	1600	320	ug/kg		40
Chrysene	3400	320	ug/kg		40
Dibenz(a,h)Anthracene	550	320	ug/kg		40
Fluoranthene	9900	320	ug/kg		40
Fluorene	690	320	ug/kg		40
Indeno(1,2,3-c,d)Pyrene	1400	320	ug/kg		40
Naphthalene	400	320	ug/kg		40
Phenanthrene	7400	320	ug/kg		40
Pyrene	7600	320	ug/kg		40

Summary of Analytical Results

Client ID: TMSB48A
GPL ID: 407075-002-006-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/14/2004
Time Analyzed: 23:27
Analysis Batch: 69450

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	61	8.0	ug/kg		1
Acenaphthene	660	8.0	ug/kg	E	1
Acenaphthylene	120	8.0	ug/kg		1
Anthracene	1100	8.0	ug/kg	E	1
Benzo(a)anthracene	3500	8.0	ug/kg	E	1
Benzo(a)pyrene	2000	8.0	ug/kg	E	1
Benzo(b)fluoranthene	3100	8.0	ug/kg	E	1
Benzo(g,h,i)perylene	1300	8.0	ug/kg	E	1
Benzo(k)fluoranthene	800	8.0	ug/kg	E	1
Chrysene	2300	8.0	ug/kg	E	1
Dibenz(a,h)Anthracene	430	8.0	ug/kg	E	1
Fluoranthene	2600	8.0	ug/kg	E	1
Fluorene	640	8.0	ug/kg	E	1
Indeno(1,2,3-c,d)Pyrene	1200	8.0	ug/kg	E	1
Naphthalene	210	8.0	ug/kg		1
Phenanthrene	1600	8.0	ug/kg	E	1
Pyrene	2700	8.0	ug/kg	E	1

Summary of Analytical Results

Client ID: TMSB48ADL
GPL ID: 407075-002-006-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/15/2004
Time Analyzed: 19:19
Analysis Batch: 69473

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	320	ug/kg	U	40
Acenaphthene	750	320	ug/kg		40
Acenaphthylene	BQL	320	ug/kg	U	40
Anthracene	1700	320	ug/kg		40
Benzo(a)anthracene	3200	320	ug/kg		40
Benzo(a)pyrene	2600	320	ug/kg		40
Benzo(b)fluoranthene	4300	320	ug/kg		40
Benzo(g,h,i)perylene	1300	320	ug/kg		40
Benzo(k)fluoranthene	1600	320	ug/kg		40
Chrysene	3300	320	ug/kg		40
Dibenz(a,h)Anthracene	430	320	ug/kg		40
Fluoranthene	9000	320	ug/kg		40
Fluorene	690	320	ug/kg		40
Indeno(1,2,3-c,d)Pyrene	1200	320	ug/kg		40
Naphthalene	BQL	320	ug/kg	U	40
Phenanthrene	7200	320	ug/kg		40
Pyrene	7200	320	ug/kg		40

Summary of Analytical Results

Client ID: DTSB50A
GPL ID: 407075-004-008-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67751

Analytical Method: SW8270_PAH
Date Analyzed: 07/19/2004
Time Analyzed: 15:24
Analysis Batch: 69548

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	8.7	ug/kg	U	1
Acenaphthene	26	8.7	ug/kg		1
Acenaphthylene	16	8.7	ug/kg		1
Anthracene	94	8.7	ug/kg		1
Benzo(a)anthracene	210	8.7	ug/kg		1
Benzo(a)pyrene	180	8.7	ug/kg		1
Benzo(b)fluoranthene	330	8.7	ug/kg		1
Benzo(g,h,i)perylene	130	8.7	ug/kg		1
Benzo(k)fluoranthene	84	8.7	ug/kg		1
Chrysene	230	8.7	ug/kg		1
Dibenz(a,h)Anthracene	37	8.7	ug/kg		1
Fluoranthene	530	8.7	ug/kg		1
Fluorene	24	8.7	ug/kg		1
Indeno(1,2,3-c,d)Pyrene	120	8.7	ug/kg		1
Naphthalene	BQL	8.7	ug/kg	U	1
Phenanthrene	300	8.7	ug/kg		1
Pyrene	370	8.7	ug/kg		1

Summary of Analytical Results

Client ID: DTSB50ADL
GPL ID: 407075-004-008-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67751

Analytical Method: SW8270_PAH
Date Analyzed: 07/19/2004
Time Analyzed: 19:18
Analysis Batch: 69548

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	17	ug/kg	U	2
Acenaphthene	24	17	ug/kg		2
Acenaphthylene	BQL	17	ug/kg	U	2
Anthracene	93	17	ug/kg		2
Benzo(a)anthracene	200	17	ug/kg		2
Benzo(a)pyrene	180	17	ug/kg		2
Benzo(b)fluoranthene	330	17	ug/kg		2
Benzo(g,h,i)perylene	110	17	ug/kg		2
Benzo(k)fluoranthene	91	17	ug/kg		2
Chrysene	220	17	ug/kg		2
Dibenz(a,h)Anthracene	33	17	ug/kg		2
Fluoranthene	540	17	ug/kg		2
Fluorene	23	17	ug/kg		2
Indeno(1,2,3-c,d)Pyrene	110	17	ug/kg		2
Naphthalene	BQL	17	ug/kg	U	2
Phenanthrene	290	17	ug/kg		2
Pyrene	340	17	ug/kg		2

Summary of Analytical Results

Client ID: DTSB51A
GPL ID: 407075-005-009-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/14/2004
Time Analyzed: 23:57
Analysis Batch: 69450

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	51	8.2	ug/kg		1
Acenaphthene	730	8.2	ug/kg	E	1
Acenaphthylene	83	8.2	ug/kg		1
Anthracene	1200	8.2	ug/kg	E	1
Benzo(a)anthracene	3700	8.2	ug/kg	E	1
Benzo(a)pyrene	2100	8.2	ug/kg	E	1
Benzo(b)fluoranthene	3000	8.2	ug/kg	E	1
Benzo(g,h,i)perylene	1300	8.2	ug/kg	E	1
Benzo(k)fluoranthene	760	8.2	ug/kg	E	1
Chrysene	2200	8.2	ug/kg	E	1
Dibenz(a,h)Anthracene	450	8.2	ug/kg	E	1
Fluoranthene	2600	8.2	ug/kg	E	1
Fluorene	740	8.2	ug/kg	E	1
Indeno(1,2,3-c,d)Pyrene	1300	8.2	ug/kg	E	1
Naphthalene	150	8.2	ug/kg		1
Phenanthrene	1700	8.2	ug/kg	E	1
Pyrene	2500	8.2	ug/kg	E	1

Summary of Analytical Results

Client ID: DTSB51ADL
GPL ID: 407075-005-009-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/15/2004
Time Analyzed: 19:49
Analysis Batch: 69473

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	330	ug/kg	U	40
Acenaphthene	810	330	ug/kg		40
Acenaphthylene	BQL	330	ug/kg	U	40
Anthracene	1900	330	ug/kg		40
Benzo(a)anthracene	3300	330	ug/kg		40
Benzo(a)pyrene	2800	330	ug/kg		40
Benzo(b)fluoranthene	4500	330	ug/kg		40
Benzo(g,h,i)perylene	1200	330	ug/kg		40
Benzo(k)fluoranthene	1600	330	ug/kg		40
Chrysene	3700	330	ug/kg		40
Dibenz(a,h)Anthracene	460	330	ug/kg		40
Fluoranthene	10000	330	ug/kg		40
Fluorene	810	330	ug/kg		40
Indeno(1,2,3-c,d)Pyrene	1200	330	ug/kg		40
Naphthalene	BQL	330	ug/kg	U	40
Phenanthrene	8500	330	ug/kg		40
Pyrene	8200	330	ug/kg		40

Summary of Analytical Results

Client ID: DTSB52ADL
GPL ID: 407075-006-010-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67751

Analytical Method: SW8270_PAH
Date Analyzed: 07/19/2004
Time Analyzed: 17:21
Analysis Batch: 69548

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	43	ug/kg	U	5
Acenaphthene	640	43	ug/kg		5
Acenaphthylene	BQL	43	ug/kg	U	5
Anthracene	1100	43	ug/kg		5
Benzo(a)anthracene	2300	43	ug/kg		5
Benzo(a)pyrene	2000	43	ug/kg		5
Benzo(b)fluoranthene	2900	43	ug/kg		5
Benzo(g,h,i)perylene	1000	43	ug/kg		5
Benzo(k)fluoranthene	940	43	ug/kg		5
Chrysene	2200	43	ug/kg		5
Dibenz(a,h)Anthracene	310	43	ug/kg		5
Fluoranthene	3800	43	ug/kg		5
Fluorene	590	43	ug/kg		5
Indeno(1,2,3-c,d)Pyrene	1000	43	ug/kg		5
Naphthalene	86	43	ug/kg		5
Phenanthrene	3300	43	ug/kg		5
Pyrene	2800	43	ug/kg		5

Summary of Analytical Results

Client ID: DTSB52ADL2
GPL ID: 407075-006-010-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67751

Analytical Method: SW8270_PAH
Date Analyzed: 07/19/2004
Time Analyzed: 18:49
Analysis Batch: 69548

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	220	ug/kg	U	25
Acenaphthene	650	220	ug/kg		25
Acenaphthylene	BQL	220	ug/kg	U	25
Anthracene	970	220	ug/kg		25
Benzo(a)anthracene	2200	220	ug/kg		25
Benzo(a)pyrene	1800	220	ug/kg		25
Benzo(b)fluoranthene	3000	220	ug/kg		25
Benzo(g,h,i)perylene	990	220	ug/kg		25
Benzo(k)fluoranthene	680	220	ug/kg		25
Chrysene	2100	220	ug/kg		25
Dibenz(a,h)Anthracene	290	220	ug/kg		25
Fluoranthene	6700	220	ug/kg		25
Fluorene	540	220	ug/kg		25
Indeno(1,2,3-c,d)Pyrene	920	220	ug/kg		25
Naphthalene	BQL	220	ug/kg	U	25
Phenanthrene	5500	220	ug/kg		25
Pyrene	4300	220	ug/kg		25

Summary of Analytical Results

Client ID: DTSB54A
GPL ID: 407075-008-012-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/14/2004
Time Analyzed: 17:29
Analysis Batch: 69450

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	9.1	ug/kg	U	1
Acenaphthene	BQL	9.1	ug/kg	U	1
Acenaphthylene	BQL	9.1	ug/kg	U	1
Anthracene	BQL	9.1	ug/kg	U	1
Benzo(a)anthracene	BQL	9.1	ug/kg	U	1
Benzo(a)pyrene	BQL	9.1	ug/kg	U	1
Benzo(b)fluoranthene	12	9.1	ug/kg		1
Benzo(g,h,i)perylene	BQL	9.1	ug/kg	U	1
Benzo(k)fluoranthene	BQL	9.1	ug/kg	U	1
Chrysene	BQL	9.1	ug/kg	U	1
Dibenz(a,h)Anthracene	BQL	9.1	ug/kg	U	1
Fluoranthene	13	9.1	ug/kg		1
Fluorene	BQL	9.1	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	BQL	9.1	ug/kg	U	1
Naphthalene	BQL	9.1	ug/kg	U	1
Phenanthrene	BQL	9.1	ug/kg	U	1
Pyrene	12	9.1	ug/kg		1

Summary of Analytical Results

Client ID: DTSB55ADL
GPL ID: 407075-009-013-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/15/2004
Time Analyzed: 01:26
Analysis Batch: 69450

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	510	85	ug/kg		10
Acenaphthene	8400	85	ug/kg	E	10
Acenaphthylene	310	85	ug/kg		10
Anthracene	12000	85	ug/kg	E	10
Benzo(a)anthracene	36000	85	ug/kg	E	10
Benzo(a)pyrene	23000	85	ug/kg	E	10
Benzo(b)fluoranthene	34000	85	ug/kg	E	10
Benzo(g,h,i)perylene	12000	85	ug/kg	E	10
Benzo(k)fluoranthene	7400	85	ug/kg	E	10
Chrysene	23000	85	ug/kg	E	10
Dibenz(a,h)Anthracene	4600	85	ug/kg	E	10
Fluoranthene	29000	85	ug/kg	E	10
Fluorene	8100	85	ug/kg	E	10
Indeno(1,2,3-c,d)Pyrene	12000	85	ug/kg	E	10
Naphthalene	1300	85	ug/kg		10
Phenanthrene	22000	85	ug/kg	E	10
Pyrene	25000	85	ug/kg	E	10

Summary of Analytical Results

Client ID: DTSB55ADL2
GPL ID: 407075-009-013-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/15/2004
Time Analyzed: 20:49
Analysis Batch: 69473

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	3400	ug/kg	U	400
Acenaphthene	13000	3400	ug/kg		400
Acenaphthylene	BQL	3400	ug/kg	U	400
Anthracene	24000	3400	ug/kg		400
Benzo(a)anthracene	42000	3400	ug/kg		400
Benzo(a)pyrene	32000	3400	ug/kg		400
Benzo(b)fluoranthene	52000	3400	ug/kg		400
Benzo(g,h,i)perylene	14000	3400	ug/kg		400
Benzo(k)fluoranthene	16000	3400	ug/kg		400
Chrysene	43000	3400	ug/kg		400
Dibenz(a,h)Anthracene	4800	3400	ug/kg		400
Fluoranthene	130000	3400	ug/kg		400
Fluorene	13000	3400	ug/kg		400
Indeno(1,2,3-c,d)Pyrene	14000	3400	ug/kg		400
Naphthalene	BQL	3400	ug/kg	U	400
Phenanthrene	120000	3400	ug/kg		400
Pyrene	100000	3400	ug/kg		400

Summary of Analytical Results

Client ID: DTSB56A
GPL ID: 407075-010-014-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/14/2004
Time Analyzed: 22:27
Analysis Batch: 69450

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	11	9.0	ug/kg		1
Acenaphthene	300	9.0	ug/kg		1
Acenaphthylene	72	9.0	ug/kg		1
Anthracene	610	9.0	ug/kg	E	1
Benzo(a)anthracene	1200	9.0	ug/kg	E	1
Benzo(a)pyrene	930	9.0	ug/kg	E	1
Benzo(b)fluoranthene	1500	9.0	ug/kg	E	1
Benzo(g,h,i)perylene	630	9.0	ug/kg	E	1
Benzo(k)fluoranthene	470	9.0	ug/kg	E	1
Chrysene	1100	9.0	ug/kg	E	1
Dibenz(a,h)Anthracene	210	9.0	ug/kg		1
Fluoranthene	1100	9.0	ug/kg	E	1
Fluorene	270	9.0	ug/kg		1
Indeno(1,2,3-c,d)Pyrene	610	9.0	ug/kg	E	1
Naphthalene	24	9.0	ug/kg		1
Phenanthrene	890	9.0	ug/kg	E	1
Pyrene	1100	9.0	ug/kg	E	1

Summary of Analytical Results

Client ID: DTSB56ADL
GPL ID: 407075-010-014-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/15/2004
Time Analyzed: 14:22
Analysis Batch: 69473

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	90	ug/kg	U	10
Acenaphthene	270	90	ug/kg		10
Acenaphthylene	BQL	90	ug/kg	U	10
Anthracene	650	90	ug/kg		10
Benzo(a)anthracene	1300	90	ug/kg		10
Benzo(a)pyrene	970	90	ug/kg		10
Benzo(b)fluoranthene	2300	90	ug/kg		10
Benzo(g,h,i)perylene	540	90	ug/kg		10
Benzo(k)fluoranthene	2300	90	ug/kg		10
Chrysene	1300	90	ug/kg		10
Dibenz(a,h)Anthracene	190	90	ug/kg		10
Fluoranthene	3400	90	ug/kg		10
Fluorene	250	90	ug/kg		10
Indeno(1,2,3-c,d)Pyrene	550	90	ug/kg		10
Naphthalene	BQL	90	ug/kg	U	10
Phenanthrene	2500	90	ug/kg		10
Pyrene	2700	90	ug/kg		10

Summary of Analytical Results

Client ID: DTSB57A
GPL ID: 407075-011-015-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67751

Analytical Method: SW8270_PAH
Date Analyzed: 07/19/2004
Time Analyzed: 14:54
Analysis Batch: 69548

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	8.8	ug/kg	U	1
Acenaphthene	BQL	8.8	ug/kg	U	1
Acenaphthylene	BQL	8.8	ug/kg	U	1
Anthracene	BQL	8.8	ug/kg	U	1
Benzo(a)anthracene	BQL	8.8	ug/kg	U	1
Benzo(a)pyrene	BQL	8.8	ug/kg	U	1
Benzo(b)fluoranthene	BQL	8.8	ug/kg	U	1
Benzo(g,h,i)perylene	BQL	8.8	ug/kg	U	1
Benzo(k)fluoranthene	BQL	8.8	ug/kg	U	1
Chrysene	BQL	8.8	ug/kg	U	1
Dibenz(a,h)Anthracene	BQL	8.8	ug/kg	U	1
Fluoranthene	BQL	8.8	ug/kg	U	1
Fluorene	BQL	8.8	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	BQL	8.8	ug/kg	U	1
Naphthalene	BQL	8.8	ug/kg	U	1
Phenanthrene	BQL	8.8	ug/kg	U	1
Pyrene	BQL	8.8	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB58A
GPL ID: 407075-012-016-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/14/2004
Time Analyzed: 17:59
Analysis Batch: 69450

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	10	ug/kg	U	1
Acenaphthene	62	10	ug/kg		1
Acenaphthylene	11	10	ug/kg		1
Anthracene	150	10	ug/kg		1
Benzo(a)anthracene	350	10	ug/kg		1
Benzo(a)pyrene	270	10	ug/kg		1
Benzo(b)fluoranthene	430	10	ug/kg		1
Benzo(g,h,i)perylene	180	10	ug/kg		1
Benzo(k)fluoranthene	150	10	ug/kg		1
Chrysene	380	10	ug/kg		1
Dibenz(a,h)Anthracene	BQL	10	ug/kg	U	1
Fluoranthene	640	10	ug/kg	E	1
Fluorene	69	10	ug/kg		1
Indeno(1,2,3-c,d)Pyrene	170	10	ug/kg		1
Naphthalene	BQL	10	ug/kg	U	1
Phenanthrene	570	10	ug/kg	E	1
Pyrene	600	10	ug/kg	E	1

Summary of Analytical Results

Client ID: DTSB58ADL
GPL ID: 407075-012-016-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/15/2004
Time Analyzed: 11:53
Analysis Batch: 69473

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	21	ug/kg	U	2
Acenaphthene	57	21	ug/kg		2
Acenaphthylene	BQL	21	ug/kg	U	2
Anthracene	140	21	ug/kg		2
Benzo(a)anthracene	330	21	ug/kg		2
Benzo(a)pyrene	260	21	ug/kg		2
Benzo(b)fluoranthene	470	21	ug/kg		2
Benzo(g,h,i)perylene	130	21	ug/kg		2
Benzo(k)fluoranthene	120	21	ug/kg		2
Chrysene	350	21	ug/kg		2
Dibenz(a,h)Anthracene	BQL	21	ug/kg	U	2
Fluoranthene	940	21	ug/kg		2
Fluorene	66	21	ug/kg		2
Indeno(1,2,3-c,d)Pyrene	130	21	ug/kg		2
Naphthalene	BQL	21	ug/kg	U	2
Phenanthrene	730	21	ug/kg		2
Pyrene	700	21	ug/kg		2

Summary of Analytical Results

Client ID: DTSB59A
GPL ID: 407075-013-017-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/15/2004
Time Analyzed: 00:27
Analysis Batch: 69450

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	54	8.7	ug/kg		1
Acenaphthene	720	8.7	ug/kg	E	1
Acenaphthylene	99	8.7	ug/kg		1
Anthracene	980	8.7	ug/kg	E	1
Benzo(a)anthracene	2700	8.7	ug/kg	E	1
Benzo(a)pyrene	1900	8.7	ug/kg	E	1
Benzo(b)fluoranthene	3000	8.7	ug/kg	E	1
Benzo(g,h,i)perylene	1000	8.7	ug/kg	E	1
Benzo(k)fluoranthene	670	8.7	ug/kg	E	1
Chrysene	2000	8.7	ug/kg	E	1
Dibenz(a,h)Anthracene	370	8.7	ug/kg		1
Fluoranthene	2200	8.7	ug/kg	E	1
Fluorene	710	8.7	ug/kg	E	1
Indeno(1,2,3-c,d)Pyrene	1100	8.7	ug/kg	E	1
Naphthalene	150	8.7	ug/kg		1
Phenanthrene	1600	8.7	ug/kg	E	1
Pyrene	2200	8.7	ug/kg	E	1

Summary of Analytical Results

Client ID: DTSB59ADL
GPL ID: 407075-013-017-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/15/2004
Time Analyzed: 16:21
Analysis Batch: 69473

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	170	ug/kg	U	20
Acenaphthene	690	170	ug/kg		20
Acenaphthylene	BQL	170	ug/kg	U	20
Anthracene	1500	170	ug/kg		20
Benzo(a)anthracene	2900	170	ug/kg		20
Benzo(a)pyrene	2200	170	ug/kg		20
Benzo(b)fluoranthene	3700	170	ug/kg		20
Benzo(g,h,i)perylene	1100	170	ug/kg		20
Benzo(k)fluoranthene	1000	170	ug/kg		20
Chrysene	2700	170	ug/kg		20
Dibenz(a,h)Anthracene	410	170	ug/kg		20
Fluoranthene	8300	170	ug/kg		20
Fluorene	670	170	ug/kg		20
Indeno(1,2,3-c,d)Pyrene	1100	170	ug/kg		20
Naphthalene	BQL	170	ug/kg	U	20
Phenanthrene	6700	170	ug/kg		20
Pyrene	6200	170	ug/kg		20

Summary of Analytical Results

Client ID: TMSB59A
GPL ID: 407075-014-018-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/15/2004
Time Analyzed: 00:56
Analysis Batch: 69450

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	58	8.6	ug/kg		1
Acenaphthene	960	8.6	ug/kg	E	1
Acenaphthylene	130	8.6	ug/kg		1
Anthracene	1100	8.6	ug/kg	E	1
Benzo(a)anthracene	4100	8.6	ug/kg	E	1
Benzo(a)pyrene	2400	8.6	ug/kg	E	1
Benzo(b)fluoranthene	3700	8.6	ug/kg	E	1
Benzo(g,h,i)perylene	1200	8.6	ug/kg	E	1
Benzo(k)fluoranthene	870	8.6	ug/kg	E	1
Chrysene	2400	8.6	ug/kg	E	1
Dibenz(a,h)Anthracene	410	8.6	ug/kg		1
Fluoranthene	3000	8.6	ug/kg	E	1
Fluorene	880	8.6	ug/kg	E	1
Indeno(1,2,3-c,d)Pyrene	1200	8.6	ug/kg	E	1
Naphthalene	140	8.6	ug/kg		1
Phenanthrene	2300	8.6	ug/kg	E	1
Pyrene	2900	8.6	ug/kg	E	1

Summary of Analytical Results

Client ID: TMSB59ADL
GPL ID: 407075-014-018-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/15/2004
Time Analyzed: 20:19
Analysis Batch: 69473

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	340	ug/kg	U	40
Acenaphthene	1200	340	ug/kg		40
Acenaphthylene	BQL	340	ug/kg	U	40
Anthracene	2500	340	ug/kg		40
Benzo(a)anthracene	3900	340	ug/kg		40
Benzo(a)pyrene	3200	340	ug/kg		40
Benzo(b)fluoranthene	5400	340	ug/kg		40
Benzo(g,h,i)perylene	1400	340	ug/kg		40
Benzo(k)fluoranthene	1300	340	ug/kg		40
Chrysene	4300	340	ug/kg		40
Dibenz(a,h)Anthracene	530	340	ug/kg		40
Fluoranthene	12000	340	ug/kg		40
Fluorene	1100	340	ug/kg		40
Indeno(1,2,3-c,d)Pyrene	1500	340	ug/kg		40
Naphthalene	BQL	340	ug/kg	U	40
Phenanthrene	10000	340	ug/kg		40
Pyrene	9700	340	ug/kg		40

Summary of Analytical Results

Client ID: DTSB60A
GPL ID: 407075-015-019-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/14/2004
Time Analyzed: 18:29
Analysis Batch: 69450

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	11	ug/kg	U	1
Acenaphthene	BQL	11	ug/kg	U	1
Acenaphthylene	BQL	11	ug/kg	U	1
Anthracene	BQL	11	ug/kg	U	1
Benzo(a)anthracene	BQL	11	ug/kg	U	1
Benzo(a)pyrene	BQL	11	ug/kg	U	1
Benzo(b)fluoranthene	BQL	11	ug/kg	U	1
Benzo(g,h,i)perylene	BQL	11	ug/kg	U	1
Benzo(k)fluoranthene	BQL	11	ug/kg	U	1
Chrysene	BQL	11	ug/kg	U	1
Dibenz(a,h)Anthracene	BQL	11	ug/kg	U	1
Fluoranthene	12	11	ug/kg		1
Fluorene	BQL	11	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	BQL	11	ug/kg	U	1
Naphthalene	BQL	11	ug/kg	U	1
Phenanthrene	BQL	11	ug/kg	U	1
Pyrene	BQL	11	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB62A
GPL ID: 407075-017-021-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/14/2004
Time Analyzed: 18:59
Analysis Batch: 69450

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	9.1	ug/kg	U	1
Acenaphthene	BQL	9.1	ug/kg	U	1
Acenaphthylene	BQL	9.1	ug/kg	U	1
Anthracene	BQL	9.1	ug/kg	U	1
Benzo(a)anthracene	BQL	9.1	ug/kg	U	1
Benzo(a)pyrene	BQL	9.1	ug/kg	U	1
Benzo(b)fluoranthene	BQL	9.1	ug/kg	U	1
Benzo(g,h,i)perylene	BQL	9.1	ug/kg	U	1
Benzo(k)fluoranthene	BQL	9.1	ug/kg	U	1
Chrysene	BQL	9.1	ug/kg	U	1
Dibenz(a,h)Anthracene	BQL	9.1	ug/kg	U	1
Fluoranthene	9.1	9.1	ug/kg		1
Fluorene	BQL	9.1	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	BQL	9.1	ug/kg	U	1
Naphthalene	BQL	9.1	ug/kg	U	1
Phenanthrene	BQL	9.1	ug/kg	U	1
Pyrene	BQL	9.1	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB63A
GPL ID: 407075-018-022-1/2
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/14/2004
Time Analyzed: 19:59
Analysis Batch: 69450

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	8.7	ug/kg	U	1
Acenaphthene	49	8.7	ug/kg		1
Acenaphthylene	13	8.7	ug/kg		1
Anthracene	130	8.7	ug/kg		1
Benzo(a)anthracene	340	8.7	ug/kg		1
Benzo(a)pyrene	280	8.7	ug/kg		1
Benzo(b)fluoranthene	470	8.7	ug/kg	E	1
Benzo(g,h,i)perylene	190	8.7	ug/kg		1
Benzo(k)fluoranthene	140	8.7	ug/kg		1
Chrysene	380	8.7	ug/kg		1
Dibenz(a,h)Anthracene	BQL	8.7	ug/kg	U	1
Fluoranthene	560	8.7	ug/kg	E	1
Fluorene	45	8.7	ug/kg		1
Indeno(1,2,3-c,d)Pyrene	170	8.7	ug/kg		1
Naphthalene	BQL	8.7	ug/kg	U	1
Phenanthrene	430	8.7	ug/kg		1
Pyrene	520	8.7	ug/kg	E	1

Summary of Analytical Results

Client ID: DTSB63ADL
GPL ID: 407075-018-022-1/2
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/15/2004
Time Analyzed: 12:53
Analysis Batch: 69473

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	35	ug/kg	U	4
Acenaphthene	40	35	ug/kg		4
Acenaphthylene	BQL	35	ug/kg	U	4
Anthracene	120	35	ug/kg		4
Benzo(a)anthracene	330	35	ug/kg		4
Benzo(a)pyrene	260	35	ug/kg		4
Benzo(b)fluoranthene	460	35	ug/kg		4
Benzo(g,h,i)perylene	130	35	ug/kg		4
Benzo(k)fluoranthene	140	35	ug/kg		4
Chrysene	320	35	ug/kg		4
Dibenz(a,h)Anthracene	BQL	35	ug/kg	U	4
Fluoranthene	840	35	ug/kg		4
Fluorene	42	35	ug/kg		4
Indeno(1,2,3-c,d)Pyrene	140	35	ug/kg		4
Naphthalene	BQL	35	ug/kg	U	4
Phenanthrene	480	35	ug/kg		4
Pyrene	690	35	ug/kg		4

Summary of Analytical Results

Client ID: DTSB64A
GPL ID: 407075-019-024-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/21/2004
Prep Time: 00:00
Prep Batch: 67842

Analytical Method: SW8270_PAH
Date Analyzed: 07/21/2004
Time Analyzed: 22:48
Analysis Batch: 69659

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	30	ug/kg	U	1
Acenaphthene	160	30	ug/kg		1
Acenaphthylene	BQL	30	ug/kg	U	1
Anthracene	340	30	ug/kg		1
Benzo(a)anthracene	960	30	ug/kg		1
Benzo(a)pyrene	880	30	ug/kg		1
Benzo(b)fluoranthene	1500	30	ug/kg		1
Benzo(g,h,i)perylene	490	30	ug/kg		1
Benzo(k)fluoranthene	330	30	ug/kg		1
Chrysene	970	30	ug/kg		1
Dibenz(a,h)Anthracene	BQL	30	ug/kg	U	1
Fluoranthene	2400	30	ug/kg	E	1
Fluorene	140	30	ug/kg		1
Indeno(1,2,3-c,d)Pyrene	490	30	ug/kg		1
Naphthalene	42	30	ug/kg		1
Phenanthrene	1700	30	ug/kg	E	1
Pyrene	1700	30	ug/kg	E	1

Summary of Analytical Results

Client ID: DTSB64ADL
GPL ID: 407075-019-024-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/21/2004
Prep Time: 00:00
Prep Batch: 67842

Analytical Method: SW8270_PAH
Date Analyzed: 07/22/2004
Time Analyzed: 17:31
Analysis Batch: 69660

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	60	ug/kg	U	2
Acenaphthene	160	60	ug/kg		2
Acenaphthylene	BQL	60	ug/kg	U	2
Anthracene	290	60	ug/kg		2
Benzo(a)anthracene	890	60	ug/kg		2
Benzo(a)pyrene	790	60	ug/kg		2
Benzo(b)fluoranthene	1200	60	ug/kg		2
Benzo(g,h,i)perylene	460	60	ug/kg		2
Benzo(k)fluoranthene	390	60	ug/kg		2
Chrysene	850	60	ug/kg		2
Dibenz(a,h)Anthracene	BQL	60	ug/kg	U	2
Fluoranthene	2600	60	ug/kg		2
Fluorene	150	60	ug/kg		2
Indeno(1,2,3-c,d)Pyrene	440	60	ug/kg		2
Naphthalene	BQL	60	ug/kg	U	2
Phenanthrene	1500	60	ug/kg		2
Pyrene	1500	60	ug/kg		2

Summary of Analytical Results

Client ID: DTSB65A
GPL ID: 407075-020-025-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67751

Analytical Method: SW8270_PAH
Date Analyzed: 07/19/2004
Time Analyzed: 15:53
Analysis Batch: 69548

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	10	ug/kg	U	1
Acenaphthene	BQL	10	ug/kg	U	1
Acenaphthylene	BQL	10	ug/kg	U	1
Anthracene	21	10	ug/kg		1
Benzo(a)anthracene	58	10	ug/kg		1
Benzo(a)pyrene	58	10	ug/kg		1
Benzo(b)fluoranthene	110	10	ug/kg		1
Benzo(g,h,i)perylene	41	10	ug/kg		1
Benzo(k)fluoranthene	31	10	ug/kg		1
Chrysene	66	10	ug/kg		1
Dibenz(a,h)Anthracene	12	10	ug/kg		1
Fluoranthene	150	10	ug/kg		1
Fluorene	BQL	10	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	35	10	ug/kg		1
Naphthalene	BQL	10	ug/kg	U	1
Phenanthrene	67	10	ug/kg		1
Pyrene	100	10	ug/kg		1

Summary of Analytical Results

Client ID: DTSB66A
GPL ID: 407075-021-001-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/14/2004
Time Analyzed: 19:29
Analysis Batch: 69450

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	8.4	ug/kg	U	1
Acenaphthene	BQL	8.4	ug/kg	U	1
Acenaphthylene	BQL	8.4	ug/kg	U	1
Anthracene	BQL	8.4	ug/kg	U	1
Benzo(a)anthracene	BQL	8.4	ug/kg	U	1
Benzo(a)pyrene	BQL	8.4	ug/kg	U	1
Benzo(b)fluoranthene	BQL	8.4	ug/kg	U	1
Benzo(g,h,i)perylene	BQL	8.4	ug/kg	U	1
Benzo(k)fluoranthene	BQL	8.4	ug/kg	U	1
Chrysene	BQL	8.4	ug/kg	U	1
Dibenz(a,h)Anthracene	BQL	8.4	ug/kg	U	1
Fluoranthene	BQL	8.4	ug/kg	U	1
Fluorene	BQL	8.4	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	BQL	8.4	ug/kg	U	1
Naphthalene	BQL	8.4	ug/kg	U	1
Phenanthrene	BQL	8.4	ug/kg	U	1
Pyrene	BQL	8.4	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB67ADL
GPL ID: 407075-022-002-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/14/2004
Time Analyzed: 21:58
Analysis Batch: 69450

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	2000	87	ug/kg		10
Acenaphthene	7800	87	ug/kg	E	10
Acenaphthylene	210	87	ug/kg		10
Anthracene	9300	87	ug/kg	E	10
Benzo(a)anthracene	21000	87	ug/kg	E	10
Benzo(a)pyrene	17000	87	ug/kg	E	10
Benzo(b)fluoranthene	22000	87	ug/kg	E	10
Benzo(g,h,i)perylene	11000	87	ug/kg	E	10
Benzo(k)fluoranthene	7100	87	ug/kg	E	10
Chrysene	18000	87	ug/kg	E	10
Dibenz(a,h)Anthracene	3600	87	ug/kg		10
Fluoranthene	17000	87	ug/kg	E	10
Fluorene	7200	87	ug/kg	E	10
Indeno(1,2,3-c,d)Pyrene	11000	87	ug/kg	E	10
Naphthalene	7200	87	ug/kg	E	10
Phenanthrene	14000	87	ug/kg	E	10
Pyrene	17000	87	ug/kg	E	10

Summary of Analytical Results

Client ID: DTSB67ADL2
GPL ID: 407075-022-002-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/15/2004
Time Analyzed: 21:19
Analysis Batch: 69473

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	1700	1800	ug/kg		200
Acenaphthene	10000	1800	ug/kg		200
Acenaphthylene	BQL	1800	ug/kg	U	200
Anthracene	17000	1800	ug/kg		200
Benzo(a)anthracene	27000	1800	ug/kg		200
Benzo(a)pyrene	23000	1800	ug/kg		200
Benzo(b)fluoranthene	36000	1800	ug/kg		200
Benzo(g,h,i)perylene	9900	1800	ug/kg		200
Benzo(k)fluoranthene	8900	1800	ug/kg		200
Chrysene	25000	1800	ug/kg		200
Dibenz(a,h)Anthracene	3500	1800	ug/kg		200
Fluoranthene	77000	1800	ug/kg		200
Fluorene	9600	1800	ug/kg		200
Indeno(1,2,3-c,d)Pyrene	10000	1800	ug/kg		200
Naphthalene	10000	1800	ug/kg		200
Phenanthrene	75000	1800	ug/kg		200
Pyrene	61000	1800	ug/kg		200

Summary of Analytical Results

Client ID: DTSB68A
GPL ID: 407075-023-003-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/14/2004
Time Analyzed: 21:28
Analysis Batch: 69450

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	9.2	ug/kg	U	1
Acenaphthene	110	9.2	ug/kg		1
Acenaphthylene	43	9.2	ug/kg		1
Anthracene	290	9.2	ug/kg		1
Benzo(a)anthracene	680	9.2	ug/kg	E	1
Benzo(a)pyrene	570	9.2	ug/kg	E	1
Benzo(b)fluoranthene	1000	9.2	ug/kg	E	1
Benzo(g,h,i)perylene	350	9.2	ug/kg		1
Benzo(k)fluoranthene	260	9.2	ug/kg		1
Chrysene	720	9.2	ug/kg	E	1
Dibenz(a,h)Anthracene	120	9.2	ug/kg		1
Fluoranthene	860	9.2	ug/kg	E	1
Fluorene	96	9.2	ug/kg		1
Indeno(1,2,3-c,d)Pyrene	340	9.2	ug/kg		1
Naphthalene	15	9.2	ug/kg		1
Phenanthrene	680	9.2	ug/kg	E	1
Pyrene	860	9.2	ug/kg	E	1

Summary of Analytical Results

Client ID: DTSB68ADL
GPL ID: 407075-023-003-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 00:00
Prep Batch: 67694

Analytical Method: SW8270_PAH
Date Analyzed: 07/15/2004
Time Analyzed: 13:22
Analysis Batch: 69473

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	37	ug/kg	U	4
Acenaphthene	110	37	ug/kg		4
Acenaphthylene	42	37	ug/kg		4
Anthracene	280	37	ug/kg		4
Benzo(a)anthracene	690	37	ug/kg		4
Benzo(a)pyrene	600	37	ug/kg		4
Benzo(b)fluoranthene	1100	37	ug/kg		4
Benzo(g,h,i)perylene	320	37	ug/kg		4
Benzo(k)fluoranthene	290	37	ug/kg		4
Chrysene	770	37	ug/kg		4
Dibenz(a,h)Anthracene	120	37	ug/kg		4
Fluoranthene	1700	37	ug/kg		4
Fluorene	94	37	ug/kg		4
Indeno(1,2,3-c,d)Pyrene	330	37	ug/kg		4
Naphthalene	BQL	37	ug/kg	U	4
Phenanthrene	1100	37	ug/kg		4
Pyrene	1400	37	ug/kg		4

Summary of Analytical Results

Client ID: DTSB69A
GPL ID: 407075-024-004-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67751

Analytical Method: SW8270_PAH
Date Analyzed: 07/19/2004
Time Analyzed: 16:22
Analysis Batch: 69548

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	8.5	ug/kg	U	1
Acenaphthene	22	8.5	ug/kg		1
Acenaphthylene	BQL	8.5	ug/kg	U	1
Anthracene	43	8.5	ug/kg		1
Benzo(a)anthracene	160	8.5	ug/kg		1
Benzo(a)pyrene	150	8.5	ug/kg		1
Benzo(b)fluoranthene	250	8.5	ug/kg		1
Benzo(g,h,i)perylene	85	8.5	ug/kg		1
Benzo(k)fluoranthene	66	8.5	ug/kg		1
Chrysene	160	8.5	ug/kg		1
Dibenz(a,h)Anthracene	23	8.5	ug/kg		1
Fluoranthene	420	8.5	ug/kg		1
Fluorene	18	8.5	ug/kg		1
Indeno(1,2,3-c,d)Pyrene	78	8.5	ug/kg		1
Naphthalene	BQL	8.5	ug/kg	U	1
Phenanthrene	240	8.5	ug/kg		1
Pyrene	270	8.5	ug/kg		1

GPL LABORATORIES, LLP
ANALYTICAL RESULTS

Project Name : Radford

Date Printed August 5, 2004

GPL ID	Client ID
407075-001-005-1/1	DTSB48A
407075-001-005-1/1	DTSB48ADL
407075-004-008-1/1	DTSB50A
407075-004-008-1/1	DTSB50ADL
407075-005-009-1/1	DTSB51A
407075-005-009-1/1	DTSB51ADL
407075-006-010-1/1	DTSB52A
407075-006-010-1/1	DTSB52ADL
407075-006-010-1/1	DTSB52ADL2
407075-008-012-1/1	DTSB54A
407075-009-013-1/1	DTSB55A
407075-009-013-1/1	DTSB55ADL
407075-009-013-1/1	DTSB55ADL2
407075-010-014-1/1	DTSB56A
407075-010-014-1/1	DTSB56ADL
407075-011-015-1/1	DTSB57A
407075-012-016-1/1	DTSB58A
407075-012-016-1/1	DTSB58ADL
407075-013-017-1/1	DTSB59A
407075-013-017-1/1	DTSB59ADL
407075-015-019-1/1	DTSB60A
407075-017-021-1/1	DTSB62A
407075-018-022-1/2	DTSB63A
407075-018-022-1/2	DTSB63ADL
407075-019-024-1/1	DTSB64A
407075-019-024-1/1	DTSB64ADL
407075-020-025-1/1	DTSB65A
407075-021-001-1/1	DTSB66A
407075-022-002-1/1	DTSB67A
407075-022-002-1/1	DTSB67ADL
407075-022-002-1/1	DTSB67ADL2
407075-023-003-1/1	DTSB68A
407075-023-003-1/1	DTSB68ADL
407075-024-004-1/1	DTSB69A
407075-002-006-1/1	TMSB48A
407075-002-006-1/1	TMSB48ADL
407075-014-018-1/1	TMSB59A
407075-014-018-1/1	TMSB59ADL

Analytical Report For 407076

for

Shaw Environmental & Infrastructure

Project Manager : Eric Malarek

Project Name : Radford

August 5, 2004

GPL

Laboratories

GPL Laboratories, LLLP Certifies that the test results meet all requirements of the NELAC Standards unless otherwise noted.

Reviewed by, Project Manager	Approved by, Laboratory Director

7210A Corporate CT Frederick, MD 21703 Phone (301) 694-5310 Fax: (301) 620-0731
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Summary of Analytical Results

Client ID: DTSB70A
GPL ID: 407076-001-001-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/14/2004
Time Analyzed: 16:30
Analysis Batch: 69442

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	72	1.0	%		1

Summary of Analytical Results

Client ID: TMSB71A
GPL ID: 407076-002-002-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/14/2004
Time Analyzed: 16:30
Analysis Batch: 69442

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	69	1.0	%		1

Summary of Analytical Results

Client ID: DTSB71A
GPL ID: 407076-003-003-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/14/2004
Time Analyzed: 16:30
Analysis Batch: 69442

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	71	1.0	%		1

Summary of Analytical Results

Client ID: DTSB72A
GPL ID: 407076-004-004-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/14/2004
Time Analyzed: 16:30
Analysis Batch: 69442

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	76	1.0	%		1

Summary of Analytical Results

Client ID: DTSB73A
GPL ID: 407076-005-005-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/14/2004
Time Analyzed: 16:30
Analysis Batch: 69442

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	75	1.0	%		1

Summary of Analytical Results

Client ID: DTSB74A
GPL ID: 407076-006-006-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/19/2004
Time Analyzed: 21:30
Analysis Batch: 69569

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	83	1.0	%		1

Summary of Analytical Results

Client ID: DTSB75A
GPL ID: 407076-007-007-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/14/2004
Time Analyzed: 16:30
Analysis Batch: 69442

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	74	1.0	%		1

Summary of Analytical Results

Client ID: TMSB75A
GPL ID: 407076-008-008-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/14/2004
Time Analyzed: 16:30
Analysis Batch: 69442

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	74	1.0	%		1

Summary of Analytical Results

Client ID: DTSB76A
GPL ID: 407076-009-009-1/2
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/19/2004
Time Analyzed: 21:30
Analysis Batch: 69569

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	83	1.0	%		1

Summary of Analytical Results

Client ID: DTSB77A
GPL ID: 407076-010-011-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/14/2004
Time Analyzed: 16:30
Analysis Batch: 69442

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	74	1.0	%		1

Summary of Analytical Results

Client ID: DTSB78A
GPL ID: 407076-011-012-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/19/2004
Time Analyzed: 21:30
Analysis Batch: 69569

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	72	1.0	%		1

Summary of Analytical Results

Client ID: TMSB71A
GPL ID: 407076-002-002-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67881

Analytical Method: SW8082
Date Analyzed: 07/26/2004
Time Analyzed: 13:57
Analysis Batch: 69893

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	48	ug/kg	U	1
PCB-1221	BQL	48	ug/kg	U	1
PCB-1232	BQL	48	ug/kg	U	1
PCB-1242	BQL	48	ug/kg	U	1
PCB-1248	BQL	48	ug/kg	U	1
PCB-1254	BQL	48	ug/kg	U	1
PCB-1260	BQL	48	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB71A
GPL ID: 407076-003-003-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67881

Analytical Method: SW8082
Date Analyzed: 07/26/2004
Time Analyzed: 14:26
Analysis Batch: 69893

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	47	ug/kg	U	1
PCB-1221	BQL	47	ug/kg	U	1
PCB-1232	BQL	47	ug/kg	U	1
PCB-1242	BQL	47	ug/kg	U	1
PCB-1248	BQL	47	ug/kg	U	1
PCB-1254	BQL	47	ug/kg	U	1
PCB-1260	BQL	47	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB72A
GPL ID: 407076-004-004-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67881

Analytical Method: SW8082
Date Analyzed: 07/26/2004
Time Analyzed: 14:55
Analysis Batch: 69893

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	44	ug/kg	U	1
PCB-1221	BQL	44	ug/kg	U	1
PCB-1232	BQL	44	ug/kg	U	1
PCB-1242	BQL	44	ug/kg	U	1
PCB-1248	BQL	44	ug/kg	U	1
PCB-1254	BQL	44	ug/kg	U	1
PCB-1260	BQL	44	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB73A
GPL ID: 407076-005-005-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67881

Analytical Method: SW8082
Date Analyzed: 07/26/2004
Time Analyzed: 15:24
Analysis Batch: 69893

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	44	ug/kg	U	1
PCB-1221	BQL	44	ug/kg	U	1
PCB-1232	BQL	44	ug/kg	U	1
PCB-1242	BQL	44	ug/kg	U	1
PCB-1248	BQL	44	ug/kg	U	1
PCB-1254	BQL	44	ug/kg	U	1
PCB-1260	BQL	44	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB74A
GPL ID: 407076-006-006-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67881

Analytical Method: SW8082
Date Analyzed: 07/26/2004
Time Analyzed: 15:53
Analysis Batch: 69893

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	40	ug/kg	U	1
PCB-1221	BQL	40	ug/kg	U	1
PCB-1232	BQL	40	ug/kg	U	1
PCB-1242	BQL	40	ug/kg	U	1
PCB-1248	BQL	40	ug/kg	U	1
PCB-1254	BQL	40	ug/kg	U	1
PCB-1260	BQL	40	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB75A
GPL ID: 407076-007-007-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67881

Analytical Method: SW8082
Date Analyzed: 07/26/2004
Time Analyzed: 16:23
Analysis Batch: 69893

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	45	ug/kg	U	1
PCB-1221	BQL	45	ug/kg	U	1
PCB-1232	BQL	45	ug/kg	U	1
PCB-1242	BQL	45	ug/kg	U	1
PCB-1248	BQL	45	ug/kg	U	1
PCB-1254	BQL	45	ug/kg	U	1
PCB-1260	BQL	45	ug/kg	U	1

Summary of Analytical Results

Client ID: TMSB75A
GPL ID: 407076-008-008-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67881

Analytical Method: SW8082
Date Analyzed: 07/26/2004
Time Analyzed: 16:52
Analysis Batch: 69893

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	45	ug/kg	U	1
PCB-1221	BQL	45	ug/kg	U	1
PCB-1232	BQL	45	ug/kg	U	1
PCB-1242	BQL	45	ug/kg	U	1
PCB-1248	BQL	45	ug/kg	U	1
PCB-1254	BQL	45	ug/kg	U	1
PCB-1260	BQL	45	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB76A
GPL ID: 407076-009-010-2/2
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67881

Analytical Method: SW8082
Date Analyzed: 07/26/2004
Time Analyzed: 17:50
Analysis Batch: 69893

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	40	ug/kg	U	1
PCB-1221	BQL	40	ug/kg	U	1
PCB-1232	BQL	40	ug/kg	U	1
PCB-1242	BQL	40	ug/kg	U	1
PCB-1248	BQL	40	ug/kg	U	1
PCB-1254	BQL	40	ug/kg	U	1
PCB-1260	BQL	40	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB77A
GPL ID: 407076-010-011-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67881

Analytical Method: SW8082
Date Analyzed: 07/26/2004
Time Analyzed: 19:17
Analysis Batch: 69893

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	45	ug/kg	U	1
PCB-1221	BQL	45	ug/kg	U	1
PCB-1232	BQL	45	ug/kg	U	1
PCB-1242	BQL	45	ug/kg	U	1
PCB-1248	BQL	45	ug/kg	U	1
PCB-1254	BQL	45	ug/kg	U	1
PCB-1260	BQL	45	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB78A
GPL ID: 407076-011-012-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67881

Analytical Method: SW8082
Date Analyzed: 07/26/2004
Time Analyzed: 19:46
Analysis Batch: 69893

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	46	ug/kg	U	1
PCB-1221	BQL	46	ug/kg	U	1
PCB-1232	BQL	46	ug/kg	U	1
PCB-1242	BQL	46	ug/kg	U	1
PCB-1248	BQL	46	ug/kg	U	1
PCB-1254	BQL	46	ug/kg	U	1
PCB-1260	BQL	46	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB70A
GPL ID: 407076-001-001-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550
Prep Date: 07/15/2004
Prep Time: 10:59
Prep Batch: 67720

Analytical Method: SW8082
Date Analyzed: 08/03/2004
Time Analyzed: 10:24
Analysis Batch: 69893

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	46	ug/kg	U	1
PCB-1221	BQL	46	ug/kg	U	1
PCB-1232	BQL	46	ug/kg	U	1
PCB-1242	BQL	46	ug/kg	U	1
PCB-1248	BQL	46	ug/kg	U	1
PCB-1254	BQL	46	ug/kg	U	1
PCB-1260	BQL	46	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB70A
GPL ID: 407076-001-001-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 11:43
Prep Batch: 67695

Analytical Method: SW8270_PAH
Date Analyzed: 07/14/2004
Time Analyzed: 17:40
Analysis Batch: 69469

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	9.2	ug/kg	U	1
Acenaphthene	13	9.2	ug/kg		1
Acenaphthylene	BQL	9.2	ug/kg	U	1
Anthracene	37	9.2	ug/kg		1
Benzo(a)anthracene	100	9.2	ug/kg		1
Benzo(a)pyrene	110	9.2	ug/kg		1
Benzo(b)fluoranthene	130	9.2	ug/kg		1
Benzo(g,h,i)perylene	76	9.2	ug/kg		1
Benzo(k)fluoranthene	87	9.2	ug/kg		1
Chrysene	130	9.2	ug/kg		1
Dibenz(a,h)Anthracene	BQL	9.2	ug/kg	U	1
Fluoranthene	350	9.2	ug/kg		1
Fluorene	12	9.2	ug/kg		1
Indeno(1,2,3-c,d)Pyrene	76	9.2	ug/kg		1
Naphthalene	BQL	9.2	ug/kg	U	1
Phenanthrene	160	9.2	ug/kg		1
Pyrene	220	9.2	ug/kg		1

Summary of Analytical Results

Client ID: TMSB71A
GPL ID: 407076-002-002-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 11:43
Prep Batch: 67695

Analytical Method: SW8270_PAH
Date Analyzed: 07/14/2004
Time Analyzed: 19:27
Analysis Batch: 69469

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	9.7	ug/kg	U	1
Acenaphthene	38	9.7	ug/kg		1
Acenaphthylene	BQL	9.7	ug/kg	U	1
Anthracene	71	9.7	ug/kg		1
Benzo(a)anthracene	220	9.7	ug/kg		1
Benzo(a)pyrene	200	9.7	ug/kg		1
Benzo(b)fluoranthene	260	9.7	ug/kg		1
Benzo(g,h,i)perylene	140	9.7	ug/kg		1
Benzo(k)fluoranthene	150	9.7	ug/kg		1
Chrysene	260	9.7	ug/kg		1
Dibenz(a,h)Anthracene	64	9.7	ug/kg		1
Fluoranthene	620	9.7	ug/kg	E	1
Fluorene	35	9.7	ug/kg		1
Indeno(1,2,3-c,d)Pyrene	140	9.7	ug/kg		1
Naphthalene	11	9.7	ug/kg		1
Phenanthrene	410	9.7	ug/kg		1
Pyrene	440	9.7	ug/kg		1

Summary of Analytical Results

Client ID: TMSB71ADL
GPL ID: 407076-002-002-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 11:43
Prep Batch: 67695

Analytical Method: SW8270_PAH
Date Analyzed: 07/15/2004
Time Analyzed: 20:18
Analysis Batch: 69470

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	19	ug/kg	U	2
Acenaphthene	36	19	ug/kg		2
Acenaphthylene	BQL	19	ug/kg	U	2
Anthracene	59	19	ug/kg		2
Benzo(a)anthracene	200	19	ug/kg		2
Benzo(a)pyrene	190	19	ug/kg		2
Benzo(b)fluoranthene	250	19	ug/kg		2
Benzo(g,h,i)perylene	140	19	ug/kg		2
Benzo(k)fluoranthene	130	19	ug/kg		2
Chrysene	250	19	ug/kg		2
Dibenz(a,h)Anthracene	63	19	ug/kg		2
Fluoranthene	660	19	ug/kg		2
Fluorene	36	19	ug/kg		2
Indeno(1,2,3-c,d)Pyrene	130	19	ug/kg		2
Naphthalene	BQL	19	ug/kg	U	2
Phenanthrene	400	19	ug/kg		2
Pyrene	380	19	ug/kg		2

Summary of Analytical Results

Client ID: DTSB71A
GPL ID: 407076-003-003-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 11:43
Prep Batch: 67695

Analytical Method: SW8270_PAH
Date Analyzed: 07/14/2004
Time Analyzed: 20:03
Analysis Batch: 69469

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	9.5	ug/kg	U	1
Acenaphthene	28	9.5	ug/kg		1
Acenaphthylene	BQL	9.5	ug/kg	U	1
Anthracene	68	9.5	ug/kg		1
Benzo(a)anthracene	200	9.5	ug/kg		1
Benzo(a)pyrene	190	9.5	ug/kg		1
Benzo(b)fluoranthene	210	9.5	ug/kg		1
Benzo(g,h,i)perylene	120	9.5	ug/kg		1
Benzo(k)fluoranthene	160	9.5	ug/kg		1
Chrysene	240	9.5	ug/kg		1
Dibenz(a,h)Anthracene	56	9.5	ug/kg		1
Fluoranthene	600	9.5	ug/kg	E	1
Fluorene	26	9.5	ug/kg		1
Indeno(1,2,3-c,d)Pyrene	120	9.5	ug/kg		1
Naphthalene	BQL	9.5	ug/kg	U	1
Phenanthrene	330	9.5	ug/kg		1
Pyrene	400	9.5	ug/kg		1

Summary of Analytical Results

Client ID: DTSB71AD
GPL ID: 407076-003-003-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 11:43
Prep Batch: 67695

Analytical Method: SW8270_PAH
Date Analyzed: 07/15/2004
Time Analyzed: 20:53
Analysis Batch: 69470

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	19	ug/kg	U	2
Acenaphthene	31	19	ug/kg		2
Acenaphthylene	BQL	19	ug/kg	U	2
Anthracene	60	19	ug/kg		2
Benzo(a)anthracene	190	19	ug/kg		2
Benzo(a)pyrene	170	19	ug/kg		2
Benzo(b)fluoranthene	190	19	ug/kg		2
Benzo(g,h,i)perylene	130	19	ug/kg		2
Benzo(k)fluoranthene	150	19	ug/kg		2
Chrysene	220	19	ug/kg		2
Dibenz(a,h)Anthracene	58	19	ug/kg		2
Fluoranthene	650	19	ug/kg		2
Fluorene	27	19	ug/kg		2
Indeno(1,2,3-c,d)Pyrene	120	19	ug/kg		2
Naphthalene	BQL	19	ug/kg	U	2
Phenanthrene	310	19	ug/kg		2
Pyrene	330	19	ug/kg		2

Summary of Analytical Results

Client ID: DTSB72A
GPL ID: 407076-004-004-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 11:43
Prep Batch: 67695

Analytical Method: SW8270_PAH
Date Analyzed: 07/14/2004
Time Analyzed: 20:38
Analysis Batch: 69469

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	8.7	ug/kg	U	1
Acenaphthene	11	8.7	ug/kg		1
Acenaphthylene	BQL	8.7	ug/kg	U	1
Anthracene	30	8.7	ug/kg		1
Benzo(a)anthracene	69	8.7	ug/kg		1
Benzo(a)pyrene	67	8.7	ug/kg		1
Benzo(b)fluoranthene	97	8.7	ug/kg		1
Benzo(g,h,i)perylene	52	8.7	ug/kg		1
Benzo(k)fluoranthene	48	8.7	ug/kg		1
Chrysene	84	8.7	ug/kg		1
Dibenz(a,h)Anthracene	24	8.7	ug/kg		1
Fluoranthene	190	8.7	ug/kg		1
Fluorene	11	8.7	ug/kg		1
Indeno(1,2,3-c,d)Pyrene	52	8.7	ug/kg		1
Naphthalene	BQL	8.7	ug/kg	U	1
Phenanthrene	130	8.7	ug/kg		1
Pyrene	140	8.7	ug/kg		1

Summary of Analytical Results

Client ID: DTSB73A
GPL ID: 407076-005-005-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 11:43
Prep Batch: 67695

Analytical Method: SW8270_PAH
Date Analyzed: 07/14/2004
Time Analyzed: 21:14
Analysis Batch: 69469

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	8.9	ug/kg	U	1
Acenaphthene	BQL	8.9	ug/kg	U	1
Acenaphthylene	BQL	8.9	ug/kg	U	1
Anthracene	18	8.9	ug/kg		1
Benzo(a)anthracene	40	8.9	ug/kg		1
Benzo(a)pyrene	34	8.9	ug/kg		1
Benzo(b)fluoranthene	39	8.9	ug/kg		1
Benzo(g,h,i)perylene	24	8.9	ug/kg		1
Benzo(k)fluoranthene	35	8.9	ug/kg		1
Chrysene	48	8.9	ug/kg		1
Dibenz(a,h)Anthracene	BQL	8.9	ug/kg	U	1
Fluoranthene	110	8.9	ug/kg		1
Fluorene	BQL	8.9	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	24	8.9	ug/kg		1
Naphthalene	BQL	8.9	ug/kg	U	1
Phenanthrene	72	8.9	ug/kg		1
Pyrene	76	8.9	ug/kg		1

Summary of Analytical Results

Client ID: DTSB74A
GPL ID: 407076-006-006-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67751

Analytical Method: SW8270_PAH
Date Analyzed: 07/19/2004
Time Analyzed: 19:48
Analysis Batch: 69548

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	8.1	ug/kg	U	1
Acenaphthene	BQL	8.1	ug/kg	U	1
Acenaphthylene	BQL	8.1	ug/kg	U	1
Anthracene	BQL	8.1	ug/kg	U	1
Benzo(a)anthracene	9.3	8.1	ug/kg		1
Benzo(a)pyrene	8.9	8.1	ug/kg		1
Benzo(b)fluoranthene	14	8.1	ug/kg		1
Benzo(g,h,i)perylene	BQL	8.1	ug/kg	U	1
Benzo(k)fluoranthene	BQL	8.1	ug/kg	U	1
Chrysene	8.9	8.1	ug/kg		1
Dibenz(a,h)Anthracene	BQL	8.1	ug/kg	U	1
Fluoranthene	15	8.1	ug/kg		1
Fluorene	BQL	8.1	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	BQL	8.1	ug/kg	U	1
Naphthalene	BQL	8.1	ug/kg	U	1
Phenanthrene	BQL	8.1	ug/kg	U	1
Pyrene	13	8.1	ug/kg		1

Summary of Analytical Results

Client ID: DTSB75A
GPL ID: 407076-007-007-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 11:43
Prep Batch: 67695

Analytical Method: SW8270_PAH
Date Analyzed: 07/14/2004
Time Analyzed: 21:49
Analysis Batch: 69469

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	9.0	ug/kg	U	1
Acenaphthene	63	9.0	ug/kg		1
Acenaphthylene	11	9.0	ug/kg		1
Anthracene	200	9.0	ug/kg		1
Benzo(a)anthracene	470	9.0	ug/kg	E	1
Benzo(a)pyrene	420	9.0	ug/kg		1
Benzo(b)fluoranthene	500	9.0	ug/kg	E	1
Benzo(g,h,i)perylene	280	9.0	ug/kg		1
Benzo(k)fluoranthene	320	9.0	ug/kg		1
Chrysene	520	9.0	ug/kg	E	1
Dibenz(a,h)Anthracene	130	9.0	ug/kg		1
Fluoranthene	930	9.0	ug/kg	E	1
Fluorene	70	9.0	ug/kg		1
Indeno(1,2,3-c,d)Pyrene	280	9.0	ug/kg		1
Naphthalene	13	9.0	ug/kg		1
Phenanthrene	720	9.0	ug/kg	E	1
Pyrene	780	9.0	ug/kg	E	1

Summary of Analytical Results

Client ID: DTSB75ADL
GPL ID: 407076-007-007-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 11:43
Prep Batch: 67695

Analytical Method: SW8270_PAH
Date Analyzed: 07/16/2004
Time Analyzed: 10:02
Analysis Batch: 69475

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	36	ug/kg	U	4
Acenaphthene	72	36	ug/kg		4
Acenaphthylene	BQL	36	ug/kg	U	4
Anthracene	170	36	ug/kg		4
Benzo(a)anthracene	450	36	ug/kg		4
Benzo(a)pyrene	400	36	ug/kg		4
Benzo(b)fluoranthene	450	36	ug/kg		4
Benzo(g,h,i)perylene	300	36	ug/kg		4
Benzo(k)fluoranthene	320	36	ug/kg		4
Chrysene	550	36	ug/kg		4
Dibenz(a,h)Anthracene	130	36	ug/kg		4
Fluoranthene	1400	36	ug/kg		4
Fluorene	81	36	ug/kg		4
Indeno(1,2,3-c,d)Pyrene	290	36	ug/kg		4
Naphthalene	BQL	36	ug/kg	U	4
Phenanthrene	830	36	ug/kg		4
Pyrene	820	36	ug/kg		4

Summary of Analytical Results

Client ID: TMSB75A
GPL ID: 407076-008-008-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 11:43
Prep Batch: 67695

Analytical Method: SW8270_PAH
Date Analyzed: 07/14/2004
Time Analyzed: 22:24
Analysis Batch: 69469

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	9.0	ug/kg	U	1
Acenaphthene	260	9.0	ug/kg		1
Acenaphthylene	16	9.0	ug/kg		1
Anthracene	580	9.0	ug/kg	E	1
Benzo(a)anthracene	990	9.0	ug/kg	E	1
Benzo(a)pyrene	1000	9.0	ug/kg	E	1
Benzo(b)fluoranthene	1300	9.0	ug/kg	E	1
Benzo(g,h,i)perylene	610	9.0	ug/kg	E	1
Benzo(k)fluoranthene	710	9.0	ug/kg	E	1
Chrysene	980	9.0	ug/kg	E	1
Dibenz(a,h)Anthracene	BQL	9.0	ug/kg	U	1
Fluoranthene	1500	9.0	ug/kg	E	1
Fluorene	270	9.0	ug/kg		1
Indeno(1,2,3-c,d)Pyrene	640	9.0	ug/kg	E	1
Naphthalene	15	9.0	ug/kg		1
Phenanthrene	1200	9.0	ug/kg	E	1
Pyrene	1200	9.0	ug/kg	E	1

Summary of Analytical Results

Client ID: TMSB75ADL
GPL ID: 407076-008-008-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 11:43
Prep Batch: 67695

Analytical Method: SW8270_PAH
Date Analyzed: 07/15/2004
Time Analyzed: 19:44
Analysis Batch: 69470

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	90	ug/kg	U	10
Acenaphthene	280	90	ug/kg		10
Acenaphthylene	BQL	90	ug/kg	U	10
Anthracene	630	90	ug/kg		10
Benzo(a)anthracene	1200	90	ug/kg		10
Benzo(a)pyrene	1100	90	ug/kg		10
Benzo(b)fluoranthene	1200	90	ug/kg		10
Benzo(g,h,i)perylene	800	90	ug/kg		10
Benzo(k)fluoranthene	820	90	ug/kg		10
Chrysene	1300	90	ug/kg		10
Dibenz(a,h)Anthracene	BQL	90	ug/kg	U	10
Fluoranthene	3700	90	ug/kg		10
Fluorene	320	90	ug/kg		10
Indeno(1,2,3-c,d)Pyrene	750	90	ug/kg		10
Naphthalene	BQL	90	ug/kg	U	10
Phenanthrene	2900	90	ug/kg		10
Pyrene	2100	90	ug/kg		10

Summary of Analytical Results

Client ID: DTSB76A
GPL ID: 407076-009-009-1/2
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67751

Analytical Method: SW8270_PAH
Date Analyzed: 07/19/2004
Time Analyzed: 20:17
Analysis Batch: 69548

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	8.1	ug/kg	U	1
Acenaphthene	110	8.1	ug/kg		1
Acenaphthylene	8.9	8.1	ug/kg		1
Anthracene	220	8.1	ug/kg		1
Benzo(a)anthracene	490	8.1	ug/kg		1
Benzo(a)pyrene	440	8.1	ug/kg		1
Benzo(b)fluoranthene	720	8.1	ug/kg		1
Benzo(g,h,i)perylene	210	8.1	ug/kg		1
Benzo(k)fluoranthene	180	8.1	ug/kg		1
Chrysene	460	8.1	ug/kg		1
Dibenz(a,h)Anthracene	60	8.1	ug/kg		1
Fluoranthene	880	8.1	ug/kg		1
Fluorene	110	8.1	ug/kg		1
Indeno(1,2,3-c,d)Pyrene	210	8.1	ug/kg		1
Naphthalene	BQL	8.1	ug/kg	U	1
Phenanthrene	710	8.1	ug/kg		1
Pyrene	670	8.1	ug/kg		1

Summary of Analytical Results

Client ID: DTSB76ADL
GPL ID: 407076-009-009-1/2
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67751

Analytical Method: SW8270_PAH
Date Analyzed: 07/19/2004
Time Analyzed: 18:20
Analysis Batch: 69548

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	40	ug/kg	U	5
Acenaphthene	100	40	ug/kg		5
Acenaphthylene	BQL	40	ug/kg	U	5
Anthracene	210	40	ug/kg		5
Benzo(a)anthracene	460	40	ug/kg		5
Benzo(a)pyrene	390	40	ug/kg		5
Benzo(b)fluoranthene	590	40	ug/kg		5
Benzo(g,h,i)perylene	230	40	ug/kg		5
Benzo(k)fluoranthene	180	40	ug/kg		5
Chrysene	430	40	ug/kg		5
Dibenz(a,h)Anthracene	67	40	ug/kg		5
Fluoranthene	1200	40	ug/kg		5
Fluorene	99	40	ug/kg		5
Indeno(1,2,3-c,d)Pyrene	210	40	ug/kg		5
Naphthalene	BQL	40	ug/kg	U	5
Phenanthrene	950	40	ug/kg		5
Pyrene	810	40	ug/kg		5

Summary of Analytical Results

Client ID: DTSB77ADL
GPL ID: 407076-010-011-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 11:43
Prep Batch: 67695

Analytical Method: SW8270_PAH
Date Analyzed: 07/15/2004
Time Analyzed: 17:26
Analysis Batch: 69470

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	180	ug/kg	U	20
Acenaphthene	2500	180	ug/kg		20
Acenaphthylene	BQL	180	ug/kg	U	20
Anthracene	4800	180	ug/kg		20
Benzo(a)anthracene	6500	180	ug/kg		20
Benzo(a)pyrene	6300	180	ug/kg		20
Benzo(b)fluoranthene	6800	180	ug/kg		20
Benzo(g,h,i)perylene	4300	180	ug/kg		20
Benzo(k)fluoranthene	4800	180	ug/kg		20
Chrysene	7100	180	ug/kg		20
Dibenz(a,h)Anthracene	BQL	180	ug/kg	U	20
Fluoranthene	14000	180	ug/kg	E	20
Fluorene	2800	180	ug/kg		20
Indeno(1,2,3-c,d)Pyrene	4200	180	ug/kg		20
Naphthalene	250	180	ug/kg		20
Phenanthrene	13000	180	ug/kg	E	20
Pyrene	7700	180	ug/kg		20

Summary of Analytical Results

Client ID: DTSB77ADL2
GPL ID: 407076-010-011-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/14/2004
Prep Time: 11:43
Prep Batch: 67695

Analytical Method: SW8270_PAH
Date Analyzed: 07/15/2004
Time Analyzed: 18:00
Analysis Batch: 69470

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	910	ug/kg	U	100
Acenaphthene	2500	910	ug/kg		100
Acenaphthylene	BQL	910	ug/kg	U	100
Anthracene	4100	910	ug/kg		100
Benzo(a)anthracene	6900	910	ug/kg		100
Benzo(a)pyrene	5800	910	ug/kg		100
Benzo(b)fluoranthene	5900	910	ug/kg		100
Benzo(g,h,i)perylene	4100	910	ug/kg		100
Benzo(k)fluoranthene	4800	910	ug/kg		100
Chrysene	7700	910	ug/kg		100
Dibenz(a,h)Anthracene	BQL	910	ug/kg	U	100
Fluoranthene	27000	910	ug/kg		100
Fluorene	2800	910	ug/kg		100
Indeno(1,2,3-c,d)Pyrene	4000	910	ug/kg		100
Naphthalene	BQL	910	ug/kg	U	100
Phenanthrene	22000	910	ug/kg		100
Pyrene	14000	910	ug/kg		100

Summary of Analytical Results

Client ID: DTSB78A
GPL ID: 407076-011-012-1/1
Matrix: SOIL
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3550-LL
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67751

Analytical Method: SW8270_PAH
Date Analyzed: 07/19/2004
Time Analyzed: 16:52
Analysis Batch: 69548

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	9.2	ug/kg	U	1
Acenaphthene	BQL	9.2	ug/kg	U	1
Acenaphthylene	BQL	9.2	ug/kg	U	1
Anthracene	18	9.2	ug/kg		1
Benzo(a)anthracene	74	9.2	ug/kg		1
Benzo(a)pyrene	79	9.2	ug/kg		1
Benzo(b)fluoranthene	120	9.2	ug/kg		1
Benzo(g,h,i)perylene	50	9.2	ug/kg		1
Benzo(k)fluoranthene	34	9.2	ug/kg		1
Chrysene	72	9.2	ug/kg		1
Dibenz(a,h)Anthracene	15	9.2	ug/kg		1
Fluoranthene	160	9.2	ug/kg		1
Fluorene	BQL	9.2	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	43	9.2	ug/kg		1
Naphthalene	BQL	9.2	ug/kg	U	1
Phenanthrene	77	9.2	ug/kg		1
Pyrene	120	9.2	ug/kg		1

GPL LABORATORIES, LLP
ANALYTICAL RESULTS

Project Name : Radford

Date Printed August 5, 2004

GPL ID	Client ID
407076-001-001-1/1	DTSB70A
407076-003-003-1/1	DTSB71A
407076-003-003-1/1	DTSB71AD
407076-004-004-1/1	DTSB72A
407076-005-005-1/1	DTSB73A
407076-006-006-1/1	DTSB74A
407076-007-007-1/1	DTSB75A
407076-007-007-1/1	DTSB75ADL
407076-009-009-1/2	DTSB76A
407076-009-010-2/2	DTSB76A
407076-009-009-1/2	DTSB76ADL
407076-010-011-1/1	DTSB77A
407076-010-011-1/1	DTSB77ADL
407076-010-011-1/1	DTSB77ADL2
407076-011-012-1/1	DTSB78A
407076-002-002-1/1	TMSB71A
407076-002-002-1/1	TMSB71ADL
407076-008-008-1/1	TMSB75A
407076-008-008-1/1	TMSB75ADL

Analytical Report For 407077

for

Shaw Environmental & Infrastructure

Project Manager : Eric Malarek

Project Name : Radford

August 5, 2004

GPL

Laboratories

GPL Laboratories, LLLP Certifies that the test results meet all requirements of the NELAC Standards unless otherwise noted.

Reviewed by, Project Manager	Approved by, Laboratory Director

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Summary of Analytical Results

Client ID: 071304R1
GPL ID: 407077-001-005-1/2
Matrix: WATER
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3520C
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67781

Analytical Method: SW8082
Date Analyzed: 07/20/2004
Time Analyzed: 14:56
Analysis Batch: 69768

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	1.1	ug/L	U	1
PCB-1221	BQL	1.1	ug/L	U	1
PCB-1232	BQL	1.1	ug/L	U	1
PCB-1242	BQL	1.1	ug/L	U	1
PCB-1248	BQL	1.1	ug/L	U	1
PCB-1254	BQL	1.1	ug/L	U	1
PCB-1260	BQL	1.1	ug/L	U	1

Summary of Analytical Results

Client ID: 071304R2
GPL ID: 407077-002-007-1/2
Matrix: WATER
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3520C
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67781

Analytical Method: SW8082
Date Analyzed: 07/20/2004
Time Analyzed: 15:25
Analysis Batch: 69768

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	1.1	ug/L	U	1
PCB-1221	BQL	1.1	ug/L	U	1
PCB-1232	BQL	1.1	ug/L	U	1
PCB-1242	BQL	1.1	ug/L	U	1
PCB-1248	BQL	1.1	ug/L	U	1
PCB-1254	BQL	1.1	ug/L	U	1
PCB-1260	BQL	1.1	ug/L	U	1

Summary of Analytical Results

Client ID: 071304R1
GPL ID: 407077-001-001-1/2
Matrix: WATER
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3520C-LL
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67759

Analytical Method: SW8270_PAH
Date Analyzed: 07/20/2004
Time Analyzed: 12:13
Analysis Batch: 69780

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	0.21	ug/L	U	1
Acenaphthene	BQL	0.21	ug/L	U	1
Acenaphthylene	BQL	0.21	ug/L	U	1
Anthracene	BQL	0.21	ug/L	U	1
Benzo(a)anthracene	BQL	0.21	ug/L	U	1
Benzo(a)pyrene	BQL	0.21	ug/L	U	1
Benzo(b)fluoranthene	BQL	0.21	ug/L	U	1
Benzo(g,h,i)perylene	BQL	0.21	ug/L	U	1
Benzo(k)fluoranthene	BQL	0.21	ug/L	U	1
Chrysene	BQL	0.21	ug/L	U	1
Dibenz(a,h)Anthracene	BQL	0.21	ug/L	U	1
Fluoranthene	BQL	0.21	ug/L	U	1
Fluorene	BQL	0.21	ug/L	U	1
Indeno(1,2,3-c,d)Pyrene	BQL	0.21	ug/L	U	1
Naphthalene	BQL	0.21	ug/L	U	1
Phenanthrene	BQL	0.21	ug/L	U	1
Pyrene	BQL	0.21	ug/L	U	1

Summary of Analytical Results

Client ID: 071304R2
GPL ID: 407077-002-003-1/2
Matrix: WATER
Date Collected: 07/13/2004
Date Received: 07/14/2004

Prep Method: SW3520C-LL
Prep Date: 07/16/2004
Prep Time: 00:00
Prep Batch: 67759

Analytical Method: SW8270_PAH
Date Analyzed: 07/20/2004
Time Analyzed: 12:43
Analysis Batch: 69780

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	0.21	ug/L	U	1
Acenaphthene	BQL	0.21	ug/L	U	1
Acenaphthylene	BQL	0.21	ug/L	U	1
Anthracene	BQL	0.21	ug/L	U	1
Benzo(a)anthracene	BQL	0.21	ug/L	U	1
Benzo(a)pyrene	BQL	0.21	ug/L	U	1
Benzo(b)fluoranthene	BQL	0.21	ug/L	U	1
Benzo(g,h,i)perylene	BQL	0.21	ug/L	U	1
Benzo(k)fluoranthene	BQL	0.21	ug/L	U	1
Chrysene	BQL	0.21	ug/L	U	1
Dibenz(a,h)Anthracene	BQL	0.21	ug/L	U	1
Fluoranthene	BQL	0.21	ug/L	U	1
Fluorene	BQL	0.21	ug/L	U	1
Indeno(1,2,3-c,d)Pyrene	BQL	0.21	ug/L	U	1
Naphthalene	BQL	0.21	ug/L	U	1
Phenanthrene	BQL	0.21	ug/L	U	1
Pyrene	BQL	0.21	ug/L	U	1

GPL LABORATORIES, LLP
ANALYTICAL RESULTS

Project Name : Radford

Date Printed August 5, 2004

GPL ID	Client ID
407077-001-001-1/2	071304R1
407077-001-005-1/2	071304R1
407077-002-003-1/2	071304R2
407077-002-007-1/2	071304R2

Analytical Report For 407108

for

Shaw Environmental & Infrastructure

Project Manager : Eric Malarek

Project Name : Radford

August 5, 2004

GPL

Laboratories

GPL Laboratories, LLLP Certifies that the test results meet all requirements of the NELAC Standards unless otherwise noted.

Reviewed by, Project Manager	Approved by, Laboratory Director

7210A Corporate CT Frederick, MD 21703 Phone (301) 694-5310 Fax: (301) 620-0731
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Summary of Analytical Results

Client ID: WBGSB26A
GPL ID: 407108-001-001-1/2
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/19/2004
Time Analyzed: 21:30
Analysis Batch: 69569

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	73	1.0	%		1

Summary of Analytical Results

Client ID: WBGSB27A
GPL ID: 407108-002-003-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/19/2004
Time Analyzed: 21:30
Analysis Batch: 69569

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	71	1.0	%		1

Summary of Analytical Results

Client ID: WBGSB28A
GPL ID: 407108-003-004-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/19/2004
Time Analyzed: 21:30
Analysis Batch: 69569

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	79	1.0	%		1

Summary of Analytical Results

Client ID: TMSB28A
GPL ID: 407108-004-005-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/19/2004
Time Analyzed: 21:30
Analysis Batch: 69569

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	77	1.0	%		1

Summary of Analytical Results

Client ID: WBGSD16
GPL ID: 407108-005-006-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/19/2004
Time Analyzed: 21:30
Analysis Batch: 69569

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	42	1.0	%		1

Summary of Analytical Results

Client ID: TMSD16
GPL ID: 407108-006-007-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/19/2004
Time Analyzed: 21:30
Analysis Batch: 69569

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	41	1.0	%		1

Summary of Analytical Results

Client ID: NBGSD02
GPL ID: 407108-007-008-1/1
Matrix: SOIL
Date Collected: 07/14/2004
Date Received: 07/17/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/19/2004
Time Analyzed: 21:30
Analysis Batch: 69569

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	81	1.0	%		1

Summary of Analytical Results

Client ID: NBSD03
GPL ID: 407108-008-009-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/19/2004
Time Analyzed: 21:30
Analysis Batch: 69569

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	87	1.0	%		1

Summary of Analytical Results

Client ID: NBGSD04
GPL ID: 407108-009-010-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/19/2004
Time Analyzed: 21:30
Analysis Batch: 69569

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	82	1.0	%		1

Summary of Analytical Results

Client ID: WBGSW16
GPL ID: 407108-010-011-1/1
Matrix: WATER
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: E314.0
Date Analyzed: 07/28/2004
Time Analyzed: 12:47
Analysis Batch: 69876

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Perchlorate	BQL	1.0	ug/L	U	1

Summary of Analytical Results

Client ID: WBGSW17
GPL ID: 407108-011-012-1/1
Matrix: WATER
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: E314.0
Date Analyzed: 07/28/2004
Time Analyzed: 13:45
Analysis Batch: 69876

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Perchlorate	BQL	1.0	ug/L	U	1

Summary of Analytical Results

Client ID: TMSW17
GPL ID: 407108-012-013-1/1
Matrix: WATER
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: E314.0
Date Analyzed: 07/28/2004
Time Analyzed: 14:05
Analysis Batch: 69876

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Perchlorate	BQL	1.0	ug/L	U	1

Summary of Analytical Results

Client ID: WBGSB26A
GPL ID: 407108-001-001-1/2
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3050B
Prep Date: 07/20/2004
Prep Time: 00:00
Prep Batch: 67796

Analytical Method: SW6010B
Date Analyzed: 07/29/2004
Time Analyzed: 22:55
Analysis Batch: 17265

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	15700	21.8	mg/kg		1
Antimony	BQL	2.2	mg/kg	UN	1
Arsenic	8.3	2.2	mg/kg		1
Barium	45.5	.54	mg/kg		1
Beryllium	0.83	.22	mg/kg	E	1
Cadmium	BQL	.65	mg/kg	U	1
Calcium	1650	109	mg/kg		1
Chromium	26.7	.54	mg/kg		1
Cobalt	14.5	.54	mg/kg		1
Copper	15.6	1.1	mg/kg		1
Iron	24900	16.3	mg/kg		1
Lead	32.5	1.1	mg/kg		1
Magnesium	1220	27.2	mg/kg	N	1
Manganese	637	.54	mg/kg		1
Nickel	14.9	1.1	mg/kg		1
Potassium	702	27.2	mg/kg		1
Selenium	1.1	2.2	mg/kg	B	1
Silver	BQL	.33	mg/kg	U	1
Sodium	62.1	272	mg/kg	B	1
Thallium	BQL	3.3	mg/kg	U	1
Vanadium	46.1	1.1	mg/kg		1
Zinc	43.6	2.2	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB27A
GPL ID: 407108-002-003-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3050B
Prep Date: 07/20/2004
Prep Time: 00:00
Prep Batch: 67796

Analytical Method: SW6010B
Date Analyzed: 07/29/2004
Time Analyzed: 23:35
Analysis Batch: 17265

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	19000	22.3	mg/kg		1
Antimony	1.6	2.2	mg/kg	BN	1
Arsenic	9.5	2.2	mg/kg		1
Barium	128	.56	mg/kg		1
Beryllium	0.92	.22	mg/kg	E	1
Cadmium	0.38	.67	mg/kg	B	1
Calcium	8840	112	mg/kg		1
Chromium	44.8	.56	mg/kg		1
Cobalt	10.2	.56	mg/kg		1
Copper	47.1	1.1	mg/kg		1
Iron	24600	16.7	mg/kg		1
Lead	279	1.1	mg/kg		1
Magnesium	3390	27.9	mg/kg	N	1
Manganese	428	.56	mg/kg		1
Nickel	17.3	1.1	mg/kg		1
Potassium	1120	27.9	mg/kg		1
Selenium	0.75	2.2	mg/kg	B	1
Silver	BQL	.33	mg/kg	U	1
Sodium	136	279	mg/kg	B	1
Thallium	BQL	3.3	mg/kg	U	1
Vanadium	48	1.1	mg/kg		1
Zinc	459	2.2	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB28A
GPL ID: 407108-003-004-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3050B
Prep Date: 07/20/2004
Prep Time: 00:00
Prep Batch: 67796

Analytical Method: SW6010B
Date Analyzed: 07/29/2004
Time Analyzed: 23:43
Analysis Batch: 17265

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	21800	19.4	mg/kg		1
Antimony	0.61	1.9	mg/kg	BN	1
Arsenic	9.4	1.9	mg/kg		1
Barium	81.7	.49	mg/kg		1
Beryllium	1.3	.19	mg/kg	E	1
Cadmium	0.084	.58	mg/kg	B	1
Calcium	3980	97	mg/kg		1
Chromium	45.2	.49	mg/kg		1
Cobalt	9.8	.49	mg/kg		1
Copper	28.6	.97	mg/kg		1
Iron	28300	14.6	mg/kg		1
Lead	114	.97	mg/kg		1
Magnesium	3140	24.3	mg/kg	N	1
Manganese	251	.49	mg/kg		1
Nickel	20.7	.97	mg/kg		1
Potassium	1200	24.3	mg/kg		1
Selenium	0.86	1.9	mg/kg	B	1
Silver	BQL	.29	mg/kg	U	1
Sodium	84.5	243	mg/kg	B	1
Thallium	BQL	2.9	mg/kg	U	1
Vanadium	53.9	.97	mg/kg		1
Zinc	202	1.9	mg/kg		1

Summary of Analytical Results

Client ID: TMSB28A
GPL ID: 407108-004-005-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3050B
Prep Date: 07/20/2004
Prep Time: 00:00
Prep Batch: 67796

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 00:10
Analysis Batch: 17265

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	22400	20.9	mg/kg		1
Antimony	0.57	2.1	mg/kg	BN	1
Arsenic	9.9	2.1	mg/kg		1
Barium	86.5	.52	mg/kg		1
Beryllium	1.4	.21	mg/kg	E	1
Cadmium	0.088	.63	mg/kg	B	1
Calcium	4000	105	mg/kg		1
Chromium	45.5	.52	mg/kg		1
Cobalt	11.2	.52	mg/kg		1
Copper	29.8	1	mg/kg		1
Iron	29200	15.7	mg/kg		1
Lead	112	1	mg/kg		1
Magnesium	3230	26.1	mg/kg	N	1
Manganese	294	.52	mg/kg		1
Nickel	21.4	1	mg/kg		1
Potassium	1250	26.1	mg/kg		1
Selenium	0.72	2.1	mg/kg	B	1
Silver	BQL	.31	mg/kg	U	1
Sodium	77.9	261	mg/kg	B	1
Thallium	BQL	3.1	mg/kg	U	1
Vanadium	56.5	1	mg/kg		1
Zinc	200	2.1	mg/kg		1

Summary of Analytical Results

Client ID: WBGSD16
GPL ID: 407108-005-006-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3050B
Prep Date: 07/20/2004
Prep Time: 00:00
Prep Batch: 67796

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 00:18
Analysis Batch: 17265

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	19300	25.9	mg/kg		1
Antimony	BQL	2.6	mg/kg	UN	1
Arsenic	9.6	2.6	mg/kg		1
Barium	63.3	.65	mg/kg		1
Beryllium	1.1	.26	mg/kg	E	1
Cadmium	BQL	.78	mg/kg	U	1
Calcium	14500	129	mg/kg		1
Cobalt	17.2	.65	mg/kg		1
Copper	19.3	1.3	mg/kg		1
Iron	31500	19.4	mg/kg		1
Nickel	17	1.3	mg/kg		1
Potassium	1140	32.4	mg/kg		1
Sodium	123	324	mg/kg	B	1
Vanadium	52.8	1.3	mg/kg		1
Zinc	63.1	2.6	mg/kg		1

Summary of Analytical Results

Client ID: WBGSD16
GPL ID: 407108-005-006-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3050B
Prep Date: 07/20/2004
Prep Time: 00:00
Prep Batch: 67796

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 00:26
Analysis Batch: 17265

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Chromium	42.7	1.3	mg/kg		2
Lead	45.5	2.6	mg/kg		2
Magnesium	4200	64.7	mg/kg	N	2
Manganese	1700	1.3	mg/kg		2
Selenium	BQL	5.2	mg/kg	U	2
Silver	BQL	.78	mg/kg	U	2
Thallium	BQL	7.8	mg/kg	U	2

Summary of Analytical Results

Client ID: TMSD16
GPL ID: 407108-006-007-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3050B
Prep Date: 07/20/2004
Prep Time: 00:00
Prep Batch: 67796

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 00:34
Analysis Batch: 17265

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	18400	29	mg/kg		1
Antimony	BQL	2.9	mg/kg	UN	1
Arsenic	11	2.9	mg/kg		1
Barium	59.5	.72	mg/kg		1
Beryllium	1.2	.29	mg/kg	E	1
Cadmium	0.090	.87	mg/kg	B	1
Calcium	24000	145	mg/kg		1
Chromium	44.4	.72	mg/kg		1
Cobalt	15.7	.72	mg/kg		1
Copper	21	1.4	mg/kg		1
Iron	35700	21.7	mg/kg		1
Lead	40.6	1.4	mg/kg		1
Magnesium	9140	36.2	mg/kg	N	1
Manganese	1370	.72	mg/kg		1
Nickel	16.7	1.4	mg/kg		1
Potassium	920	36.2	mg/kg		1
Selenium	BQL	2.9	mg/kg	U	1
Silver	BQL	.43	mg/kg	U	1
Sodium	179	362	mg/kg	B	1
Thallium	BQL	4.3	mg/kg	U	1
Vanadium	61.5	1.4	mg/kg		1
Zinc	65.4	2.9	mg/kg		1

Summary of Analytical Results

Client ID: NBGSD02
GPL ID: 407108-007-008-1/1
Matrix: SOIL
Date Collected: 07/14/2004
Date Received: 07/17/2004

Prep Method: SW3050B
Prep Date: 07/20/2004
Prep Time: 00:00
Prep Batch: 67796

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 00:42
Analysis Batch: 17265

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	21400	18.5	mg/kg		1
Antimony	0.38	1.9	mg/kg	BN	1
Arsenic	8.9	1.9	mg/kg		1
Barium	44.2	.46	mg/kg		1
Beryllium	0.67	.19	mg/kg	E	1
Cadmium	0.083	.56	mg/kg	B	1
Calcium	2680	92.5	mg/kg		1
Chromium	38.3	.46	mg/kg		1
Cobalt	6.2	.46	mg/kg		1
Copper	20.5	.93	mg/kg		1
Iron	31700	13.9	mg/kg		1
Lead	146	.93	mg/kg		1
Magnesium	1820	23.1	mg/kg	N	1
Manganese	215	.46	mg/kg		1
Nickel	14.3	.93	mg/kg		1
Potassium	655	23.1	mg/kg		1
Selenium	0.84	1.9	mg/kg	B	1
Silver	BQL	.28	mg/kg	U	1
Sodium	79.9	231	mg/kg	B	1
Thallium	BQL	2.8	mg/kg	U	1
Vanadium	55.8	.93	mg/kg		1
Zinc	208	1.9	mg/kg		1

Summary of Analytical Results

Client ID: NBSD03
GPL ID: 407108-008-009-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3050B
Prep Date: 07/20/2004
Prep Time: 00:00
Prep Batch: 67796

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 00:50
Analysis Batch: 17265

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	19500	17.2	mg/kg		1
Antimony	1.6	1.7	mg/kg	BN	1
Arsenic	6.8	1.7	mg/kg		1
Barium	123	.43	mg/kg		1
Beryllium	0.64	.17	mg/kg	E	1
Cadmium	1.7	.52	mg/kg		1
Calcium	35700	86.1	mg/kg		1
Chromium	397	.43	mg/kg		1
Cobalt	8.9	.43	mg/kg		1
Copper	41.5	.86	mg/kg		1
Iron	24800	12.9	mg/kg		1
Magnesium	19000	21.5	mg/kg	N	1
Manganese	334	.43	mg/kg		1
Nickel	13.1	.86	mg/kg		1
Potassium	1530	21.5	mg/kg		1
Selenium	BQL	1.7	mg/kg	U	1
Silver	BQL	.26	mg/kg	U	1
Thallium	BQL	2.6	mg/kg	U	1
Vanadium	46.3	.86	mg/kg		1

Summary of Analytical Results

Client ID: NBSD03
GPL ID: 407108-008-009-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3050B
Prep Date: 07/20/2004
Prep Time: 00:00
Prep Batch: 67796

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 00:58
Analysis Batch: 17265

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Lead	3500	17.2	mg/kg		20
Sodium	BQL	4310	mg/kg	U	20
Zinc	4220	34.4	mg/kg		20

Summary of Analytical Results

Client ID: NBGSD04
GPL ID: 407108-009-010-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3050B
Prep Date: 07/20/2004
Prep Time: 00:00
Prep Batch: 67796

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 01:06
Analysis Batch: 17265

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	13200	16.2	mg/kg		1
Antimony	2.1	1.6	mg/kg	N	1
Arsenic	5.1	1.6	mg/kg		1
Barium	142	.41	mg/kg		1
Beryllium	0.48	.16	mg/kg	E	1
Cadmium	1.1	.49	mg/kg		1
Calcium	12200	81	mg/kg		1
Chromium	151	.41	mg/kg		1
Cobalt	7.5	.41	mg/kg		1
Copper	46.7	.81	mg/kg		1
Iron	14500	12.2	mg/kg		1
Magnesium	7930	20.3	mg/kg	N	1
Manganese	319	.41	mg/kg		1
Nickel	10	.81	mg/kg		1
Potassium	899	20.3	mg/kg		1
Selenium	BQL	1.6	mg/kg	U	1
Silver	BQL	.24	mg/kg	U	1
Thallium	BQL	2.4	mg/kg	U	1
Vanadium	29	.81	mg/kg		1

Summary of Analytical Results

Client ID: NBGSD04
GPL ID: 407108-009-010-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3050B
Prep Date: 07/20/2004
Prep Time: 00:00
Prep Batch: 67796

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 01:14
Analysis Batch: 17265

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Lead	2200	8.1	mg/kg		10
Sodium	345	2030	mg/kg	B	10
Zinc	2630	16.2	mg/kg		10

Summary of Analytical Results

Client ID: WBGSB26A
GPL ID: 407108-001-001-1/2
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW7471_DIG
Prep Date: 07/20/2004
Prep Time: 13:00
Prep Batch: 67817

Analytical Method: SW7471A
Date Analyzed: 07/21/2004
Time Analyzed: 14:06
Analysis Batch: 17265

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.061	.043	mg/kg		1

GPL LABORATORIES, LLLP

Summary of Analytical Results

Client ID: WBGSB27A
GPL ID: 407108-002-003-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW7471_DIG
Prep Date: 07/20/2004
Prep Time: 13:00
Prep Batch: 67817

Analytical Method: SW7471A
Date Analyzed: 07/21/2004
Time Analyzed: 14:21
Analysis Batch: 17265

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.070	.043	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB28A
GPL ID: 407108-003-004-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW7471_DIG
Prep Date: 07/20/2004
Prep Time: 13:00
Prep Batch: 67817

Analytical Method: SW7471A
Date Analyzed: 07/21/2004
Time Analyzed: 14:23
Analysis Batch: 17265

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.067	.036	mg/kg		1

GPL LABORATORIES, LLLP

Summary of Analytical Results

Client ID: TMSB28A
GPL ID: 407108-004-005-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW7471_DIG
Prep Date: 07/20/2004
Prep Time: 13:00
Prep Batch: 67817

Analytical Method: SW7471A
Date Analyzed: 07/21/2004
Time Analyzed: 14:26
Analysis Batch: 17265

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.060	.032	mg/kg		1

Summary of Analytical Results

Client ID: WBGSD16
GPL ID: 407108-005-006-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW7471_DIG
Prep Date: 07/20/2004
Prep Time: 13:00
Prep Batch: 67817

Analytical Method: SW7471A
Date Analyzed: 07/21/2004
Time Analyzed: 14:29
Analysis Batch: 17265

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.041	.046	mg/kg	B	1

Summary of Analytical Results

Client ID: TMSD16
GPL ID: 407108-006-007-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW7471_DIG
Prep Date: 07/20/2004
Prep Time: 13:00
Prep Batch: 67817

Analytical Method: SW7471A
Date Analyzed: 07/21/2004
Time Analyzed: 14:32
Analysis Batch: 17265

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.054	.046	mg/kg		1

Summary of Analytical Results

Client ID: NBGSD02
GPL ID: 407108-007-008-1/1
Matrix: SOIL
Date Collected: 07/14/2004
Date Received: 07/17/2004

Prep Method: SW7471_DIG
Prep Date: 07/20/2004
Prep Time: 13:00
Prep Batch: 67817

Analytical Method: SW7471A
Date Analyzed: 07/21/2004
Time Analyzed: 14:35
Analysis Batch: 17265

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.10	.036	mg/kg		1

Summary of Analytical Results

Client ID: NBSD03
GPL ID: 407108-008-009-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW7471_DIG
Prep Date: 07/20/2004
Prep Time: 13:00
Prep Batch: 67817

Analytical Method: SW7471A
Date Analyzed: 07/21/2004
Time Analyzed: 14:38
Analysis Batch: 17265

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.048	.029	mg/kg		1

Summary of Analytical Results

Client ID: NBGSD04
GPL ID: 407108-009-010-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW7471_DIG
Prep Date: 07/20/2004
Prep Time: 13:00
Prep Batch: 67817

Analytical Method: SW7471A
Date Analyzed: 07/21/2004
Time Analyzed: 14:40
Analysis Batch: 17265

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.051	.033	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB26A
GPL ID: 407108-001-001-1/2
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67881

Analytical Method: SW8082
Date Analyzed: 07/26/2004
Time Analyzed: 20:15
Analysis Batch: 69893

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	45	ug/kg	U	1
PCB-1221	BQL	45	ug/kg	U	1
PCB-1232	BQL	45	ug/kg	U	1
PCB-1242	BQL	45	ug/kg	U	1
PCB-1248	BQL	45	ug/kg	U	1
PCB-1254	BQL	45	ug/kg	U	1
PCB-1260	BQL	45	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGSB27A
GPL ID: 407108-002-003-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67881

Analytical Method: SW8082
Date Analyzed: 07/26/2004
Time Analyzed: 21:42
Analysis Batch: 69893

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	47	ug/kg	U	1
PCB-1221	BQL	47	ug/kg	U	1
PCB-1232	BQL	47	ug/kg	U	1
PCB-1242	BQL	47	ug/kg	U	1
PCB-1248	BQL	47	ug/kg	U	1
PCB-1254	BQL	47	ug/kg	U	1
PCB-1260	BQL	47	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGSB28A
GPL ID: 407108-003-004-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67881

Analytical Method: SW8082
Date Analyzed: 07/26/2004
Time Analyzed: 22:11
Analysis Batch: 69893

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	42	ug/kg	U	1
PCB-1221	BQL	42	ug/kg	U	1
PCB-1232	BQL	42	ug/kg	U	1
PCB-1242	BQL	42	ug/kg	U	1
PCB-1248	BQL	42	ug/kg	U	1
PCB-1254	BQL	42	ug/kg	U	1
PCB-1260	BQL	42	ug/kg	U	1

Summary of Analytical Results

Client ID: TMSB28A
GPL ID: 407108-004-005-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67881

Analytical Method: SW8082
Date Analyzed: 07/26/2004
Time Analyzed: 23:38
Analysis Batch: 69893

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	44	ug/kg	U	1
PCB-1221	BQL	44	ug/kg	U	1
PCB-1232	BQL	44	ug/kg	U	1
PCB-1242	BQL	44	ug/kg	U	1
PCB-1248	BQL	44	ug/kg	U	1
PCB-1254	BQL	44	ug/kg	U	1
PCB-1260	BQL	44	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGSD16
GPL ID: 407108-005-006-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67881

Analytical Method: SW8082
Date Analyzed: 07/27/2004
Time Analyzed: 00:07
Analysis Batch: 69893

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	79	ug/kg	U	1
PCB-1221	BQL	79	ug/kg	U	1
PCB-1232	BQL	79	ug/kg	U	1
PCB-1242	BQL	79	ug/kg	U	1
PCB-1248	BQL	79	ug/kg	U	1
PCB-1254	BQL	79	ug/kg	U	1
PCB-1260	BQL	79	ug/kg	U	1

Summary of Analytical Results

Client ID: TMSD16
GPL ID: 407108-006-007-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67881

Analytical Method: SW8082
Date Analyzed: 07/27/2004
Time Analyzed: 00:36
Analysis Batch: 69893

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	82	ug/kg	U	1
PCB-1221	BQL	82	ug/kg	U	1
PCB-1232	BQL	82	ug/kg	U	1
PCB-1242	BQL	82	ug/kg	U	1
PCB-1248	BQL	82	ug/kg	U	1
PCB-1254	BQL	82	ug/kg	U	1
PCB-1260	BQL	82	ug/kg	U	1

Summary of Analytical Results

Client ID: NBGSD02
GPL ID: 407108-007-008-1/1
Matrix: SOIL
Date Collected: 07/14/2004
Date Received: 07/17/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67881

Analytical Method: SW8082
Date Analyzed: 07/31/2004
Time Analyzed: 12:35
Analysis Batch: 69893

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	41	ug/kg	U	1
PCB-1221	BQL	41	ug/kg	U	1
PCB-1232	BQL	41	ug/kg	U	1
PCB-1242	BQL	41	ug/kg	U	1
PCB-1248	BQL	41	ug/kg	U	1
PCB-1254	68	41	ug/kg		1
PCB-1260	BQL	41	ug/kg	U	1

Summary of Analytical Results

Client ID: NBSD03
GPL ID: 407108-008-009-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67881

Analytical Method: SW8082
Date Analyzed: 07/27/2004
Time Analyzed: 01:34
Analysis Batch: 69893

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	39	ug/kg	U	1
PCB-1221	BQL	39	ug/kg	U	1
PCB-1232	BQL	39	ug/kg	U	1
PCB-1242	BQL	39	ug/kg	U	1
PCB-1248	BQL	39	ug/kg	U	1
PCB-1254	BQL	39	ug/kg	U	1
PCB-1260	BQL	39	ug/kg	U	1

Summary of Analytical Results

Client ID: NBGSD04
GPL ID: 407108-009-010-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67881

Analytical Method: SW8082
Date Analyzed: 07/31/2004
Time Analyzed: 13:04
Analysis Batch: 69893

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	41	ug/kg	U	1
PCB-1221	BQL	41	ug/kg	U	1
PCB-1232	BQL	41	ug/kg	U	1
PCB-1242	BQL	41	ug/kg	U	1
PCB-1248	BQL	41	ug/kg	U	1
PCB-1254	150	41	ug/kg		1
PCB-1260	BQL	41	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGSB26A
GPL ID: 407108-001-001-1/2
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67933

Analytical Method: SW8270_PAH
Date Analyzed: 07/27/2004
Time Analyzed: 01:14
Analysis Batch: 69828

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	9.1	ug/kg	U	1
Acenaphthene	BQL	9.1	ug/kg	U	1
Acenaphthylene	BQL	9.1	ug/kg	U	1
Anthracene	15	9.1	ug/kg		1
Benzo(a)anthracene	89	9.1	ug/kg		1
Benzo(a)pyrene	91	9.1	ug/kg		1
Benzo(b)fluoranthene	170	9.1	ug/kg		1
Benzo(g,h,i)perylene	74	9.1	ug/kg		1
Benzo(k)fluoranthene	44	9.1	ug/kg		1
Chrysene	110	9.1	ug/kg		1
Dibenz(a,h)Anthracene	BQL	9.1	ug/kg	U	1
Fluoranthene	230	9.1	ug/kg		1
Fluorene	BQL	9.1	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	69	9.1	ug/kg		1
Naphthalene	BQL	9.1	ug/kg	U	1
Phenanthrene	87	9.1	ug/kg		1
Pyrene	140	9.1	ug/kg		1

Summary of Analytical Results

Client ID: WBGSB27A
GPL ID: 407108-002-003-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67933

Analytical Method: SW8270_PAH
Date Analyzed: 07/27/2004
Time Analyzed: 18:28
Analysis Batch: 69829

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	9.4	ug/kg	U	1
Acenaphthene	BQL	9.4	ug/kg	U	1
Acenaphthylene	BQL	9.4	ug/kg	U	1
Anthracene	52	9.4	ug/kg		1
Benzo(a)anthracene	420	9.4	ug/kg		1
Benzo(a)pyrene	530	9.4	ug/kg	E	1
Benzo(b)fluoranthene	730	9.4	ug/kg	E	1
Benzo(g,h,i)perylene	270	9.4	ug/kg		1
Benzo(k)fluoranthene	240	9.4	ug/kg		1
Chrysene	330	9.4	ug/kg		1
Dibenz(a,h)Anthracene	80	9.4	ug/kg		1
Fluoranthene	720	9.4	ug/kg	E	1
Fluorene	BQL	9.4	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	270	9.4	ug/kg		1
Naphthalene	BQL	9.4	ug/kg	U	1
Phenanthrene	200	9.4	ug/kg		1
Pyrene	390	9.4	ug/kg		1

Summary of Analytical Results

Client ID: WBGSB27ADL
GPL ID: 407108-002-003-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67933

Analytical Method: SW8270_PAH
Date Analyzed: 07/27/2004
Time Analyzed: 16:00
Analysis Batch: 69829

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	94	ug/kg	U	10
Acenaphthene	BQL	94	ug/kg	U	10
Acenaphthylene	BQL	94	ug/kg	U	10
Anthracene	BQL	94	ug/kg	U	10
Benzo(a)anthracene	430	94	ug/kg		10
Benzo(a)pyrene	510	94	ug/kg		10
Benzo(b)fluoranthene	640	94	ug/kg		10
Benzo(g,h,i)perylene	340	94	ug/kg		10
Benzo(k)fluoranthene	230	94	ug/kg		10
Chrysene	350	94	ug/kg		10
Dibenz(a,h)Anthracene	BQL	94	ug/kg	U	10
Fluoranthene	610	94	ug/kg		10
Fluorene	BQL	94	ug/kg	U	10
Indeno(1,2,3-c,d)Pyrene	300	94	ug/kg		10
Naphthalene	BQL	94	ug/kg	U	10
Phenanthrene	200	94	ug/kg		10
Pyrene	390	94	ug/kg		10

Summary of Analytical Results

Client ID: WBGSB28A
GPL ID: 407108-003-004-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67933

Analytical Method: SW8270_PAH
Date Analyzed: 07/27/2004
Time Analyzed: 03:05
Analysis Batch: 69828

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	8.5	ug/kg	U	1
Acenaphthene	BQL	8.5	ug/kg	U	1
Acenaphthylene	BQL	8.5	ug/kg	U	1
Anthracene	BQL	8.5	ug/kg	U	1
Benzo(a)anthracene	21	8.5	ug/kg		1
Benzo(a)pyrene	29	8.5	ug/kg		1
Benzo(b)fluoranthene	46	8.5	ug/kg		1
Benzo(g,h,i)perylene	27	8.5	ug/kg		1
Benzo(k)fluoranthene	17	8.5	ug/kg		1
Chrysene	26	8.5	ug/kg		1
Dibenz(a,h)Anthracene	BQL	8.5	ug/kg	U	1
Fluoranthene	48	8.5	ug/kg		1
Fluorene	BQL	8.5	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	25	8.5	ug/kg		1
Naphthalene	BQL	8.5	ug/kg	U	1
Phenanthrene	16	8.5	ug/kg		1
Pyrene	28	8.5	ug/kg		1

Summary of Analytical Results

Client ID: TMSB28A
GPL ID: 407108-004-005-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67933

Analytical Method: SW8270_PAH
Date Analyzed: 07/27/2004
Time Analyzed: 15:32
Analysis Batch: 69829

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	16	8.7	ug/kg		1
Acenaphthene	BQL	8.7	ug/kg	U	1
Acenaphthylene	BQL	8.7	ug/kg	U	1
Anthracene	BQL	8.7	ug/kg	U	1
Benzo(a)anthracene	36	8.7	ug/kg		1
Benzo(a)pyrene	50	8.7	ug/kg		1
Benzo(b)fluoranthene	81	8.7	ug/kg		1
Benzo(g,h,i)perylene	37	8.7	ug/kg		1
Benzo(k)fluoranthene	25	8.7	ug/kg		1
Chrysene	43	8.7	ug/kg		1
Dibenz(a,h)Anthracene	BQL	8.7	ug/kg	U	1
Fluoranthene	67	8.7	ug/kg		1
Fluorene	BQL	8.7	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	35	8.7	ug/kg		1
Naphthalene	9.2	8.7	ug/kg		1
Phenanthrene	23	8.7	ug/kg		1
Pyrene	41	8.7	ug/kg		1

GPL LABORATORIES, LLLP

Summary of Analytical Results

Client ID: WBGSD16
GPL ID: 407108-005-006-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67933

Analytical Method: SW8270_PAH
Date Analyzed: 07/27/2004
Time Analyzed: 18:56
Analysis Batch: 69829

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	16	ug/kg	U	1
Acenaphthene	BQL	16	ug/kg	U	1
Acenaphthylene	BQL	16	ug/kg	U	1
Anthracene	78	16	ug/kg		1
Benzo(a)anthracene	78	16	ug/kg		1
Benzo(a)pyrene	87	16	ug/kg		1
Benzo(b)fluoranthene	170	16	ug/kg		1
Benzo(g,h,i)perylene	54	16	ug/kg		1
Benzo(k)fluoranthene	53	16	ug/kg		1
Chrysene	99	16	ug/kg		1
Dibenz(a,h)Anthracene	BQL	16	ug/kg	U	1
Fluoranthene	180	16	ug/kg		1
Fluorene	BQL	16	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	60	16	ug/kg		1
Naphthalene	BQL	16	ug/kg	U	1
Phenanthrene	74	16	ug/kg		1
Pyrene	120	16	ug/kg		1

Summary of Analytical Results

Client ID: WBGSD16DL
GPL ID: 407108-005-006-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67933

Analytical Method: SW8270_PAH
Date Analyzed: 07/27/2004
Time Analyzed: 16:28
Analysis Batch: 69829

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	160	ug/kg	U	10
Acenaphthene	BQL	160	ug/kg	U	10
Acenaphthylene	BQL	160	ug/kg	U	10
Anthracene	BQL	160	ug/kg	U	10
Benzo(a)anthracene	BQL	160	ug/kg	U	10
Benzo(a)pyrene	BQL	160	ug/kg	U	10
Benzo(b)fluoranthene	BQL	160	ug/kg	U	10
Benzo(g,h,i)perylene	BQL	160	ug/kg	U	10
Benzo(k)fluoranthene	BQL	160	ug/kg	U	10
Chrysene	BQL	160	ug/kg	U	10
Dibenz(a,h)Anthracene	BQL	160	ug/kg	U	10
Fluoranthene	200	160	ug/kg		10
Fluorene	BQL	160	ug/kg	U	10
Indeno(1,2,3-c,d)Pyrene	BQL	160	ug/kg	U	10
Naphthalene	BQL	160	ug/kg	U	10
Phenanthrene	BQL	160	ug/kg	U	10
Pyrene	BQL	160	ug/kg	U	10

Summary of Analytical Results

Client ID: TMSD16
GPL ID: 407108-006-007-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67933

Analytical Method: SW8270_PAH
Date Analyzed: 07/27/2004
Time Analyzed: 19:23
Analysis Batch: 69829

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	16	ug/kg	U	1
Acenaphthene	29	16	ug/kg		1
Acenaphthylene	BQL	16	ug/kg	U	1
Anthracene	48	16	ug/kg		1
Benzo(a)anthracene	160	16	ug/kg		1
Benzo(a)pyrene	170	16	ug/kg		1
Benzo(b)fluoranthene	290	16	ug/kg		1
Benzo(g,h,i)perylene	95	16	ug/kg		1
Benzo(k)fluoranthene	120	16	ug/kg		1
Chrysene	170	16	ug/kg		1
Dibenz(a,h)Anthracene	BQL	16	ug/kg	U	1
Fluoranthene	390	16	ug/kg		1
Fluorene	26	16	ug/kg		1
Indeno(1,2,3-c,d)Pyrene	96	16	ug/kg		1
Naphthalene	BQL	16	ug/kg	U	1
Phenanthrene	220	16	ug/kg		1
Pyrene	270	16	ug/kg		1

Summary of Analytical Results

Client ID: TMSD16DL
GPL ID: 407108-006-007-1/1
Matrix: SOIL
Date Collected: 07/16/2004
Date Received: 07/17/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67933

Analytical Method: SW8270_PAH
Date Analyzed: 07/27/2004
Time Analyzed: 16:56
Analysis Batch: 69829

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	160	ug/kg	U	10
Acenaphthene	BQL	160	ug/kg	U	10
Acenaphthylene	BQL	160	ug/kg	U	10
Anthracene	BQL	160	ug/kg	U	10
Benzo(a)anthracene	170	160	ug/kg		10
Benzo(a)pyrene	180	160	ug/kg		10
Benzo(b)fluoranthene	250	160	ug/kg		10
Benzo(g,h,i)perylene	BQL	160	ug/kg	U	10
Benzo(k)fluoranthene	BQL	160	ug/kg	U	10
Chrysene	180	160	ug/kg		10
Dibenz(a,h)Anthracene	BQL	160	ug/kg	U	10
Fluoranthene	390	160	ug/kg		10
Fluorene	BQL	160	ug/kg	U	10
Indeno(1,2,3-c,d)Pyrene	BQL	160	ug/kg	U	10
Naphthalene	BQL	160	ug/kg	U	10
Phenanthrene	210	160	ug/kg		10
Pyrene	250	160	ug/kg		10

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ANALYTICAL RESULTS

Project Name : Radford

Date Printed August 5, 2004

GPL ID	Client ID
407108-007-008-1/1	NBGSD02
407108-009-010-1/1	NBGSD04
407108-008-009-1/1	NBSD03
407108-004-005-1/1	TMSB28A
407108-006-007-1/1	TMSD16
407108-006-007-1/1	TMSD16DL
407108-012-013-1/1	TMSW17
407108-001-001-1/2	WBGSB26A
407108-002-003-1/1	WBGSB27A
407108-002-003-1/1	WBGSB27ADL
407108-003-004-1/1	WBGSB28A
407108-005-006-1/1	WBGSD16
407108-005-006-1/1	WBGSD16DL
407108-010-011-1/1	WBGSW16
407108-011-012-1/1	WBGSW17

Analytical Report For 407135

for

Shaw Environmental & Infrastructure

Project Manager : Eric Malarek

Project Name : Radford

August 5, 2004

GPL

Laboratories

GPL Laboratories, LLLP Certifies that the test results meet all requirements of the NELAC Standards unless otherwise noted.

Reviewed by, Project Manager	Approved by, Laboratory Director

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Summary of Analytical Results

Client ID: 071904R1
GPL ID: 407135-001-001-1/1
Matrix: WATER
Date Collected: 07/19/2004
Date Received: 07/21/2004

Prep Method: SW3010A
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67923

Analytical Method: SW6010B
Date Analyzed: 08/05/2004
Time Analyzed: 01:37
Analysis Batch: 17287

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	20.7	200	ug/L	BN	1
Antimony	6.9	20	ug/L	B	1
Arsenic	BQL	20	ug/L	U	1
Barium	0.24	5	ug/L	B	1
Beryllium	BQL	2	ug/L	U	1
Cadmium	BQL	6	ug/L	U	1
Calcium	BQL	1000	ug/L	U	1
Chromium	BQL	5	ug/L	U	1
Cobalt	1.3	5	ug/L	B	1
Copper	BQL	10	ug/L	U	1
Iron	BQL	150	ug/L	U	1
Lead	BQL	10	ug/L	U	1
Magnesium	24.2	250	ug/L	B	1
Manganese	0.74	5	ug/L	B	1
Nickel	BQL	10	ug/L	U	1
Potassium	BQL	250	ug/L	UNE	1
Selenium	BQL	20	ug/L	U	1
Silver	BQL	3	ug/L	U	1
Sodium	567	2500	ug/L	B	1
Thallium	BQL	30	ug/L	U	1
Vanadium	1.3	10	ug/L	B	1
Zinc	BQL	20	ug/L	U	1

Summary of Analytical Results

Client ID: 071904R2
GPL ID: 407135-002-002-1/1
Matrix: WATER
Date Collected: 07/19/2004
Date Received: 07/21/2004

Prep Method: SW3010A
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67923

Analytical Method: SW6010B
Date Analyzed: 08/05/2004
Time Analyzed: 01:45
Analysis Batch: 17287

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	21.4	200	ug/L	BN	1
Antimony	BQL	20	ug/L	U	1
Arsenic	BQL	20	ug/L	U	1
Barium	0.48	5	ug/L	B	1
Beryllium	BQL	2	ug/L	U	1
Cadmium	BQL	6	ug/L	U	1
Calcium	103	1000	ug/L	B	1
Chromium	BQL	5	ug/L	U	1
Cobalt	0.85	5	ug/L	B	1
Copper	5.1	10	ug/L	B	1
Iron	26.4	150	ug/L	B	1
Lead	BQL	10	ug/L	U	1
Magnesium	35.9	250	ug/L	B	1
Manganese	1.4	5	ug/L	B	1
Nickel	BQL	10	ug/L	U	1
Potassium	44	250	ug/L	BNE	1
Selenium	4.4	20	ug/L	B	1
Silver	1.2	3	ug/L	B	1
Sodium	BQL	2500	ug/L	U	1
Thallium	BQL	30	ug/L	U	1
Vanadium	BQL	10	ug/L	U	1
Zinc	BQL	20	ug/L	U	1

Summary of Analytical Results

Client ID: 072004R1
GPL ID: 407135-003-003-1/1
Matrix: WATER
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3010A
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67923

Analytical Method: SW6010B
Date Analyzed: 08/05/2004
Time Analyzed: 01:52
Analysis Batch: 17287

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	BQL	200	ug/L	UN	1
Antimony	BQL	20	ug/L	U	1
Arsenic	BQL	20	ug/L	U	1
Barium	0.42	5	ug/L	B	1
Beryllium	BQL	2	ug/L	U	1
Cadmium	BQL	6	ug/L	U	1
Calcium	108	1000	ug/L	B	1
Chromium	1.2	5	ug/L	B	1
Cobalt	BQL	5	ug/L	U	1
Copper	BQL	10	ug/L	U	1
Iron	BQL	150	ug/L	U	1
Lead	BQL	10	ug/L	U	1
Magnesium	26.1	250	ug/L	B	1
Manganese	1.8	5	ug/L	B	1
Nickel	BQL	10	ug/L	U	1
Potassium	BQL	250	ug/L	UNE	1
Selenium	BQL	20	ug/L	U	1
Silver	1.2	3	ug/L	B	1
Sodium	373	2500	ug/L	B	1
Thallium	BQL	30	ug/L	U	1
Vanadium	0.89	10	ug/L	B	1
Zinc	BQL	20	ug/L	U	1

Summary of Analytical Results

Client ID: 072004R3
GPL ID: 407135-004-004-1/1
Matrix: WATER
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3010A
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67923

Analytical Method: SW6010B
Date Analyzed: 08/05/2004
Time Analyzed: 02:00
Analysis Batch: 17287

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	25.1	200	ug/L	BN	1
Antimony	4.9	20	ug/L	B	1
Arsenic	BQL	20	ug/L	U	1
Barium	BQL	5	ug/L	U	1
Beryllium	BQL	2	ug/L	U	1
Cadmium	BQL	6	ug/L	U	1
Calcium	78.3	1000	ug/L	B	1
Chromium	1.1	5	ug/L	B	1
Cobalt	0.64	5	ug/L	B	1
Copper	BQL	10	ug/L	U	1
Iron	BQL	150	ug/L	U	1
Lead	1.8	10	ug/L	B	1
Magnesium	14.2	250	ug/L	B	1
Manganese	1.6	5	ug/L	B	1
Nickel	BQL	10	ug/L	U	1
Potassium	BQL	250	ug/L	UNE	1
Selenium	BQL	20	ug/L	U	1
Silver	0.73	3	ug/L	B	1
Sodium	499	2500	ug/L	B	1
Thallium	BQL	30	ug/L	U	1
Vanadium	BQL	10	ug/L	U	1
Zinc	BQL	20	ug/L	U	1

Summary of Analytical Results

Client ID: 071904R1
GPL ID: 407135-001-001-1/1
Matrix: WATER
Date Collected: 07/19/2004
Date Received: 07/21/2004

Prep Method: SW7470A_DIG
Prep Date: 08/04/2004
Prep Time: 15:00
Prep Batch: 68091

Analytical Method: SW7470A
Date Analyzed: 08/05/2004
Time Analyzed: 12:25
Analysis Batch: 17287

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	BQL	.2	ug/L	U	1

GPL LABORATORIES, LLLP

Summary of Analytical Results

Client ID: 071904R2
GPL ID: 407135-002-002-1/1
Matrix: WATER
Date Collected: 07/19/2004
Date Received: 07/21/2004

Prep Method: SW7470A_DIG
Prep Date: 08/04/2004
Prep Time: 15:00
Prep Batch: 68091

Analytical Method: SW7470A
Date Analyzed: 08/05/2004
Time Analyzed: 12:28
Analysis Batch: 17287

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	BQL	.2	ug/L	U	1

Summary of Analytical Results

Client ID: 072004R1
GPL ID: 407135-003-003-1/1
Matrix: WATER
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7470A_DIG
Prep Date: 08/04/2004
Prep Time: 15:00
Prep Batch: 68091

Analytical Method: SW7470A
Date Analyzed: 08/05/2004
Time Analyzed: 12:31
Analysis Batch: 17287

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	BQL	.2	ug/L	U	1

Summary of Analytical Results

Client ID: 072004R3
GPL ID: 407135-004-004-1/1
Matrix: WATER
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7470A_DIG
Prep Date: 08/04/2004
Prep Time: 15:00
Prep Batch: 68091

Analytical Method: SW7470A
Date Analyzed: 08/05/2004
Time Analyzed: 12:34
Analysis Batch: 17287

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	BQL	.2	ug/L	U	1

Summary of Analytical Results

Client ID: 071904R1
GPL ID: 407135-001-007-1/2
Matrix: WATER
Date Collected: 07/19/2004
Date Received: 07/21/2004

Prep Method: SW3520C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67909

Analytical Method: SW8082
Date Analyzed: 07/28/2004
Time Analyzed: 02:10
Analysis Batch: 69982

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	1.0	ug/L	U	1
PCB-1221	BQL	1.0	ug/L	U	1
PCB-1232	BQL	1.0	ug/L	U	1
PCB-1242	BQL	1.0	ug/L	U	1
PCB-1248	BQL	1.0	ug/L	U	1
PCB-1254	BQL	1.0	ug/L	U	1
PCB-1260	BQL	1.0	ug/L	U	1

Summary of Analytical Results

Client ID: 071904R2
GPL ID: 407135-002-009-1/2
Matrix: WATER
Date Collected: 07/19/2004
Date Received: 07/21/2004

Prep Method: SW3520C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67909

Analytical Method: SW8082
Date Analyzed: 07/28/2004
Time Analyzed: 02:39
Analysis Batch: 69982

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	1.0	ug/L	U	1
PCB-1221	BQL	1.0	ug/L	U	1
PCB-1232	BQL	1.0	ug/L	U	1
PCB-1242	BQL	1.0	ug/L	U	1
PCB-1248	BQL	1.0	ug/L	U	1
PCB-1254	BQL	1.0	ug/L	U	1
PCB-1260	BQL	1.0	ug/L	U	1

Summary of Analytical Results

Client ID: 072004R1
GPL ID: 407135-003-011-1/2
Matrix: WATER
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3520C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67909

Analytical Method: SW8082
Date Analyzed: 07/28/2004
Time Analyzed: 03:08
Analysis Batch: 69982

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	1.1	ug/L	U	1
PCB-1221	BQL	1.1	ug/L	U	1
PCB-1232	BQL	1.1	ug/L	U	1
PCB-1242	BQL	1.1	ug/L	U	1
PCB-1248	BQL	1.1	ug/L	U	1
PCB-1254	BQL	1.1	ug/L	U	1
PCB-1260	BQL	1.1	ug/L	U	1

Summary of Analytical Results

Client ID: 072004R3
GPL ID: 407135-004-013-1/2
Matrix: WATER
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3520C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67909

Analytical Method: SW8082
Date Analyzed: 07/28/2004
Time Analyzed: 03:37
Analysis Batch: 69982

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	1.0	ug/L	U	1
PCB-1221	BQL	1.0	ug/L	U	1
PCB-1232	BQL	1.0	ug/L	U	1
PCB-1242	BQL	1.0	ug/L	U	1
PCB-1248	BQL	1.0	ug/L	U	1
PCB-1254	BQL	1.0	ug/L	U	1
PCB-1260	BQL	1.0	ug/L	U	1

Summary of Analytical Results

Client ID: 071904R2
GPL ID: 407135-002-005-1/2
Matrix: WATER
Date Collected: 07/19/2004
Date Received: 07/21/2004

Prep Method: SW3520C-LL
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67900

Analytical Method: SW8270_PAH
Date Analyzed: 07/26/2004
Time Analyzed: 20:36
Analysis Batch: 69827

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	0.20	ug/L	U	1
Acenaphthene	BQL	0.20	ug/L	U	1
Acenaphthylene	BQL	0.20	ug/L	U	1
Anthracene	BQL	0.20	ug/L	U	1
Benzo(a)anthracene	BQL	0.20	ug/L	U	1
Benzo(a)pyrene	BQL	0.20	ug/L	U	1
Benzo(b)fluoranthene	BQL	0.20	ug/L	U	1
Benzo(g,h,i)perylene	BQL	0.20	ug/L	U	1
Benzo(k)fluoranthene	BQL	0.20	ug/L	U	1
Chrysene	BQL	0.20	ug/L	U	1
Dibenz(a,h)Anthracene	BQL	0.20	ug/L	U	1
Fluoranthene	BQL	0.20	ug/L	U	1
Fluorene	BQL	0.20	ug/L	U	1
Indeno(1,2,3-c,d)Pyrene	BQL	0.20	ug/L	U	1
Naphthalene	BQL	0.20	ug/L	U	1
Phenanthrene	BQL	0.20	ug/L	U	1
Pyrene	BQL	0.20	ug/L	U	1

GPL LABORATORIES, LLP
ANALYTICAL RESULTS

Project Name : Radford

Date Printed August 5, 2004

GPL ID	Client ID
407135-001-001-1/1	071904R1
407135-001-007-1/2	071904R1
407135-002-002-1/1	071904R2
407135-002-005-1/2	071904R2
407135-002-009-1/2	071904R2
407135-003-003-1/1	072004R1
407135-003-011-1/2	072004R1
407135-004-004-1/1	072004R3
407135-004-013-1/2	072004R3

Analytical Report For 407137

for

Shaw Environmental & Infrastructure

Project Manager : Eric Malarek

Project Name : Radford

August 5, 2004

GPL

Laboratories

GPL Laboratories, LLLP Certifies that the test results meet all requirements of the NELAC Standards unless otherwise noted.

Reviewed by, Project Manager	Approved by, Laboratory Director

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Summary of Analytical Results

Client ID: DTSB85A
GPL ID: 407137-006-007-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/21/2004
Time Analyzed: 16:00
Analysis Batch: 69651

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	76	1.0	%		1

Summary of Analytical Results

Client ID: DTSB81A
GPL ID: 407137-007-008-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/21/2004
Time Analyzed: 16:00
Analysis Batch: 69651

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	73	1.0	%		1

Summary of Analytical Results

Client ID: DTSB82A
GPL ID: 407137-008-009-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/21/2004
Time Analyzed: 16:00
Analysis Batch: 69651

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	79	1.0	%		1

Summary of Analytical Results

Client ID: DTSB83A
GPL ID: 407137-010-011-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/21/2004
Time Analyzed: 16:00
Analysis Batch: 69651

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	79	1.0	%		1

Summary of Analytical Results

Client ID: DTSB84A
GPL ID: 407137-011-012-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/21/2004
Time Analyzed: 16:00
Analysis Batch: 69651

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	78	1.0	%		1

Summary of Analytical Results

Client ID: DTSB87A
GPL ID: 407137-012-013-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/21/2004
Time Analyzed: 16:00
Analysis Batch: 69651

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	83	1.0	%		1

Summary of Analytical Results

Client ID: DTSB86A
GPL ID: 407137-013-014-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/21/2004
Time Analyzed: 16:00
Analysis Batch: 69651

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	81	1.0	%		1

Summary of Analytical Results

Client ID: DTSB88A
GPL ID: 407137-014-015-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/21/2004
Time Analyzed: 16:00
Analysis Batch: 69651

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	80	1.0	%		1

Summary of Analytical Results

Client ID: DTSB80A
GPL ID: 407137-015-016-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/21/2004
Time Analyzed: 16:00
Analysis Batch: 69651

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	82	1.0	%		1

Summary of Analytical Results

Client ID: DTSB85A
GPL ID: 407137-006-007-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3550-LL
Prep Date: 07/21/2004
Prep Time: 00:00
Prep Batch: 67842

Analytical Method: SW8270_PAH
Date Analyzed: 07/21/2004
Time Analyzed: 17:32
Analysis Batch: 69659

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	8.8	ug/kg	U	1
Acenaphthene	BQL	8.8	ug/kg	U	1
Acenaphthylene	BQL	8.8	ug/kg	U	1
Anthracene	BQL	8.8	ug/kg	U	1
Benzo(a)anthracene	BQL	8.8	ug/kg	U	1
Benzo(a)pyrene	BQL	8.8	ug/kg	U	1
Benzo(b)fluoranthene	BQL	8.8	ug/kg	U	1
Benzo(g,h,i)perylene	BQL	8.8	ug/kg	U	1
Benzo(k)fluoranthene	BQL	8.8	ug/kg	U	1
Chrysene	BQL	8.8	ug/kg	U	1
Dibenz(a,h)Anthracene	BQL	8.8	ug/kg	U	1
Fluoranthene	BQL	8.8	ug/kg	U	1
Fluorene	BQL	8.8	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	BQL	8.8	ug/kg	U	1
Naphthalene	BQL	8.8	ug/kg	U	1
Phenanthrene	BQL	8.8	ug/kg	U	1
Pyrene	BQL	8.8	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB81A
GPL ID: 407137-007-008-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3550-LL
Prep Date: 07/21/2004
Prep Time: 00:00
Prep Batch: 67842

Analytical Method: SW8270_PAH
Date Analyzed: 07/21/2004
Time Analyzed: 20:54
Analysis Batch: 69659

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	9.1	ug/kg	U	1
Acenaphthene	BQL	9.1	ug/kg	U	1
Acenaphthylene	20	9.1	ug/kg		1
Anthracene	56	9.1	ug/kg		1
Benzo(a)anthracene	110	9.1	ug/kg		1
Benzo(a)pyrene	93	9.1	ug/kg		1
Benzo(b)fluoranthene	220	9.1	ug/kg		1
Benzo(g,h,i)perylene	71	9.1	ug/kg		1
Benzo(k)fluoranthene	69	9.1	ug/kg		1
Chrysene	130	9.1	ug/kg		1
Dibenz(a,h)Anthracene	BQL	9.1	ug/kg	U	1
Fluoranthene	210	9.1	ug/kg		1
Fluorene	BQL	9.1	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	69	9.1	ug/kg		1
Naphthalene	BQL	9.1	ug/kg	U	1
Phenanthrene	73	9.1	ug/kg		1
Pyrene	160	9.1	ug/kg		1

Summary of Analytical Results

Client ID: DTSB82A
GPL ID: 407137-008-009-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3550-LL
Prep Date: 07/21/2004
Prep Time: 00:00
Prep Batch: 67842

Analytical Method: SW8270_PAH
Date Analyzed: 07/21/2004
Time Analyzed: 18:01
Analysis Batch: 69659

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	8.5	ug/kg	U	1
Acenaphthene	BQL	8.5	ug/kg	U	1
Acenaphthylene	BQL	8.5	ug/kg	U	1
Anthracene	BQL	8.5	ug/kg	U	1
Benzo(a)anthracene	BQL	8.5	ug/kg	U	1
Benzo(a)pyrene	BQL	8.5	ug/kg	U	1
Benzo(b)fluoranthene	BQL	8.5	ug/kg	U	1
Benzo(g,h,i)perylene	BQL	8.5	ug/kg	U	1
Benzo(k)fluoranthene	BQL	8.5	ug/kg	U	1
Chrysene	BQL	8.5	ug/kg	U	1
Dibenz(a,h)Anthracene	BQL	8.5	ug/kg	U	1
Fluoranthene	BQL	8.5	ug/kg	U	1
Fluorene	BQL	8.5	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	BQL	8.5	ug/kg	U	1
Naphthalene	BQL	8.5	ug/kg	U	1
Phenanthrene	BQL	8.5	ug/kg	U	1
Pyrene	BQL	8.5	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB83A
GPL ID: 407137-010-011-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3550-LL
Prep Date: 07/21/2004
Prep Time: 00:00
Prep Batch: 67842

Analytical Method: SW8270_PAH
Date Analyzed: 07/21/2004
Time Analyzed: 18:29
Analysis Batch: 69659

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	8.5	ug/kg	U	1
Acenaphthene	BQL	8.5	ug/kg	U	1
Acenaphthylene	BQL	8.5	ug/kg	U	1
Anthracene	BQL	8.5	ug/kg	U	1
Benzo(a)anthracene	14	8.5	ug/kg		1
Benzo(a)pyrene	11	8.5	ug/kg		1
Benzo(b)fluoranthene	17	8.5	ug/kg		1
Benzo(g,h,i)perylene	BQL	8.5	ug/kg	U	1
Benzo(k)fluoranthene	BQL	8.5	ug/kg	U	1
Chrysene	14	8.5	ug/kg		1
Dibenz(a,h)Anthracene	BQL	8.5	ug/kg	U	1
Fluoranthene	37	8.5	ug/kg		1
Fluorene	BQL	8.5	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	BQL	8.5	ug/kg	U	1
Naphthalene	BQL	8.5	ug/kg	U	1
Phenanthrene	26	8.5	ug/kg		1
Pyrene	22	8.5	ug/kg		1

Summary of Analytical Results

Client ID: DTSB84A
GPL ID: 407137-011-012-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3550-LL
Prep Date: 07/21/2004
Prep Time: 00:00
Prep Batch: 67842

Analytical Method: SW8270_PAH
Date Analyzed: 07/21/2004
Time Analyzed: 18:58
Analysis Batch: 69659

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	8.6	ug/kg	U	1
Acenaphthene	BQL	8.6	ug/kg	U	1
Acenaphthylene	BQL	8.6	ug/kg	U	1
Anthracene	BQL	8.6	ug/kg	U	1
Benzo(a)anthracene	BQL	8.6	ug/kg	U	1
Benzo(a)pyrene	BQL	8.6	ug/kg	U	1
Benzo(b)fluoranthene	BQL	8.6	ug/kg	U	1
Benzo(g,h,i)perylene	BQL	8.6	ug/kg	U	1
Benzo(k)fluoranthene	BQL	8.6	ug/kg	U	1
Chrysene	BQL	8.6	ug/kg	U	1
Dibenz(a,h)Anthracene	BQL	8.6	ug/kg	U	1
Fluoranthene	BQL	8.6	ug/kg	U	1
Fluorene	BQL	8.6	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	BQL	8.6	ug/kg	U	1
Naphthalene	BQL	8.6	ug/kg	U	1
Phenanthrene	BQL	8.6	ug/kg	U	1
Pyrene	BQL	8.6	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB87A
GPL ID: 407137-012-013-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3550-LL
Prep Date: 07/21/2004
Prep Time: 00:00
Prep Batch: 67842

Analytical Method: SW8270_PAH
Date Analyzed: 07/21/2004
Time Analyzed: 19:27
Analysis Batch: 69659

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	8.1	ug/kg	U	1
Acenaphthene	BQL	8.1	ug/kg	U	1
Acenaphthylene	BQL	8.1	ug/kg	U	1
Anthracene	BQL	8.1	ug/kg	U	1
Benzo(a)anthracene	9.7	8.1	ug/kg		1
Benzo(a)pyrene	10	8.1	ug/kg		1
Benzo(b)fluoranthene	18	8.1	ug/kg		1
Benzo(g,h,i)perylene	8.5	8.1	ug/kg		1
Benzo(k)fluoranthene	BQL	8.1	ug/kg	U	1
Chrysene	11	8.1	ug/kg		1
Dibenz(a,h)Anthracene	BQL	8.1	ug/kg	U	1
Fluoranthene	23	8.1	ug/kg		1
Fluorene	BQL	8.1	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	BQL	8.1	ug/kg	U	1
Naphthalene	BQL	8.1	ug/kg	U	1
Phenanthrene	8.5	8.1	ug/kg		1
Pyrene	15	8.1	ug/kg		1

Summary of Analytical Results

Client ID: DTSB86A
GPL ID: 407137-013-014-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3550-LL
Prep Date: 07/21/2004
Prep Time: 00:00
Prep Batch: 67842

Analytical Method: SW8270_PAH
Date Analyzed: 07/21/2004
Time Analyzed: 19:56
Analysis Batch: 69659

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	8.2	ug/kg	U	1
Acenaphthene	BQL	8.2	ug/kg	U	1
Acenaphthylene	BQL	8.2	ug/kg	U	1
Anthracene	BQL	8.2	ug/kg	U	1
Benzo(a)anthracene	23	8.2	ug/kg		1
Benzo(a)pyrene	25	8.2	ug/kg		1
Benzo(b)fluoranthene	45	8.2	ug/kg		1
Benzo(g,h,i)perylene	20	8.2	ug/kg		1
Benzo(k)fluoranthene	14	8.2	ug/kg		1
Chrysene	27	8.2	ug/kg		1
Dibenz(a,h)Anthracene	BQL	8.2	ug/kg	U	1
Fluoranthene	61	8.2	ug/kg		1
Fluorene	BQL	8.2	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	19	8.2	ug/kg		1
Naphthalene	BQL	8.2	ug/kg	U	1
Phenanthrene	21	8.2	ug/kg		1
Pyrene	40	8.2	ug/kg		1

Summary of Analytical Results

Client ID: DTSB88A
GPL ID: 407137-014-015-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3550-LL
Prep Date: 07/21/2004
Prep Time: 00:00
Prep Batch: 67842

Analytical Method: SW8270_PAH
Date Analyzed: 07/21/2004
Time Analyzed: 20:25
Analysis Batch: 69659

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	8.3	ug/kg	U	1
Acenaphthene	BQL	8.3	ug/kg	U	1
Acenaphthylene	BQL	8.3	ug/kg	U	1
Anthracene	15	8.3	ug/kg		1
Benzo(a)anthracene	61	8.3	ug/kg		1
Benzo(a)pyrene	52	8.3	ug/kg		1
Benzo(b)fluoranthene	84	8.3	ug/kg		1
Benzo(g,h,i)perylene	38	8.3	ug/kg		1
Benzo(k)fluoranthene	24	8.3	ug/kg		1
Chrysene	51	8.3	ug/kg		1
Dibenz(a,h)Anthracene	BQL	8.3	ug/kg	U	1
Fluoranthene	150	8.3	ug/kg		1
Fluorene	BQL	8.3	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	36	8.3	ug/kg		1
Naphthalene	BQL	8.3	ug/kg	U	1
Phenanthrene	76	8.3	ug/kg		1
Pyrene	94	8.3	ug/kg		1

Summary of Analytical Results

Client ID: DTSB80A
GPL ID: 407137-015-016-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3550-LL
Prep Date: 07/21/2004
Prep Time: 00:00
Prep Batch: 67842

Analytical Method: SW8270_PAH
Date Analyzed: 07/21/2004
Time Analyzed: 21:22
Analysis Batch: 69659

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	8.1	ug/kg	U	1
Acenaphthene	BQL	8.1	ug/kg	U	1
Acenaphthylene	BQL	8.1	ug/kg	U	1
Anthracene	BQL	8.1	ug/kg	U	1
Benzo(a)anthracene	24	8.1	ug/kg		1
Benzo(a)pyrene	24	8.1	ug/kg		1
Benzo(b)fluoranthene	41	8.1	ug/kg		1
Benzo(g,h,i)perylene	18	8.1	ug/kg		1
Benzo(k)fluoranthene	8.5	8.1	ug/kg		1
Chrysene	24	8.1	ug/kg		1
Dibenz(a,h)Anthracene	BQL	8.1	ug/kg	U	1
Fluoranthene	50	8.1	ug/kg		1
Fluorene	BQL	8.1	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	17	8.1	ug/kg		1
Naphthalene	BQL	8.1	ug/kg	U	1
Phenanthrene	22	8.1	ug/kg		1
Pyrene	35	8.1	ug/kg		1

GPL LABORATORIES, LLP
ANALYTICAL RESULTS

Project Name : Radford

Date Printed August 5, 2004

GPL ID	Client ID
407137-015-016-1/1	DTSB80A
407137-007-008-1/1	DTSB81A
407137-008-009-1/1	DTSB82A
407137-010-011-1/1	DTSB83A
407137-011-012-1/1	DTSB84A
407137-006-007-1/1	DTSB85A
407137-013-014-1/1	DTSB86A
407137-012-013-1/1	DTSB87A
407137-014-015-1/1	DTSB88A

Analytical Report For 407138

for

Shaw Environmental & Infrastructure

Project Manager : Eric Malarek

Project Name : Radford

August 5, 2004

GPL

Laboratories

GPL Laboratories, LLLP Certifies that the test results meet all requirements of the NELAC Standards unless otherwise noted.

Reviewed by, Project Manager	Approved by, Laboratory Director

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Summary of Analytical Results

Client ID: NBGSB20A
GPL ID: 407138-001-001-1/2
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	84	1.0	%		1

Summary of Analytical Results

Client ID: NBGSB20B
GPL ID: 407138-002-003-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	78	1.0	%		1

Summary of Analytical Results

Client ID: NBGSB20C
GPL ID: 407138-003-004-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	72	1.0	%		1

Summary of Analytical Results

Client ID: TMSB20C
GPL ID: 407138-004-005-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	72	1.0	%		1

Summary of Analytical Results

Client ID: NBGSB20D
GPL ID: 407138-005-006-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	70	1.0	%		1

Summary of Analytical Results

Client ID: NBGSB21A
GPL ID: 407138-006-007-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	83	1.0	%		1

Summary of Analytical Results

Client ID: NBGSB21B
GPL ID: 407138-007-008-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	81	1.0	%		1

Summary of Analytical Results

Client ID: NBGSB21C
GPL ID: 407138-008-009-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	84	1.0	%		1

Summary of Analytical Results

Client ID: NBGSB21D
GPL ID: 407138-009-010-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	76	1.0	%		1

Summary of Analytical Results

Client ID: NBGSB22A
GPL ID: 407138-010-011-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	83	1.0	%		1

Summary of Analytical Results

Client ID: NBGSB22B
GPL ID: 407138-011-012-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	85	1.0	%		1

Summary of Analytical Results

Client ID: TMSB22B
GPL ID: 407138-012-013-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	85	1.0	%		1

Summary of Analytical Results

Client ID: NBGSB25B
GPL ID: 407138-013-014-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	89	1.0	%		1

Summary of Analytical Results

Client ID: NBGSB25C
GPL ID: 407138-014-015-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	84	1.0	%		1

Summary of Analytical Results

Client ID: NBGSB25D
GPL ID: 407138-015-016-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	83	1.0	%		1

Summary of Analytical Results

Client ID: NBGSB20A
GPL ID: 407138-001-001-1/2
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/23/2004
Prep Time: 00:00
Prep Batch: 67908

Analytical Method: SW8082
Date Analyzed: 07/31/2004
Time Analyzed: 13:33
Analysis Batch: 69980

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	40	ug/kg	U	1
PCB-1221	BQL	40	ug/kg	U	1
PCB-1232	BQL	40	ug/kg	U	1
PCB-1242	BQL	40	ug/kg	U	1
PCB-1248	BQL	40	ug/kg	U	1
PCB-1254	230	40	ug/kg		1
PCB-1260	BQL	40	ug/kg	U	1

Summary of Analytical Results

Client ID: NBGSB20B
GPL ID: 407138-002-003-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/23/2004
Prep Time: 00:00
Prep Batch: 67908

Analytical Method: SW8082
Date Analyzed: 07/27/2004
Time Analyzed: 09:46
Analysis Batch: 69980

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	43	ug/kg	U	1
PCB-1221	BQL	43	ug/kg	U	1
PCB-1232	BQL	43	ug/kg	U	1
PCB-1242	BQL	43	ug/kg	U	1
PCB-1248	BQL	43	ug/kg	U	1
PCB-1254	BQL	43	ug/kg	U	1
PCB-1260	BQL	43	ug/kg	U	1

Summary of Analytical Results

Client ID: NBGSB20C
GPL ID: 407138-003-004-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/23/2004
Prep Time: 00:00
Prep Batch: 67908

Analytical Method: SW8082
Date Analyzed: 07/27/2004
Time Analyzed: 10:15
Analysis Batch: 69980

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	46	ug/kg	U	1
PCB-1221	BQL	46	ug/kg	U	1
PCB-1232	BQL	46	ug/kg	U	1
PCB-1242	BQL	46	ug/kg	U	1
PCB-1248	BQL	46	ug/kg	U	1
PCB-1254	BQL	46	ug/kg	U	1
PCB-1260	BQL	46	ug/kg	U	1

Summary of Analytical Results

Client ID: TMSB20C
GPL ID: 407138-004-005-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/23/2004
Prep Time: 00:00
Prep Batch: 67908

Analytical Method: SW8082
Date Analyzed: 07/27/2004
Time Analyzed: 10:44
Analysis Batch: 69980

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	46	ug/kg	U	1
PCB-1221	BQL	46	ug/kg	U	1
PCB-1232	BQL	46	ug/kg	U	1
PCB-1242	BQL	46	ug/kg	U	1
PCB-1248	BQL	46	ug/kg	U	1
PCB-1254	BQL	46	ug/kg	U	1
PCB-1260	BQL	46	ug/kg	U	1

Summary of Analytical Results

Client ID: NBGSB20D
GPL ID: 407138-005-006-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/23/2004
Prep Time: 00:00
Prep Batch: 67908

Analytical Method: SW8082
Date Analyzed: 07/27/2004
Time Analyzed: 11:13
Analysis Batch: 69980

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	48	ug/kg	U	1
PCB-1221	BQL	48	ug/kg	U	1
PCB-1232	BQL	48	ug/kg	U	1
PCB-1242	BQL	48	ug/kg	U	1
PCB-1248	BQL	48	ug/kg	U	1
PCB-1254	BQL	48	ug/kg	U	1
PCB-1260	BQL	48	ug/kg	U	1

Summary of Analytical Results

Client ID: NBGSB21A DL
GPL ID: 407138-006-007-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/23/2004
Prep Time: 00:00
Prep Batch: 67908

Analytical Method: SW8082
Date Analyzed: 07/31/2004
Time Analyzed: 14:02
Analysis Batch: 69980

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	160	ug/kg	U	4
PCB-1221	BQL	160	ug/kg	U	4
PCB-1232	BQL	160	ug/kg	U	4
PCB-1242	BQL	160	ug/kg	U	4
PCB-1248	BQL	160	ug/kg	U	4
PCB-1254	1300	160	ug/kg		4
PCB-1260	BQL	160	ug/kg	U	4

Summary of Analytical Results

Client ID: NBGSB21B
GPL ID: 407138-007-008-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/23/2004
Prep Time: 00:00
Prep Batch: 67908

Analytical Method: SW8082
Date Analyzed: 07/27/2004
Time Analyzed: 12:11
Analysis Batch: 69980

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	41	ug/kg	U	1
PCB-1221	BQL	41	ug/kg	U	1
PCB-1232	BQL	41	ug/kg	U	1
PCB-1242	BQL	41	ug/kg	U	1
PCB-1248	BQL	41	ug/kg	U	1
PCB-1254	BQL	41	ug/kg	U	1
PCB-1260	BQL	41	ug/kg	U	1

Summary of Analytical Results

Client ID: NBGSB21C
GPL ID: 407138-008-009-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/23/2004
Prep Time: 00:00
Prep Batch: 67908

Analytical Method: SW8082
Date Analyzed: 07/31/2004
Time Analyzed: 14:31
Analysis Batch: 69980

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	40	ug/kg	U	1
PCB-1221	BQL	40	ug/kg	U	1
PCB-1232	BQL	40	ug/kg	U	1
PCB-1242	BQL	40	ug/kg	U	1
PCB-1248	BQL	40	ug/kg	U	1
PCB-1254	180	40	ug/kg		1
PCB-1260	BQL	40	ug/kg	U	1

Summary of Analytical Results

Client ID: NBGSB21D
GPL ID: 407138-009-010-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/23/2004
Prep Time: 00:00
Prep Batch: 67908

Analytical Method: SW8082
Date Analyzed: 07/27/2004
Time Analyzed: 13:09
Analysis Batch: 69980

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	44	ug/kg	U	1
PCB-1221	BQL	44	ug/kg	U	1
PCB-1232	BQL	44	ug/kg	U	1
PCB-1242	BQL	44	ug/kg	U	1
PCB-1248	BQL	44	ug/kg	U	1
PCB-1254	BQL	44	ug/kg	U	1
PCB-1260	BQL	44	ug/kg	U	1

Summary of Analytical Results

Client ID: NBGSB22A DL
GPL ID: 407138-010-011-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/23/2004
Prep Time: 00:00
Prep Batch: 67908

Analytical Method: SW8082
Date Analyzed: 07/31/2004
Time Analyzed: 16:19
Analysis Batch: 69980

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	810	ug/kg	U	20
PCB-1221	BQL	810	ug/kg	U	20
PCB-1232	BQL	810	ug/kg	U	20
PCB-1242	BQL	810	ug/kg	U	20
PCB-1248	BQL	810	ug/kg	U	20
PCB-1254	4600	810	ug/kg		20
PCB-1260	BQL	810	ug/kg	U	20

Summary of Analytical Results

Client ID: NBGSB22B
GPL ID: 407138-011-012-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/23/2004
Prep Time: 00:00
Prep Batch: 67908

Analytical Method: SW8082
Date Analyzed: 07/27/2004
Time Analyzed: 14:07
Analysis Batch: 69980

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	39	ug/kg	U	1
PCB-1221	BQL	39	ug/kg	U	1
PCB-1232	BQL	39	ug/kg	U	1
PCB-1242	BQL	39	ug/kg	U	1
PCB-1248	BQL	39	ug/kg	U	1
PCB-1254	BQL	39	ug/kg	U	1
PCB-1260	BQL	39	ug/kg	U	1

Summary of Analytical Results

Client ID: TMSB22B
GPL ID: 407138-012-013-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/23/2004
Prep Time: 00:00
Prep Batch: 67908

Analytical Method: SW8082
Date Analyzed: 07/27/2004
Time Analyzed: 16:03
Analysis Batch: 69980

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	39	ug/kg	U	1
PCB-1221	BQL	39	ug/kg	U	1
PCB-1232	BQL	39	ug/kg	U	1
PCB-1242	BQL	39	ug/kg	U	1
PCB-1248	BQL	39	ug/kg	U	1
PCB-1254	BQL	39	ug/kg	U	1
PCB-1260	BQL	39	ug/kg	U	1

Summary of Analytical Results

Client ID: NBGSB25B
GPL ID: 407138-013-014-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/23/2004
Prep Time: 00:00
Prep Batch: 67908

Analytical Method: SW8082
Date Analyzed: 07/27/2004
Time Analyzed: 16:32
Analysis Batch: 69980

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	37	ug/kg	U	1
PCB-1221	BQL	37	ug/kg	U	1
PCB-1232	BQL	37	ug/kg	U	1
PCB-1242	BQL	37	ug/kg	U	1
PCB-1248	BQL	37	ug/kg	U	1
PCB-1254	BQL	37	ug/kg	U	1
PCB-1260	BQL	37	ug/kg	U	1

Summary of Analytical Results

Client ID: NBGSB25C
GPL ID: 407138-014-015-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/23/2004
Prep Time: 00:00
Prep Batch: 67908

Analytical Method: SW8082
Date Analyzed: 07/27/2004
Time Analyzed: 17:01
Analysis Batch: 69980

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	40	ug/kg	U	1
PCB-1221	BQL	40	ug/kg	U	1
PCB-1232	BQL	40	ug/kg	U	1
PCB-1242	BQL	40	ug/kg	U	1
PCB-1248	BQL	40	ug/kg	U	1
PCB-1254	BQL	40	ug/kg	U	1
PCB-1260	BQL	40	ug/kg	U	1

Summary of Analytical Results

Client ID: NBGSB25D
GPL ID: 407138-015-016-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/23/2004
Prep Time: 00:00
Prep Batch: 67908

Analytical Method: SW8082
Date Analyzed: 07/27/2004
Time Analyzed: 17:30
Analysis Batch: 69980

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	40	ug/kg	U	1
PCB-1221	BQL	40	ug/kg	U	1
PCB-1232	BQL	40	ug/kg	U	1
PCB-1242	BQL	40	ug/kg	U	1
PCB-1248	BQL	40	ug/kg	U	1
PCB-1254	BQL	40	ug/kg	U	1
PCB-1260	BQL	40	ug/kg	U	1

GPL LABORATORIES, LLP
ANALYTICAL RESULTS

Project Name : Radford

Date Printed August 5, 2004

GPL ID	Client ID
407138-001-001-1/2	NBGSB20A
407138-002-003-1/1	NBGSB20B
407138-003-004-1/1	NBGSB20C
407138-005-006-1/1	NBGSB20D
407138-006-007-1/1	NBGSB21A
407138-006-007-1/1	NBGSB21A DL
407138-007-008-1/1	NBGSB21B
407138-008-009-1/1	NBGSB21C
407138-009-010-1/1	NBGSB21D
407138-010-011-1/1	NBGSB22A
407138-010-011-1/1	NBGSB22A DL
407138-011-012-1/1	NBGSB22B
407138-013-014-1/1	NBGSB25B
407138-014-015-1/1	NBGSB25C
407138-015-016-1/1	NBGSB25D
407138-004-005-1/1	TMSB20C
407138-012-013-1/1	TMSB22B

Analytical Report For 407138

for

Shaw Environmental & Infrastructure

Project Manager: Eric Malarek

Project Name : Radford

August 9, 2004

GPL

Laboratories

GPL Laboratories, LLLP Certifies that the test results meet all requirements of the NELAC Standards unless otherwise noted.

Reviewed by, Project Manager	Approved by, Laboratory Director

7210A Corporate CT Frederick, MD 21703 Phone (301) 694-5310 Fax: (301) 620-0731
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Summary of Analytical Results

Client ID: NBGSB20A
GPL ID: 407138-001-001-1/2
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/05/2004
Time Analyzed: 22:50
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	15000	19.7	mg/kg		1
Barium	90.6	.49	mg/kg		1
Beryllium	0.54	.2	mg/kg		1
Cadmium	0.76	.59	mg/kg		1
Calcium	14600	98.5	mg/kg	*	1
Cobalt	14.6	.49	mg/kg		1
Copper	43	.99	mg/kg		1
Iron	19500	14.8	mg/kg		1
Magnesium	5530	24.6	mg/kg	*	1
Manganese	499	.49	mg/kg		1
Nickel	11	.99	mg/kg		1
Potassium	827	24.6	mg/kg	N*	1
Selenium	BQL	2	mg/kg	U	1
Silver	BQL	.3	mg/kg	U	1
Thallium	0.63	3	mg/kg	B	1

Summary of Analytical Results

Client ID: NBGSB20A
GPL ID: 407138-001-001-1/2
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/05/2004
Time Analyzed: 23:30
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Antimony	BQL	19.7	mg/kg	UN	10
Arsenic	6.8	19.7	mg/kg	B	10
Chromium	1000	4.9	mg/kg		10
Lead	11200	9.9	mg/kg		10
Sodium	390	2460	mg/kg	B	10
Vanadium	34.6	9.9	mg/kg		10
Zinc	1700	19.7	mg/kg		10

Summary of Analytical Results

Client ID: NBGSB20B
GPL ID: 407138-002-003-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 00:53
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	33000	19.6	mg/kg		1
Antimony	BQL	2	mg/kg	UN	1
Arsenic	10.4	2	mg/kg		1
Barium	20.6	.49	mg/kg		1
Beryllium	0.45	.2	mg/kg		1
Cadmium	0.45	.59	mg/kg	B	1
Calcium	545	98.2	mg/kg	*	1
Chromium	42.6	.49	mg/kg		1
Cobalt	3.0	.49	mg/kg		1
Copper	17.3	.98	mg/kg		1
Iron	39400	14.7	mg/kg		1
Lead	15.9	.98	mg/kg		1
Magnesium	690	24.6	mg/kg	*	1
Manganese	55.1	.49	mg/kg		1
Nickel	11.3	.98	mg/kg		1
Potassium	878	24.6	mg/kg	N*	1
Selenium	1.2	2	mg/kg	B	1
Silver	BQL	.29	mg/kg	U	1
Sodium	70.2	246	mg/kg	B	1
Thallium	BQL	2.9	mg/kg	U	1
Vanadium	78.1	.98	mg/kg		1
Zinc	19.7	2	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB20C
GPL ID: 407138-003-004-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 01:01
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	51400	21.7	mg/kg		1
Antimony	0.82	2.2	mg/kg	BN	1
Arsenic	16.1	2.2	mg/kg		1
Barium	22.8	.54	mg/kg		1
Beryllium	0.72	.22	mg/kg		1
Cadmium	0.78	.65	mg/kg		1
Calcium	277	109	mg/kg	*	1
Chromium	54.8	.54	mg/kg		1
Cobalt	6.8	.54	mg/kg		1
Copper	30.8	1.1	mg/kg		1
Iron	55200	16.3	mg/kg		1
Lead	34	1.1	mg/kg		1
Magnesium	755	27.2	mg/kg	*	1
Manganese	135	.54	mg/kg		1
Nickel	24.2	1.1	mg/kg		1
Potassium	1250	27.2	mg/kg	N*	1
Selenium	1.3	2.2	mg/kg	B	1
Silver	BQL	.33	mg/kg	U	1
Sodium	72.1	272	mg/kg	B	1
Thallium	BQL	3.3	mg/kg	U	1
Vanadium	103	1.1	mg/kg		1
Zinc	31.9	2.2	mg/kg		1

Summary of Analytical Results

Client ID: TMSB20C
GPL ID: 407138-004-005-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 01:09
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Arsenic	15.7	2	mg/kg		1
Beryllium	0.74	.2	mg/kg		1
Calcium	453	99.7	mg/kg	*	1
Magnesium	836	24.9	mg/kg	*	1
Nickel	22.3	1	mg/kg		1
Potassium	1260	24.9	mg/kg	N*	1
Silver	BQL	.3	mg/kg	U	1

Summary of Analytical Results

Client ID: TMSB20C
GPL ID: 407138-004-005-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 01:17
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	56300	39.9	mg/kg		2
Antimony	BQL	4	mg/kg	UN	2
Barium	23.9	1	mg/kg		2
Cadmium	0.65	1.2	mg/kg	B	2
Chromium	60.8	1	mg/kg		2
Cobalt	5.9	1	mg/kg		2
Copper	28.6	2	mg/kg		2
Iron	58400	29.9	mg/kg		2
Lead	33.3	2	mg/kg		2
Manganese	125	1	mg/kg		2
Selenium	1.9	4	mg/kg	B	2
Sodium	76.8	498	mg/kg	B	2
Thallium	BQL	6	mg/kg	U	2
Vanadium	109	2	mg/kg		2
Zinc	32.9	4	mg/kg		2

Summary of Analytical Results

Client ID: NBGSB20D
GPL ID: 407138-005-006-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 01:25
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	48800	20.2	mg/kg		1
Arsenic	17.5	2	mg/kg		1
Beryllium	0.78	.2	mg/kg		1
Calcium	79.2	101	mg/kg	B*	1
Magnesium	669	25.3	mg/kg	*	1
Nickel	25.5	1	mg/kg		1
Potassium	969	25.3	mg/kg	N*	1

Summary of Analytical Results

Client ID: NBGSB20D
GPL ID: 407138-005-006-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 01:33
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Antimony	BQL	4	mg/kg	UN	2
Barium	20.6	1	mg/kg		2
Cadmium	0.75	1.2	mg/kg	B	2
Chromium	55.8	1	mg/kg		2
Cobalt	6.6	1	mg/kg		2
Copper	29	2	mg/kg		2
Iron	55600	30.3	mg/kg		2
Lead	40.1	2	mg/kg		2
Manganese	156	1	mg/kg		2
Selenium	BQL	4	mg/kg	U	2
Silver	BQL	.61	mg/kg	U	2
Thallium	BQL	6.1	mg/kg	U	2
Vanadium	96.6	2	mg/kg		2
Zinc	31.1	4	mg/kg		2

Summary of Analytical Results

Client ID: NBGSB21A
GPL ID: 407138-006-007-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 01:59
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	17000	17.4	mg/kg		1
Barium	176	.43	mg/kg		1
Beryllium	0.54	.17	mg/kg		1
Cadmium	2.4	.52	mg/kg		1
Calcium	21800	86.8	mg/kg	*	1
Cobalt	16.1	.43	mg/kg		1
Copper	69.5	.87	mg/kg		1
Iron	20300	13	mg/kg		1
Magnesium	10400	21.7	mg/kg	*	1
Manganese	422	.43	mg/kg		1
Nickel	10.8	.87	mg/kg		1
Potassium	1050	21.7	mg/kg	N*	1
Selenium	BQL	1.7	mg/kg	U	1
Silver	BQL	.26	mg/kg	U	1
Thallium	0.94	2.6	mg/kg	B	1

Summary of Analytical Results

Client ID: NBGSB21A
GPL ID: 407138-006-007-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 02:10
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Antimony	BQL	34.7	mg/kg	UN	20
Arsenic	BQL	34.7	mg/kg	U	20
Chromium	1090	8.7	mg/kg		20
Lead	16500	17.4	mg/kg		20
Sodium	937	4340	mg/kg	B	20
Vanadium	35.9	17.4	mg/kg		20
Zinc	6090	34.7	mg/kg		20

Summary of Analytical Results

Client ID: NBGSB21B
GPL ID: 407138-007-008-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 02:18
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	15500	17.1	mg/kg		1
Antimony	0.39	1.7	mg/kg	BN	1
Arsenic	6.5	1.7	mg/kg		1
Barium	46.5	.43	mg/kg		1
Beryllium	0.47	.17	mg/kg		1
Cadmium	0.27	.51	mg/kg	B	1
Calcium	774	85.6	mg/kg	*	1
Chromium	32.9	.43	mg/kg		1
Cobalt	4.5	.43	mg/kg		1
Copper	9.1	.86	mg/kg		1
Iron	19700	12.8	mg/kg		1
Lead	30.4	.86	mg/kg		1
Magnesium	547	21.4	mg/kg	*	1
Manganese	621	.43	mg/kg		1
Nickel	7.9	.86	mg/kg		1
Potassium	405	21.4	mg/kg	N*	1
Selenium	0.72	1.7	mg/kg	B	1
Silver	BQL	.26	mg/kg	U	1
Sodium	77	214	mg/kg	B	1
Thallium	BQL	2.6	mg/kg	U	1
Vanadium	38.6	.86	mg/kg		1
Zinc	29.6	1.7	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB21C
GPL ID: 407138-008-009-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 02:26
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	16400	17.3	mg/kg		1
Antimony	0.88	1.7	mg/kg	BN	1
Arsenic	4.9	1.7	mg/kg		1
Barium	41.6	.43	mg/kg		1
Beryllium	0.26	.17	mg/kg		1
Cadmium	0.37	.52	mg/kg	B	1
Calcium	766	86.6	mg/kg	*	1
Chromium	352	.43	mg/kg		1
Cobalt	4.6	.43	mg/kg		1
Copper	16.1	.87	mg/kg		1
Iron	17700	13	mg/kg		1
Magnesium	878	21.6	mg/kg	*	1
Manganese	47.7	.43	mg/kg		1
Nickel	5.5	.87	mg/kg		1
Potassium	608	21.6	mg/kg	N*	1
Selenium	0.56	1.7	mg/kg	B	1
Silver	BQL	.26	mg/kg	U	1
Thallium	0.46	2.6	mg/kg	B	1
Vanadium	37.5	.87	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB21C
GPL ID: 407138-008-009-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 02:34
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Lead	4090	4.3	mg/kg		5
Sodium	BQL	1080	mg/kg	U	5
Zinc	647	8.7	mg/kg		5

Summary of Analytical Results

Client ID: NBGSB21D
GPL ID: 407138-009-010-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 02:42
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	36900	20.4	mg/kg		1
Antimony	0.96	2	mg/kg	BN	1
Arsenic	13.3	2	mg/kg		1
Barium	25.9	.51	mg/kg		1
Beryllium	0.59	.2	mg/kg		1
Cadmium	0.58	.61	mg/kg	B	1
Calcium	347	102	mg/kg	*	1
Chromium	53.1	.51	mg/kg		1
Cobalt	3.5	.51	mg/kg		1
Copper	17.6	1	mg/kg		1
Iron	46400	15.3	mg/kg		1
Lead	24.7	1	mg/kg		1
Magnesium	864	25.5	mg/kg	*	1
Manganese	62.1	.51	mg/kg		1
Nickel	13.9	1	mg/kg		1
Potassium	939	25.5	mg/kg	N*	1
Selenium	1.4	2	mg/kg	B	1
Silver	0.13	.31	mg/kg	B	1
Sodium	84.7	255	mg/kg	B	1
Thallium	BQL	3.1	mg/kg	U	1
Vanadium	86.5	1	mg/kg		1
Zinc	23.1	2	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB22A
GPL ID: 407138-010-011-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 02:50
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	12700	17.7	mg/kg		1
Barium	618	.44	mg/kg		1
Beryllium	0.47	.18	mg/kg		1
Cadmium	10.6	.53	mg/kg		1
Calcium	15000	88.3	mg/kg	*	1
Cobalt	77.9	.44	mg/kg		1
Copper	567	.88	mg/kg		1
Iron	40400	13.3	mg/kg		1
Magnesium	7480	22.1	mg/kg	*	1
Manganese	435	.44	mg/kg		1
Nickel	21	.88	mg/kg		1
Potassium	1190	22.1	mg/kg	N*	1
Selenium	BQL	1.8	mg/kg	U	1
Silver	0.99	.27	mg/kg		1
Thallium	6.3	2.7	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB22A
GPL ID: 407138-010-011-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 03:02
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Antimony	25.5	88.3	mg/kg	BN	50
Arsenic	36.6	88.3	mg/kg	B	50
Chromium	9690	22.1	mg/kg		50
Sodium	2020	11000	mg/kg	B	50
Vanadium	40.5	44.2	mg/kg	B	50
Zinc	15800	88.3	mg/kg		50

Summary of Analytical Results

Client ID: NBGSB22A
GPL ID: 407138-010-011-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 14:12
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Lead	111000	88.3	mg/kg		100

Summary of Analytical Results

Client ID: NBGSB22B
GPL ID: 407138-011-012-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 03:15
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	13700	18.5	mg/kg		1
Antimony	0.37	1.9	mg/kg	BN	1
Arsenic	4.1	1.9	mg/kg		1
Barium	25.9	.46	mg/kg		1
Beryllium	0.29	.19	mg/kg		1
Cadmium	0.19	.56	mg/kg	B	1
Calcium	820	92.6	mg/kg	*	1
Chromium	23	.46	mg/kg		1
Cobalt	4.1	.46	mg/kg		1
Copper	4.0	.93	mg/kg		1
Iron	16700	13.9	mg/kg		1
Magnesium	575	23.1	mg/kg	*	1
Manganese	182	.46	mg/kg		1
Nickel	4.2	.93	mg/kg		1
Potassium	514	23.1	mg/kg	N*	1
Selenium	0.68	1.9	mg/kg	B	1
Silver	BQL	.28	mg/kg	U	1
Sodium	73.7	231	mg/kg	B	1
Thallium	BQL	2.8	mg/kg	U	1
Vanadium	35.3	.93	mg/kg		1
Zinc	14.2	1.9	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB22B
GPL ID: 407138-011-012-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/07/2004
Time Analyzed: 09:41
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Lead	26.2	.93	mg/kg		1

Summary of Analytical Results

Client ID: TMSB22B
GPL ID: 407138-012-013-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 03:23
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	15100	16.1	mg/kg		1
Antimony	0.27	1.6	mg/kg	BN	1
Arsenic	3.7	1.6	mg/kg		1
Barium	27.1	.4	mg/kg		1
Beryllium	0.30	.16	mg/kg		1
Cadmium	0.19	.48	mg/kg	B	1
Calcium	891	80.4	mg/kg	*	1
Chromium	18	.4	mg/kg		1
Cobalt	3.1	.4	mg/kg		1
Copper	4.7	.8	mg/kg		1
Iron	16700	12.1	mg/kg		1
Magnesium	580	20.1	mg/kg	*	1
Manganese	167	.4	mg/kg		1
Nickel	5.2	.8	mg/kg		1
Potassium	535	20.1	mg/kg	N*	1
Selenium	0.71	1.6	mg/kg	B	1
Silver	BQL	.24	mg/kg	U	1
Sodium	57.6	201	mg/kg	B	1
Thallium	BQL	2.4	mg/kg	U	1
Vanadium	33.6	.8	mg/kg		1
Zinc	12.3	1.6	mg/kg		1

Summary of Analytical Results

Client ID: TMSB22B
GPL ID: 407138-012-013-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/07/2004
Time Analyzed: 09:49
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Lead	16	.8	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB25B
GPL ID: 407138-013-014-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 03:50
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	11500	16.9	mg/kg		1
Antimony	BQL	1.7	mg/kg	UN	1
Arsenic	4.3	1.7	mg/kg		1
Barium	73.8	.42	mg/kg		1
Beryllium	0.51	.17	mg/kg		1
Cadmium	0.86	.51	mg/kg		1
Calcium	4170	84.3	mg/kg	*	1
Chromium	14.9	.42	mg/kg		1
Cobalt	13.4	.42	mg/kg		1
Copper	313	.84	mg/kg		1
Iron	38600	12.6	mg/kg		1
Lead	63.5	.84	mg/kg		1
Magnesium	2800	21.1	mg/kg	*	1
Manganese	675	.42	mg/kg		1
Nickel	7.3	.84	mg/kg		1
Potassium	701	21.1	mg/kg	N*	1
Selenium	1.4	1.7	mg/kg	B	1
Silver	BQL	.25	mg/kg	U	1
Thallium	BQL	2.5	mg/kg	U	1
Vanadium	23.9	.84	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB25B
GPL ID: 407138-013-014-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 03:58
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Sodium	169	421	mg/kg	B	2
Zinc	686	3.4	mg/kg		2

Summary of Analytical Results

Client ID: NBGSB25C
GPL ID: 407138-014-015-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 04:06
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	11600	16.7	mg/kg		1
Antimony	0.42	1.7	mg/kg	BN	1
Arsenic	12.7	1.7	mg/kg		1
Barium	27.4	.42	mg/kg		1
Beryllium	0.40	.17	mg/kg		1
Cadmium	0.44	.5	mg/kg	B	1
Calcium	941	83.5	mg/kg	*	1
Chromium	29.6	.42	mg/kg		1
Cobalt	4.0	.42	mg/kg		1
Copper	8.6	.84	mg/kg		1
Iron	42300	12.5	mg/kg		1
Lead	24.1	.84	mg/kg		1
Magnesium	658	20.9	mg/kg	*	1
Manganese	221	.42	mg/kg		1
Nickel	4.8	.84	mg/kg		1
Potassium	469	20.9	mg/kg	N*	1
Selenium	1.5	1.7	mg/kg	B	1
Silver	BQL	.25	mg/kg	U	1
Sodium	69.7	209	mg/kg	B	1
Thallium	BQL	2.5	mg/kg	U	1
Vanadium	62.1	.84	mg/kg		1
Zinc	20.7	1.7	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB25D
GPL ID: 407138-015-016-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67924

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 04:14
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	20300	17.9	mg/kg		1
Antimony	0.43	1.8	mg/kg	BN	1
Arsenic	6.1	1.8	mg/kg		1
Barium	26	.45	mg/kg		1
Beryllium	0.39	.18	mg/kg		1
Cadmium	0.26	.54	mg/kg	B	1
Calcium	1010	89.4	mg/kg	*	1
Chromium	24	.45	mg/kg		1
Cobalt	2.8	.45	mg/kg		1
Copper	12	.89	mg/kg		1
Iron	23400	13.4	mg/kg		1
Lead	11.1	.89	mg/kg		1
Magnesium	779	22.4	mg/kg	*	1
Manganese	63.9	.45	mg/kg		1
Nickel	8.7	.89	mg/kg		1
Potassium	793	22.4	mg/kg	N*	1
Selenium	BQL	1.8	mg/kg	U	1
Silver	BQL	.27	mg/kg	U	1
Sodium	77.4	224	mg/kg	B	1
Thallium	BQL	2.7	mg/kg	U	1
Vanadium	46.3	.89	mg/kg		1
Zinc	17.8	1.8	mg/kg		1

GPL LABORATORIES, LLP
ANALYTICAL RESULTS

Project Name : Radford

Date Printed August 9, 2004

GPL ID	Client ID
407138-001-001-1/2	NBGSB20A
407138-001-001-1/2	NBGSB20A
407138-002-003-1/1	NBGSB20B
407138-003-004-1/1	NBGSB20C
407138-004-005-1/1	TMSB20C
407138-004-005-1/1	TMSB20C
407138-005-006-1/1	NBGSB20D
407138-005-006-1/1	NBGSB20D
407138-006-007-1/1	NBGSB21A
407138-006-007-1/1	NBGSB21A
407138-007-008-1/1	NBGSB21B
407138-008-009-1/1	NBGSB21C
407138-008-009-1/1	NBGSB21C
407138-009-010-1/1	NBGSB21D
407138-010-011-1/1	NBGSB22A
407138-010-011-1/1	NBGSB22A
407138-010-011-1/1	NBGSB22A
407138-011-012-1/1	NBGSB22B
407138-011-012-1/1	NBGSB22B
407138-012-013-1/1	TMSB22B
407138-012-013-1/1	TMSB22B
407138-013-014-1/1	NBGSB25B
407138-013-014-1/1	NBGSB25B
407138-014-015-1/1	NBGSB25C
407138-015-016-1/1	NBGSB25D

Analytical Report For 407138

for

Shaw Environmental & Infrastructure

Project Manager: Eric Malarek

Project Name : Radford

August 9, 2004

GPL

Laboratories

GPL Laboratories, LLLP Certifies that the test results meet all requirements of the NELAC Standards unless otherwise noted.

Reviewed by, Project Manager	Approved by, Laboratory Director

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GPL LABORATORIES, LLLP

Summary of Analytical Results

Client ID: NBGSB20A
GPL ID: 407138-001-001-1/2
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68062

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 16:53
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.045	.033	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB20B
GPL ID: 407138-002-003-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68062

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 17:10
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.17	.036	mg/kg		1

GPL LABORATORIES, LLLP

Summary of Analytical Results

Client ID: NBGSB20C
GPL ID: 407138-003-004-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68062

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 17:13
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.16	.035	mg/kg		1

GPL LABORATORIES, LLLP

Summary of Analytical Results

Client ID: TMSB20C
GPL ID: 407138-004-005-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68062

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 17:16
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.23	.044	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB20D
GPL ID: 407138-005-006-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68062

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 17:19
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.13	.042	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB21A
GPL ID: 407138-006-007-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68062

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 17:22
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.039	.029	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB21B
GPL ID: 407138-007-008-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68062

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 17:25
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.029	.035	mg/kg	B	1

Summary of Analytical Results

Client ID: NBGSB21C
GPL ID: 407138-008-009-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68062

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 17:28
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.040	.034	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB21D
GPL ID: 407138-009-010-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68062

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 17:31
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.25	.039	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB22A
GPL ID: 407138-010-011-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68062

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 17:33
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.031	.034	mg/kg	B	1

Summary of Analytical Results

Client ID: NBGSB22B
GPL ID: 407138-011-012-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68062

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 17:43
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.039	.031	mg/kg		1

Summary of Analytical Results

Client ID: TMSB22B
GPL ID: 407138-012-013-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68062

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 17:46
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.028	.033	mg/kg	B	1

Summary of Analytical Results

Client ID: NBGSB25B
GPL ID: 407138-013-014-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68062

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 17:49
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.021	.027	mg/kg	B	1

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Summary of Analytical Results

Client ID: NBGSB25C
GPL ID: 407138-014-015-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68062

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 17:52
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.060	.032	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB25D
GPL ID: 407138-015-016-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68062

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 17:55
Analysis Batch: 17308

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.078	.034	mg/kg		1

GPL LABORATORIES, LLP
ANALYTICAL RESULTS

Project Name : Radford

Date Printed August 9, 2004

GPL ID	Client ID
407138-001-001-1/2	NBGSB20A
407138-002-003-1/1	NBGSB20B
407138-003-004-1/1	NBGSB20C
407138-004-005-1/1	TMSB20C
407138-005-006-1/1	NBGSB20D
407138-006-007-1/1	NBGSB21A
407138-007-008-1/1	NBGSB21B
407138-008-009-1/1	NBGSB21C
407138-009-010-1/1	NBGSB21D
407138-010-011-1/1	NBGSB22A
407138-011-012-1/1	NBGSB22B
407138-012-013-1/1	TMSB22B
407138-013-014-1/1	NBGSB25B
407138-014-015-1/1	NBGSB25C
407138-015-016-1/1	NBGSB25D

Analytical Report For 407140

for

Shaw Environmental & Infrastructure

Project Manager : Eric Malarek

Project Name : Radford

August 5, 2004

GPL

Laboratories

GPL Laboratories, LLLP Certifies that the test results meet all requirements of the NELAC Standards unless otherwise noted.

Reviewed by, Project Manager	Approved by, Laboratory Director

7210A Corporate CT Frederick, MD 21703 Phone (301) 694-5310 Fax: (301) 620-0731
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Summary of Analytical Results

Client ID: DTSB48B
GPL ID: 407140-002-005-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	82	1.0	%		1

Summary of Analytical Results

Client ID: DTSB55B
GPL ID: 407140-003-006-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	80	1.0	%		1

Summary of Analytical Results

Client ID: DTSB59B
GPL ID: 407140-004-007-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	81	1.0	%		1

Summary of Analytical Results

Client ID: DTSB67B
GPL ID: 407140-005-008-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	82	1.0	%		1

Summary of Analytical Results

Client ID: DTSB77B
GPL ID: 407140-006-009-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	84	1.0	%		1

Summary of Analytical Results

Client ID: 072004R2
GPL ID: 407140-001-001-1/4
Matrix: WATER
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3520C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67909

Analytical Method: SW8082
Date Analyzed: 07/28/2004
Time Analyzed: 04:06
Analysis Batch: 69982

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	1.0	ug/L	U	1
PCB-1221	BQL	1.0	ug/L	U	1
PCB-1232	BQL	1.0	ug/L	U	1
PCB-1242	BQL	1.0	ug/L	U	1
PCB-1248	BQL	1.0	ug/L	U	1
PCB-1254	BQL	1.0	ug/L	U	1
PCB-1260	BQL	1.0	ug/L	U	1

Summary of Analytical Results

Client ID: DTSB48B
GPL ID: 407140-002-005-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/23/2004
Prep Time: 00:00
Prep Batch: 67908

Analytical Method: SW8082
Date Analyzed: 07/27/2004
Time Analyzed: 04:56
Analysis Batch: 69980

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	41	ug/kg	U	1
PCB-1221	BQL	41	ug/kg	U	1
PCB-1232	BQL	41	ug/kg	U	1
PCB-1242	BQL	41	ug/kg	U	1
PCB-1248	BQL	41	ug/kg	U	1
PCB-1254	BQL	41	ug/kg	U	1
PCB-1260	BQL	41	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB55B
GPL ID: 407140-003-006-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/23/2004
Prep Time: 00:00
Prep Batch: 67908

Analytical Method: SW8082
Date Analyzed: 07/27/2004
Time Analyzed: 05:25
Analysis Batch: 69980

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	42	ug/kg	U	1
PCB-1221	BQL	42	ug/kg	U	1
PCB-1232	BQL	42	ug/kg	U	1
PCB-1242	BQL	42	ug/kg	U	1
PCB-1248	BQL	42	ug/kg	U	1
PCB-1254	BQL	42	ug/kg	U	1
PCB-1260	BQL	42	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB59B
GPL ID: 407140-004-007-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/23/2004
Prep Time: 00:00
Prep Batch: 67908

Analytical Method: SW8082
Date Analyzed: 07/27/2004
Time Analyzed: 05:54
Analysis Batch: 69980

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	41	ug/kg	U	1
PCB-1221	BQL	41	ug/kg	U	1
PCB-1232	BQL	41	ug/kg	U	1
PCB-1242	BQL	41	ug/kg	U	1
PCB-1248	BQL	41	ug/kg	U	1
PCB-1254	BQL	41	ug/kg	U	1
PCB-1260	BQL	41	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB67B
GPL ID: 407140-005-008-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/23/2004
Prep Time: 00:00
Prep Batch: 67908

Analytical Method: SW8082
Date Analyzed: 07/27/2004
Time Analyzed: 06:23
Analysis Batch: 69980

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	41	ug/kg	U	1
PCB-1221	BQL	41	ug/kg	U	1
PCB-1232	BQL	41	ug/kg	U	1
PCB-1242	BQL	41	ug/kg	U	1
PCB-1248	BQL	41	ug/kg	U	1
PCB-1254	BQL	41	ug/kg	U	1
PCB-1260	BQL	41	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB77B
GPL ID: 407140-006-009-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/23/2004
Prep Time: 00:00
Prep Batch: 67908

Analytical Method: SW8082
Date Analyzed: 07/27/2004
Time Analyzed: 06:52
Analysis Batch: 69980

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	40	ug/kg	U	1
PCB-1221	BQL	40	ug/kg	U	1
PCB-1232	BQL	40	ug/kg	U	1
PCB-1242	BQL	40	ug/kg	U	1
PCB-1248	BQL	40	ug/kg	U	1
PCB-1254	BQL	40	ug/kg	U	1
PCB-1260	BQL	40	ug/kg	U	1

Summary of Analytical Results

Client ID: 072004R2
GPL ID: 407140-001-004-4/4
Matrix: WATER
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3520C-LL
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67900

Analytical Method: SW8270_PAH
Date Analyzed: 07/26/2004
Time Analyzed: 21:03
Analysis Batch: 69827

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	0.20	ug/L	U	1
Acenaphthene	BQL	0.20	ug/L	U	1
Acenaphthylene	BQL	0.20	ug/L	U	1
Anthracene	BQL	0.20	ug/L	U	1
Benzo(a)anthracene	BQL	0.20	ug/L	U	1
Benzo(a)pyrene	BQL	0.20	ug/L	U	1
Benzo(b)fluoranthene	BQL	0.20	ug/L	U	1
Benzo(g,h,i)perylene	BQL	0.20	ug/L	U	1
Benzo(k)fluoranthene	BQL	0.20	ug/L	U	1
Chrysene	BQL	0.20	ug/L	U	1
Dibenz(a,h)Anthracene	BQL	0.20	ug/L	U	1
Fluoranthene	BQL	0.20	ug/L	U	1
Fluorene	BQL	0.20	ug/L	U	1
Indeno(1,2,3-c,d)Pyrene	BQL	0.20	ug/L	U	1
Naphthalene	BQL	0.20	ug/L	U	1
Phenanthrene	BQL	0.20	ug/L	U	1
Pyrene	BQL	0.20	ug/L	U	1

Summary of Analytical Results

Client ID: DTSB48BDL
GPL ID: 407140-002-005-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67933

Analytical Method: SW8270_PAH
Date Analyzed: 07/27/2004
Time Analyzed: 17:24
Analysis Batch: 69829

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	89	81	ug/kg		10
Acenaphthene	1800	81	ug/kg		10
Acenaphthylene	BQL	81	ug/kg	U	10
Anthracene	3100	81	ug/kg		10
Benzo(a)anthracene	6100	81	ug/kg	E	10
Benzo(a)pyrene	5400	81	ug/kg	E	10
Benzo(b)fluoranthene	8100	81	ug/kg	E	10
Benzo(g,h,i)perylene	3000	81	ug/kg		10
Benzo(k)fluoranthene	2400	81	ug/kg		10
Chrysene	5500	81	ug/kg	E	10
Dibenz(a,h)Anthracene	BQL	81	ug/kg	U	10
Fluoranthene	16000	81	ug/kg	E	10
Fluorene	1800	81	ug/kg		10
Indeno(1,2,3-c,d)Pyrene	2900	81	ug/kg		10
Naphthalene	320	81	ug/kg		10
Phenanthrene	14000	81	ug/kg	E	10
Pyrene	10000	81	ug/kg	E	10

Summary of Analytical Results

Client ID: DTSB48BDL2
GPL ID: 407140-002-005-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67933

Analytical Method: SW8270_PAH
Date Analyzed: 07/27/2004
Time Analyzed: 18:00
Analysis Batch: 69829

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	810	ug/kg	U	100
Acenaphthene	1600	810	ug/kg		100
Acenaphthylene	BQL	810	ug/kg	U	100
Anthracene	2800	810	ug/kg		100
Benzo(a)anthracene	5900	810	ug/kg		100
Benzo(a)pyrene	5000	810	ug/kg		100
Benzo(b)fluoranthene	7700	810	ug/kg		100
Benzo(g,h,i)perylene	2800	810	ug/kg		100
Benzo(k)fluoranthene	1800	810	ug/kg		100
Chrysene	5200	810	ug/kg		100
Dibenz(a,h)Anthracene	BQL	810	ug/kg	U	100
Fluoranthene	17000	810	ug/kg		100
Fluorene	1600	810	ug/kg		100
Indeno(1,2,3-c,d)Pyrene	2900	810	ug/kg		100
Naphthalene	BQL	810	ug/kg	U	100
Phenanthrene	14000	810	ug/kg		100
Pyrene	9800	810	ug/kg		100

Summary of Analytical Results

Client ID: DTSB55B
GPL ID: 407140-003-006-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67933

Analytical Method: SW8270_PAH
Date Analyzed: 07/27/2004
Time Analyzed: 02:38
Analysis Batch: 69828

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	24	8.3	ug/kg		1
Acenaphthene	78	8.3	ug/kg		1
Acenaphthylene	BQL	8.3	ug/kg	U	1
Anthracene	73	8.3	ug/kg		1
Benzo(a)anthracene	150	8.3	ug/kg		1
Benzo(a)pyrene	120	8.3	ug/kg		1
Benzo(b)fluoranthene	180	8.3	ug/kg		1
Benzo(g,h,i)perylene	61	8.3	ug/kg		1
Benzo(k)fluoranthene	56	8.3	ug/kg		1
Chrysene	140	8.3	ug/kg		1
Dibenz(a,h)Anthracene	20	8.3	ug/kg		1
Fluoranthene	510	8.3	ug/kg	E	1
Fluorene	72	8.3	ug/kg		1
Indeno(1,2,3-c,d)Pyrene	68	8.3	ug/kg		1
Naphthalene	160	8.3	ug/kg		1
Phenanthrene	480	8.3	ug/kg	E	1
Pyrene	280	8.3	ug/kg		1

Summary of Analytical Results

Client ID: DTSB55BDL
GPL ID: 407140-003-006-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67933

Analytical Method: SW8270_PAH
Date Analyzed: 07/27/2004
Time Analyzed: 15:04
Analysis Batch: 69829

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	26	17	ug/kg		2
Acenaphthene	76	17	ug/kg		2
Acenaphthylene	BQL	17	ug/kg	U	2
Anthracene	67	17	ug/kg		2
Benzo(a)anthracene	150	17	ug/kg		2
Benzo(a)pyrene	120	17	ug/kg		2
Benzo(b)fluoranthene	170	17	ug/kg		2
Benzo(g,h,i)perylene	62	17	ug/kg		2
Benzo(k)fluoranthene	66	17	ug/kg		2
Chrysene	130	17	ug/kg		2
Dibenz(a,h)Anthracene	BQL	17	ug/kg	U	2
Fluoranthene	470	17	ug/kg		2
Fluorene	69	17	ug/kg		2
Indeno(1,2,3-c,d)Pyrene	65	17	ug/kg		2
Naphthalene	160	17	ug/kg		2
Phenanthrene	430	17	ug/kg		2
Pyrene	260	17	ug/kg		2

Summary of Analytical Results

Client ID: DTSB59B
GPL ID: 407140-004-007-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67933

Analytical Method: SW8270_PAH
Date Analyzed: 07/26/2004
Time Analyzed: 23:51
Analysis Batch: 69828

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	8.3	ug/kg	U	1
Acenaphthene	BQL	8.3	ug/kg	U	1
Acenaphthylene	BQL	8.3	ug/kg	U	1
Anthracene	BQL	8.3	ug/kg	U	1
Benzo(a)anthracene	BQL	8.3	ug/kg	U	1
Benzo(a)pyrene	BQL	8.3	ug/kg	U	1
Benzo(b)fluoranthene	BQL	8.3	ug/kg	U	1
Benzo(g,h,i)perylene	BQL	8.3	ug/kg	U	1
Benzo(k)fluoranthene	BQL	8.3	ug/kg	U	1
Chrysene	BQL	8.3	ug/kg	U	1
Dibenz(a,h)Anthracene	BQL	8.3	ug/kg	U	1
Fluoranthene	BQL	8.3	ug/kg	U	1
Fluorene	BQL	8.3	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	BQL	8.3	ug/kg	U	1
Naphthalene	BQL	8.3	ug/kg	U	1
Phenanthrene	BQL	8.3	ug/kg	U	1
Pyrene	BQL	8.3	ug/kg	U	1

Summary of Analytical Results

Client ID: DTSB67B
GPL ID: 407140-005-008-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67933

Analytical Method: SW8270_PAH
Date Analyzed: 07/27/2004
Time Analyzed: 00:18
Analysis Batch: 69828

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	8.1	ug/kg	U	1
Acenaphthene	BQL	8.1	ug/kg	U	1
Acenaphthylene	BQL	8.1	ug/kg	U	1
Anthracene	BQL	8.1	ug/kg	U	1
Benzo(a)anthracene	BQL	8.1	ug/kg	U	1
Benzo(a)pyrene	BQL	8.1	ug/kg	U	1
Benzo(b)fluoranthene	BQL	8.1	ug/kg	U	1
Benzo(g,h,i)perylene	BQL	8.1	ug/kg	U	1
Benzo(k)fluoranthene	BQL	8.1	ug/kg	U	1
Chrysene	BQL	8.1	ug/kg	U	1
Dibenz(a,h)Anthracene	BQL	8.1	ug/kg	U	1
Fluoranthene	BQL	8.1	ug/kg	U	1
Fluorene	BQL	8.1	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	BQL	8.1	ug/kg	U	1
Naphthalene	BQL	8.1	ug/kg	U	1
Phenanthrene	BQL	8.1	ug/kg	U	1
Pyrene	BQL	8.1	ug/kg	U	1

GPL LABORATORIES, LLLP

Summary of Analytical Results

Client ID: DTSB77B
GPL ID: 407140-006-009-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/22/2004
Prep Time: 00:00
Prep Batch: 67933

Analytical Method: SW8270_PAH
Date Analyzed: 07/27/2004
Time Analyzed: 00:46
Analysis Batch: 69828

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
2-Methylnaphthalene	BQL	8.0	ug/kg	U	1
Acenaphthene	BQL	8.0	ug/kg	U	1
Acenaphthylene	BQL	8.0	ug/kg	U	1
Anthracene	BQL	8.0	ug/kg	U	1
Benzo(a)anthracene	BQL	8.0	ug/kg	U	1
Benzo(a)pyrene	BQL	8.0	ug/kg	U	1
Benzo(b)fluoranthene	BQL	8.0	ug/kg	U	1
Benzo(g,h,i)perylene	BQL	8.0	ug/kg	U	1
Benzo(k)fluoranthene	BQL	8.0	ug/kg	U	1
Chrysene	BQL	8.0	ug/kg	U	1
Dibenz(a,h)Anthracene	BQL	8.0	ug/kg	U	1
Fluoranthene	BQL	8.0	ug/kg	U	1
Fluorene	BQL	8.0	ug/kg	U	1
Indeno(1,2,3-c,d)Pyrene	BQL	8.0	ug/kg	U	1
Naphthalene	BQL	8.0	ug/kg	U	1
Phenanthrene	BQL	8.0	ug/kg	U	1
Pyrene	BQL	8.0	ug/kg	U	1

GPL LABORATORIES, LLP
ANALYTICAL RESULTS

Project Name : Radford

Date Printed August 5, 2004

GPL ID	Client ID
407140-001-001-1/4	072004R2
407140-001-004-4/4	072004R2
407140-002-005-1/1	DTSB48B
407140-002-005-1/1	DTSB48BDL
407140-002-005-1/1	DTSB48BDL2
407140-003-006-1/1	DTSB55B
407140-003-006-1/1	DTSB55BDL
407140-004-007-1/1	DTSB59B
407140-005-008-1/1	DTSB67B
407140-006-009-1/1	DTSB77B

Analytical Report For 407146

for

Shaw Environmental & Infrastructure

Project Manager : Eric Malarek

Project Name : Radford

August 5, 2004

GPL

Laboratories

GPL Laboratories, LLLP Certifies that the test results meet all requirements of the NELAC Standards unless otherwise noted.

Reviewed by, Project Manager	Approved by, Laboratory Director

7210A Corporate CT Frederick, MD 21703 Phone (301) 694-5310 Fax: (301) 620-0731
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Summary of Analytical Results

Client ID: NBGSB22C
GPL ID: 407146-001-011-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	81	1.0	%		1

Summary of Analytical Results

Client ID: NBGSB22D
GPL ID: 407146-002-001-1/2
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	72	1.0	%		1

Summary of Analytical Results

Client ID: NBGSB23A
GPL ID: 407146-003-012-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	86	1.0	%		1

Summary of Analytical Results

Client ID: NBGSB23B
GPL ID: 407146-004-013-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	84	1.0	%		1

Summary of Analytical Results

Client ID: NBGSB23C
GPL ID: 407146-005-003-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	84	1.0	%		1

Summary of Analytical Results

Client ID: NBGSB23D
GPL ID: 407146-006-004-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	84	1.0	%		1

Summary of Analytical Results

Client ID: NBGSB24A
GPL ID: 407146-007-005-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	88	1.0	%		1

Summary of Analytical Results

Client ID: NBGSB24B
GPL ID: 407146-008-006-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	84	1.0	%		1

Summary of Analytical Results

Client ID: TMSB24B
GPL ID: 407146-009-007-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	86	1.0	%		1

Summary of Analytical Results

Client ID: NBGSB24C
GPL ID: 407146-010-008-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	85	1.0	%		1

Summary of Analytical Results

Client ID: NBGSB24D
GPL ID: 407146-011-009-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	87	1.0	%		1

Summary of Analytical Results

Client ID: NBGSB25A
GPL ID: 407146-012-010-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/22/2004
Time Analyzed: 17:00
Analysis Batch: 69703

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	91	1.0	%		1

Summary of Analytical Results

Client ID: NBGSB22C
GPL ID: 407146-001-011-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/24/2004
Prep Time: 00:00
Prep Batch: 67915

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 17:13
Analysis Batch: 17277

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	33400	16.4	mg/kg		1
Antimony	0.71	1.6	mg/kg	BN	1
Arsenic	10.2	1.6	mg/kg		1
Barium	23.8	.41	mg/kg		1
Beryllium	0.58	.16	mg/kg		1
Cadmium	BQL	.49	mg/kg	U	1
Calcium	996	82.1	mg/kg		1
Chromium	53.6	.41	mg/kg		1
Cobalt	3.3	.41	mg/kg		1
Copper	16.2	.82	mg/kg		1
Iron	38500	12.3	mg/kg		1
Lead	143	.82	mg/kg	*	1
Magnesium	1100	20.5	mg/kg		1
Manganese	63.4	.41	mg/kg		1
Nickel	12.7	.82	mg/kg		1
Potassium	1080	20.5	mg/kg		1
Selenium	BQL	1.6	mg/kg	U	1
Silver	BQL	.25	mg/kg	U	1
Sodium	52.1	205	mg/kg	B	1
Thallium	1.2	2.5	mg/kg	B	1
Vanadium	76.8	.82	mg/kg		1
Zinc	45.5	1.6	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB22D
GPL ID: 407146-002-001-1/2
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/24/2004
Prep Time: 00:00
Prep Batch: 67915

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 17:21
Analysis Batch: 17277

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Antimony	0.68	2.2	mg/kg	BN	1
Arsenic	10.1	2.2	mg/kg		1
Barium	24.1	.56	mg/kg		1
Beryllium	1.2	.22	mg/kg		1
Cadmium	BQL	.67	mg/kg	U	1
Calcium	76.1	111	mg/kg	B	1
Chromium	41.3	.56	mg/kg		1
Cobalt	6.5	.56	mg/kg		1
Copper	30	1.1	mg/kg		1
Iron	45400	16.7	mg/kg		1
Lead	34.9	1.1	mg/kg	*	1
Magnesium	1120	27.8	mg/kg		1
Manganese	74.6	.56	mg/kg		1
Nickel	23.2	1.1	mg/kg		1
Potassium	1080	27.8	mg/kg		1
Selenium	BQL	2.2	mg/kg	U	1
Silver	BQL	.33	mg/kg	U	1
Sodium	60.4	278	mg/kg	B	1
Thallium	0.71	3.3	mg/kg	B	1
Vanadium	84.9	1.1	mg/kg		1
Zinc	31	2.2	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB22D
GPL ID: 407146-002-001-1/2
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/24/2004
Prep Time: 00:00
Prep Batch: 67915

Analytical Method: SW6010B
Date Analyzed: 08/02/2004
Time Analyzed: 19:17
Analysis Batch: 17277

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	54900	44.5	mg/kg		2

Summary of Analytical Results

Client ID: NBGSB23A
GPL ID: 407146-003-012-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/24/2004
Prep Time: 00:00
Prep Batch: 67915

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 18:01
Analysis Batch: 17277

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	17300	17	mg/kg		1
Antimony	0.86	1.7	mg/kg	BN	1
Arsenic	6.3	1.7	mg/kg		1
Barium	36.6	.42	mg/kg		1
Beryllium	0.36	.17	mg/kg		1
Cadmium	BQL	.51	mg/kg	U	1
Calcium	1930	84.9	mg/kg		1
Chromium	50.8	.42	mg/kg		1
Cobalt	3.9	.42	mg/kg		1
Copper	10.8	.85	mg/kg		1
Iron	20400	12.7	mg/kg		1
Lead	348	.85	mg/kg	*	1
Magnesium	1330	21.2	mg/kg		1
Manganese	110	.42	mg/kg		1
Nickel	7.5	.85	mg/kg		1
Potassium	691	21.2	mg/kg		1
Selenium	BQL	1.7	mg/kg	U	1
Silver	BQL	.25	mg/kg	U	1
Sodium	104	212	mg/kg	B	1
Thallium	BQL	2.5	mg/kg	U	1
Vanadium	42.9	.85	mg/kg		1
Zinc	159	1.7	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB23B
GPL ID: 407146-004-013-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/24/2004
Prep Time: 00:00
Prep Batch: 67915

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 18:38
Analysis Batch: 17277

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	26400	18	mg/kg		1
Antimony	0.53	1.8	mg/kg	BN	1
Arsenic	7.8	1.8	mg/kg		1
Barium	21.1	.45	mg/kg		1
Beryllium	0.37	.18	mg/kg		1
Cadmium	BQL	.54	mg/kg	U	1
Calcium	440	89.9	mg/kg		1
Chromium	54.3	.45	mg/kg		1
Cobalt	3.7	.45	mg/kg		1
Copper	10.6	.9	mg/kg		1
Iron	27400	13.5	mg/kg		1
Lead	147	.9	mg/kg	*	1
Magnesium	683	22.5	mg/kg		1
Manganese	39.2	.45	mg/kg		1
Nickel	9.7	.9	mg/kg		1
Potassium	864	22.5	mg/kg		1
Selenium	0.68	1.8	mg/kg	B	1
Silver	BQL	.27	mg/kg	U	1
Sodium	65.5	225	mg/kg	B	1
Thallium	BQL	2.7	mg/kg	U	1
Vanadium	56.1	.9	mg/kg		1
Zinc	31.1	1.8	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB23C
GPL ID: 407146-005-003-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/24/2004
Prep Time: 00:00
Prep Batch: 67915

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 18:46
Analysis Batch: 17277

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	21000	17.5	mg/kg		1
Antimony	0.51	1.8	mg/kg	BN	1
Arsenic	7.3	1.8	mg/kg		1
Barium	16.2	.44	mg/kg		1
Beryllium	0.30	.18	mg/kg		1
Cadmium	BQL	.53	mg/kg	U	1
Calcium	122	87.7	mg/kg		1
Chromium	31.8	.44	mg/kg		1
Cobalt	3.3	.44	mg/kg		1
Copper	8.5	.88	mg/kg		1
Iron	25700	13.2	mg/kg		1
Lead	50.1	.88	mg/kg	*	1
Magnesium	372	21.9	mg/kg		1
Manganese	63.7	.44	mg/kg		1
Nickel	8.0	.88	mg/kg		1
Potassium	580	21.9	mg/kg		1
Selenium	0.65	1.8	mg/kg	B	1
Silver	BQL	.26	mg/kg	U	1
Sodium	41.3	219	mg/kg	B	1
Thallium	BQL	2.6	mg/kg	U	1
Vanadium	48.2	.88	mg/kg		1
Zinc	23	1.8	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB23D
GPL ID: 407146-006-004-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/24/2004
Prep Time: 00:00
Prep Batch: 67915

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 18:54
Analysis Batch: 17277

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	18000	18.2	mg/kg		1
Antimony	0.33	1.8	mg/kg	BN	1
Arsenic	4.5	1.8	mg/kg		1
Barium	14.6	.45	mg/kg		1
Beryllium	0.25	.18	mg/kg		1
Cadmium	BQL	.55	mg/kg	U	1
Calcium	27.1	90.9	mg/kg	B	1
Chromium	26.9	.45	mg/kg		1
Cobalt	2.8	.45	mg/kg		1
Copper	6.7	.91	mg/kg		1
Iron	16900	13.6	mg/kg		1
Lead	10	.91	mg/kg	*	1
Magnesium	296	22.7	mg/kg		1
Manganese	36.2	.45	mg/kg		1
Nickel	6.7	.91	mg/kg		1
Potassium	369	22.7	mg/kg		1
Selenium	BQL	1.8	mg/kg	U	1
Silver	BQL	.27	mg/kg	U	1
Sodium	56.8	227	mg/kg	B	1
Thallium	BQL	2.7	mg/kg	U	1
Vanadium	34	.91	mg/kg		1
Zinc	8.9	1.8	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB24A
GPL ID: 407146-007-005-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/24/2004
Prep Time: 00:00
Prep Batch: 67915

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 19:02
Analysis Batch: 17277

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	13000	16.5	mg/kg		1
Antimony	0.75	1.7	mg/kg	BN	1
Arsenic	5.6	1.7	mg/kg		1
Barium	97.1	.41	mg/kg		1
Beryllium	0.47	.17	mg/kg		1
Cadmium	0.28	.5	mg/kg	B	1
Calcium	9580	82.6	mg/kg		1
Chromium	174	.41	mg/kg		1
Cobalt	6.8	.41	mg/kg		1
Copper	37.9	.83	mg/kg		1
Iron	13700	12.4	mg/kg		1
Lead	1710	.83	mg/kg	*	1
Magnesium	4850	20.6	mg/kg		1
Manganese	407	.41	mg/kg		1
Nickel	8.1	.83	mg/kg		1
Potassium	604	20.6	mg/kg		1
Selenium	BQL	1.7	mg/kg	U	1
Thallium	BQL	2.5	mg/kg	U	1
Vanadium	29.2	.83	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB24A
GPL ID: 407146-007-005-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/24/2004
Prep Time: 00:00
Prep Batch: 67915

Analytical Method: SW6010B
Date Analyzed: 08/02/2004
Time Analyzed: 20:15
Analysis Batch: 17277

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Silver	BQL	1.2	mg/kg	U	5
Sodium	137	1030	mg/kg	B	5
Zinc	875	8.3	mg/kg		5

Summary of Analytical Results

Client ID: NBGSB24B
GPL ID: 407146-008-006-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/24/2004
Prep Time: 00:00
Prep Batch: 67915

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 19:10
Analysis Batch: 17277

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	13500	18.4	mg/kg		1
Antimony	0.53	1.8	mg/kg	BN	1
Arsenic	7.2	1.8	mg/kg		1
Barium	48.1	.46	mg/kg		1
Beryllium	0.54	.18	mg/kg		1
Cadmium	BQL	.55	mg/kg	U	1
Calcium	777	91.8	mg/kg		1
Chromium	26	.46	mg/kg		1
Cobalt	5.9	.46	mg/kg		1
Copper	8.5	.92	mg/kg		1
Iron	23400	13.8	mg/kg		1
Lead	27.4	.92	mg/kg	*	1
Magnesium	526	22.9	mg/kg		1
Manganese	471	.46	mg/kg		1
Nickel	7.7	.92	mg/kg		1
Potassium	444	22.9	mg/kg		1
Selenium	BQL	1.8	mg/kg	U	1
Silver	BQL	.28	mg/kg	U	1
Sodium	74.5	229	mg/kg	B	1
Thallium	BQL	2.8	mg/kg	U	1
Vanadium	42.3	.92	mg/kg		1
Zinc	34.8	1.8	mg/kg		1

Summary of Analytical Results

Client ID: TMSB24B
GPL ID: 407146-009-007-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/24/2004
Prep Time: 00:00
Prep Batch: 67915

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 19:18
Analysis Batch: 17277

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	14100	17	mg/kg		1
Antimony	BQL	1.7	mg/kg	UN	1
Arsenic	5.7	1.7	mg/kg		1
Barium	50.1	.43	mg/kg		1
Beryllium	0.52	.17	mg/kg		1
Cadmium	BQL	.51	mg/kg	U	1
Calcium	804	85.2	mg/kg		1
Chromium	20.4	.43	mg/kg		1
Cobalt	5.9	.43	mg/kg		1
Copper	8.9	.85	mg/kg		1
Iron	16600	12.8	mg/kg		1
Lead	29.2	.85	mg/kg	*	1
Magnesium	552	21.3	mg/kg		1
Manganese	474	.43	mg/kg		1
Nickel	8.3	.85	mg/kg		1
Potassium	466	21.3	mg/kg		1
Selenium	BQL	1.7	mg/kg	U	1
Sodium	46.4	213	mg/kg	B	1
Thallium	BQL	2.6	mg/kg	U	1
Vanadium	34.2	.85	mg/kg		1
Zinc	39.8	1.7	mg/kg		1

Summary of Analytical Results

Client ID: TMSB24B
GPL ID: 407146-009-007-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/24/2004
Prep Time: 00:00
Prep Batch: 67915

Analytical Method: SW6010B
Date Analyzed: 08/02/2004
Time Analyzed: 20:23
Analysis Batch: 17277

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Silver	BQL	.51	mg/kg	U	2

Summary of Analytical Results

Client ID: NBGSB24C
GPL ID: 407146-010-008-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/24/2004
Prep Time: 00:00
Prep Batch: 67915

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 19:26
Analysis Batch: 17277

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	13200	16.9	mg/kg		1
Antimony	BQL	1.7	mg/kg	UN	1
Arsenic	3.9	1.7	mg/kg		1
Barium	52.4	.42	mg/kg		1
Beryllium	0.63	.17	mg/kg		1
Cadmium	BQL	.51	mg/kg	U	1
Calcium	608	84.5	mg/kg		1
Chromium	16.1	.42	mg/kg		1
Cobalt	10.6	.42	mg/kg		1
Copper	5.1	.85	mg/kg		1
Iron	12500	12.7	mg/kg		1
Lead	23.2	.85	mg/kg	*	1
Magnesium	688	21.1	mg/kg		1
Manganese	501	.42	mg/kg		1
Nickel	6.6	.85	mg/kg		1
Potassium	507	21.1	mg/kg		1
Selenium	BQL	1.7	mg/kg	U	1
Silver	BQL	.25	mg/kg	U	1
Sodium	52.9	211	mg/kg	B	1
Thallium	BQL	2.5	mg/kg	U	1
Vanadium	28.1	.85	mg/kg		1
Zinc	20.1	1.7	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB24D
GPL ID: 407146-011-009-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/24/2004
Prep Time: 00:00
Prep Batch: 67915

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 20:17
Analysis Batch: 17277

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	16000	17.4	mg/kg		1
Antimony	0.41	1.7	mg/kg	BN	1
Arsenic	3.6	1.7	mg/kg		1
Barium	27.3	.43	mg/kg		1
Beryllium	0.29	.17	mg/kg		1
Cadmium	BQL	.52	mg/kg	U	1
Calcium	414	86.9	mg/kg		1
Chromium	18	.43	mg/kg		1
Cobalt	3.3	.43	mg/kg		1
Copper	5.8	.87	mg/kg		1
Iron	15100	13	mg/kg		1
Lead	10	.87	mg/kg	*	1
Magnesium	646	21.7	mg/kg		1
Manganese	110	.43	mg/kg		1
Nickel	6.1	.87	mg/kg		1
Potassium	649	21.7	mg/kg		1
Selenium	BQL	1.7	mg/kg	U	1
Silver	BQL	.26	mg/kg	U	1
Sodium	47.3	217	mg/kg	B	1
Thallium	BQL	2.6	mg/kg	U	1
Vanadium	32.8	.87	mg/kg		1
Zinc	11.1	1.7	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB25A
GPL ID: 407146-012-010-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/24/2004
Prep Time: 00:00
Prep Batch: 67915

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 20:25
Analysis Batch: 17277

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	17100	16.7	mg/kg		1
Antimony	2.6	1.7	mg/kg	N	1
Arsenic	6.5	1.7	mg/kg		1
Barium	202	.42	mg/kg		1
Beryllium	0.53	.17	mg/kg		1
Cadmium	1.4	.5	mg/kg		1
Calcium	37700	83.5	mg/kg		1
Chromium	494	.42	mg/kg		1
Cobalt	9.7	.42	mg/kg		1
Copper	95.4	.84	mg/kg		1
Iron	19900	12.5	mg/kg		1
Magnesium	19700	20.9	mg/kg		1
Manganese	290	.42	mg/kg		1
Nickel	13.8	.84	mg/kg		1
Potassium	1430	20.9	mg/kg		1
Selenium	BQL	1.7	mg/kg	U	1
Silver	BQL	.25	mg/kg	U	1
Thallium	BQL	2.5	mg/kg	U	1
Vanadium	35.4	.84	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB25A
GPL ID: 407146-012-010-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3050B
Prep Date: 07/24/2004
Prep Time: 00:00
Prep Batch: 67915

Analytical Method: SW6010B
Date Analyzed: 08/02/2004
Time Analyzed: 20:31
Analysis Batch: 17277

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Lead	5610	8.4	mg/kg	*	10
Sodium	404	2090	mg/kg	B	10
Zinc	4040	16.7	mg/kg		10

Summary of Analytical Results

Client ID: NBGSB22C
GPL ID: 407146-001-011-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68060

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 16:01
Analysis Batch: 17281

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.20	.036	mg/kg	*	1

Summary of Analytical Results

Client ID: NBGSB22D
GPL ID: 407146-002-001-1/2
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68060

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 16:04
Analysis Batch: 17281

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.10	.038	mg/kg	*	1

Summary of Analytical Results

Client ID: NBGSB23A
GPL ID: 407146-003-012-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68060

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 16:12
Analysis Batch: 17281

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.035	.031	mg/kg	*	1

Summary of Analytical Results

Client ID: NBGSB23B
GPL ID: 407146-004-013-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68060

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 16:15
Analysis Batch: 17281

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.089	.032	mg/kg	*	1

Summary of Analytical Results

Client ID: NBGSB23C
GPL ID: 407146-005-003-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68060

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 16:18
Analysis Batch: 17281

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.041	.027	mg/kg	*	1

Summary of Analytical Results

Client ID: NBGSB23D
GPL ID: 407146-006-004-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68060

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 16:21
Analysis Batch: 17281

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.040	.029	mg/kg	*	1

Summary of Analytical Results

Client ID: NBGSB24A
GPL ID: 407146-007-005-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68060

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 17:58
Analysis Batch: 17281

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.036	.03	mg/kg	*	1

Summary of Analytical Results

Client ID: NBGSB24B
GPL ID: 407146-008-006-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68060

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 16:33
Analysis Batch: 17281

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.038	.024	mg/kg	*	1

Summary of Analytical Results

Client ID: TMSB24B
GPL ID: 407146-009-007-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68060

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 16:36
Analysis Batch: 17281

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.038	.026	mg/kg	*	1

Summary of Analytical Results

Client ID: NBGSB24C
GPL ID: 407146-010-008-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68060

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 16:39
Analysis Batch: 17281

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.058	.029	mg/kg	*	1

Summary of Analytical Results

Client ID: NBGSB24D
GPL ID: 407146-011-009-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68060

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 16:42
Analysis Batch: 17281

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.031	.035	mg/kg	B*	1

Summary of Analytical Results

Client ID: NBGSB25A
GPL ID: 407146-012-010-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW7471_DIG
Prep Date: 08/03/2004
Prep Time: 14:00
Prep Batch: 68060

Analytical Method: SW7471A
Date Analyzed: 08/04/2004
Time Analyzed: 16:45
Analysis Batch: 17281

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.040	.032	mg/kg	*	1

Summary of Analytical Results

Client ID: NBGSB22C
GPL ID: 407146-001-011-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67934

Analytical Method: SW8082
Date Analyzed: 07/30/2004
Time Analyzed: 14:50
Analysis Batch: 69984

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	41	ug/kg	U	1
PCB-1221	BQL	41	ug/kg	U	1
PCB-1232	BQL	41	ug/kg	U	1
PCB-1242	BQL	41	ug/kg	U	1
PCB-1248	BQL	41	ug/kg	U	1
PCB-1254	BQL	41	ug/kg	U	1
PCB-1260	BQL	41	ug/kg	U	1

Summary of Analytical Results

Client ID: NBGSB22D
GPL ID: 407146-002-001-1/2
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67934

Analytical Method: SW8082
Date Analyzed: 07/30/2004
Time Analyzed: 15:19
Analysis Batch: 69984

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	46	ug/kg	U	1
PCB-1221	BQL	46	ug/kg	U	1
PCB-1232	BQL	46	ug/kg	U	1
PCB-1242	BQL	46	ug/kg	U	1
PCB-1248	BQL	46	ug/kg	U	1
PCB-1254	BQL	46	ug/kg	U	1
PCB-1260	BQL	46	ug/kg	U	1

Summary of Analytical Results

Client ID: NBGSB23A
GPL ID: 407146-003-012-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67934

Analytical Method: SW8082
Date Analyzed: 07/30/2004
Time Analyzed: 16:46
Analysis Batch: 69984

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	39	ug/kg	U	1
PCB-1221	BQL	39	ug/kg	U	1
PCB-1232	BQL	39	ug/kg	U	1
PCB-1242	BQL	39	ug/kg	U	1
PCB-1248	BQL	39	ug/kg	U	1
PCB-1254	BQL	39	ug/kg	U	1
PCB-1260	BQL	39	ug/kg	U	1

Summary of Analytical Results

Client ID: NBGSB23B
GPL ID: 407146-004-013-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67934

Analytical Method: SW8082
Date Analyzed: 07/30/2004
Time Analyzed: 17:15
Analysis Batch: 69984

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	40	ug/kg	U	1
PCB-1221	BQL	40	ug/kg	U	1
PCB-1232	BQL	40	ug/kg	U	1
PCB-1242	BQL	40	ug/kg	U	1
PCB-1248	BQL	40	ug/kg	U	1
PCB-1254	BQL	40	ug/kg	U	1
PCB-1260	BQL	40	ug/kg	U	1

Summary of Analytical Results

Client ID: NBGSB23C
GPL ID: 407146-005-003-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67934

Analytical Method: SW8082
Date Analyzed: 07/30/2004
Time Analyzed: 17:44
Analysis Batch: 69984

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	40	ug/kg	U	1
PCB-1221	BQL	40	ug/kg	U	1
PCB-1232	BQL	40	ug/kg	U	1
PCB-1242	BQL	40	ug/kg	U	1
PCB-1248	BQL	40	ug/kg	U	1
PCB-1254	BQL	40	ug/kg	U	1
PCB-1260	BQL	40	ug/kg	U	1

Summary of Analytical Results

Client ID: NBGSB23D
GPL ID: 407146-006-004-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67934

Analytical Method: SW8082
Date Analyzed: 07/30/2004
Time Analyzed: 19:11
Analysis Batch: 69984

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	40	ug/kg	U	1
PCB-1221	BQL	40	ug/kg	U	1
PCB-1232	BQL	40	ug/kg	U	1
PCB-1242	BQL	40	ug/kg	U	1
PCB-1248	BQL	40	ug/kg	U	1
PCB-1254	BQL	40	ug/kg	U	1
PCB-1260	BQL	40	ug/kg	U	1

Summary of Analytical Results

Client ID: NBGSB24A
GPL ID: 407146-007-005-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67934

Analytical Method: SW8082
Date Analyzed: 07/31/2004
Time Analyzed: 11:08
Analysis Batch: 69984

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	38	ug/kg	U	1
PCB-1221	BQL	38	ug/kg	U	1
PCB-1232	BQL	38	ug/kg	U	1
PCB-1242	BQL	38	ug/kg	U	1
PCB-1248	BQL	38	ug/kg	U	1
PCB-1254	140	38	ug/kg		1
PCB-1260	BQL	38	ug/kg	U	1

Summary of Analytical Results

Client ID: NBGSB24B
GPL ID: 407146-008-006-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67934

Analytical Method: SW8082
Date Analyzed: 07/30/2004
Time Analyzed: 20:09
Analysis Batch: 69984

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	40	ug/kg	U	1
PCB-1221	BQL	40	ug/kg	U	1
PCB-1232	BQL	40	ug/kg	U	1
PCB-1242	BQL	40	ug/kg	U	1
PCB-1248	BQL	40	ug/kg	U	1
PCB-1254	BQL	40	ug/kg	U	1
PCB-1260	BQL	40	ug/kg	U	1

Summary of Analytical Results

Client ID: TMSB24B
GPL ID: 407146-009-007-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67934

Analytical Method: SW8082
Date Analyzed: 07/30/2004
Time Analyzed: 20:38
Analysis Batch: 69984

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	39	ug/kg	U	1
PCB-1221	BQL	39	ug/kg	U	1
PCB-1232	BQL	39	ug/kg	U	1
PCB-1242	BQL	39	ug/kg	U	1
PCB-1248	BQL	39	ug/kg	U	1
PCB-1254	BQL	39	ug/kg	U	1
PCB-1260	BQL	39	ug/kg	U	1

Summary of Analytical Results

Client ID: NBGSB24C
GPL ID: 407146-010-008-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67934

Analytical Method: SW8082
Date Analyzed: 07/30/2004
Time Analyzed: 21:07
Analysis Batch: 69984

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	39	ug/kg	U	1
PCB-1221	BQL	39	ug/kg	U	1
PCB-1232	BQL	39	ug/kg	U	1
PCB-1242	BQL	39	ug/kg	U	1
PCB-1248	BQL	39	ug/kg	U	1
PCB-1254	BQL	39	ug/kg	U	1
PCB-1260	BQL	39	ug/kg	U	1

Summary of Analytical Results

Client ID: NBGSB24D
GPL ID: 407146-011-009-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67934

Analytical Method: SW8082
Date Analyzed: 07/30/2004
Time Analyzed: 21:36
Analysis Batch: 69984

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	39	ug/kg	U	1
PCB-1221	BQL	39	ug/kg	U	1
PCB-1232	BQL	39	ug/kg	U	1
PCB-1242	BQL	39	ug/kg	U	1
PCB-1248	BQL	39	ug/kg	U	1
PCB-1254	BQL	39	ug/kg	U	1
PCB-1260	BQL	39	ug/kg	U	1

Summary of Analytical Results

Client ID: NBGSB25A DL
GPL ID: 407146-012-010-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/21/2004

Prep Method: SW3540C
Prep Date: 07/26/2004
Prep Time: 00:00
Prep Batch: 67934

Analytical Method: SW8082
Date Analyzed: 07/31/2004
Time Analyzed: 11:37
Analysis Batch: 69984

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	74	ug/kg	U	2
PCB-1221	BQL	74	ug/kg	U	2
PCB-1232	BQL	74	ug/kg	U	2
PCB-1242	BQL	74	ug/kg	U	2
PCB-1248	BQL	74	ug/kg	U	2
PCB-1254	560	74	ug/kg		2
PCB-1260	BQL	74	ug/kg	U	2

GPL LABORATORIES, LLP
ANALYTICAL RESULTS

Project Name : Radford

Date Printed August 5, 2004

GPL ID	Client ID
407146-001-011-1/1	NBGSB22C
407146-002-001-1/2	NBGSB22D
407146-003-012-1/1	NBGSB23A
407146-004-013-1/1	NBGSB23B
407146-005-003-1/1	NBGSB23C
407146-006-004-1/1	NBGSB23D
407146-007-005-1/1	NBGSB24A
407146-008-006-1/1	NBGSB24B
407146-010-008-1/1	NBGSB24C
407146-011-009-1/1	NBGSB24D
407146-012-010-1/1	NBGSB25A
407146-012-010-1/1	NBGSB25A DL
407146-012-010-1/1	NBGSB25A DL
407146-009-007-1/1	TMSB24B

Analytical Report For 407170

for

Shaw Environmental & Infrastructure

Project Manager: Eric Malarek

Project Name : Radford

August 17, 2004

GPL

Laboratories

GPL Laboratories, LLLP Certifies that the test results meet all requirements of the NELAC Standards unless otherwise noted.

Reviewed by, Project Manager	Approved by, Laboratory Director

7210A Corporate CT Frederick, MD 21703 Phone (301) 694-5310 Fax: (301) 620-0731
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Summary of Analytical Results

Client ID: NRUDW03
GPL ID: 407170-012-018-1/1
Matrix: WATER
Date Collected: 07/23/2004
Date Received: 07/24/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: E410.4
Date Analyzed: 08/12/2004
Time Analyzed: 11:45
Analysis Batch: 70205

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
COD - Chemical Oxygen Demand	1600	100	mg/L		20

GPL LABORATORIES, LLP
ANALYTICAL RESULTS

Project Name : Radford

Date Printed August 17, 2004

GPL ID	Client ID
407170-012-018-1/1	NRUDW03

Analytical Report For 407170

for

Shaw Environmental & Infrastructure

Project Manager: Eric Malarek

Project Name : Radford

August 17, 2004

GPL

Laboratories

GPL Laboratories, LLLP Certifies that the test results meet all requirements of the NELAC Standards unless otherwise noted.

Reviewed by, Project Manager	Approved by, Laboratory Director

7210A Corporate CT Frederick, MD 21703 Phone (301) 694-5310 Fax: (301) 620-0731
www.gplab.com

Summary of Analytical Results

Client ID: NRUDW02
GPL ID: 407170-011-016-1/1
Matrix: SOIL
Date Collected: 07/23/2004
Date Received: 07/24/2004

Prep Method: EXT_8332
Prep Date: 07/28/2004
Prep Time: 00:00
Prep Batch: 67984

Analytical Method: SW8332
Date Analyzed: 07/30/2004
Time Analyzed: 13:39
Analysis Batch: 70082

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Nitroglycerine	BQL	6000	ug/kg	U	1

GPL LABORATORIES, LLP
ANALYTICAL RESULTS

Project Name : Radford

Date Printed August 17, 2004

GPL ID	Client ID
407170-011-016-1/1	NRUDW02

Analytical Report For 407171

for

Shaw Environmental & Infrastructure

Project Manager : Eric Malarek

Project Name : Radford

August 11, 2004

GPL

Laboratories

GPL Laboratories, LLLP Certifies that the test results meet all requirements of the NELAC Standards unless otherwise noted.

Reviewed by, Project Manager	Approved by, Laboratory Director

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Summary of Analytical Results

Client ID: WBGTS08
GPL ID: 407171-001-001-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: LIPIDS
Date Analyzed: 08/03/2004
Time Analyzed: 00:00
Analysis Batch: 70019

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Lipids	6.1	0	%		1

Summary of Analytical Results

Client ID: WBGTS22
GPL ID: 407171-002-002-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: LIPIDS
Date Analyzed: 08/03/2004
Time Analyzed: 00:00
Analysis Batch: 70019

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Lipids	6.4	0	%		1

Summary of Analytical Results

Client ID: WBGTS18
GPL ID: 407171-003-003-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: LIPIDS
Date Analyzed: 08/03/2004
Time Analyzed: 00:00
Analysis Batch: 70019

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Lipids	0.040	0	%		1

GPL LABORATORIES, LLLP

Summary of Analytical Results

Client ID: WBGTS15
GPL ID: 407171-004-004-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: LIPIDS
Date Analyzed: 08/03/2004
Time Analyzed: 00:00
Analysis Batch: 70019

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Lipids	0.050	0	%		1

Summary of Analytical Results

Client ID: WBGTS21
GPL ID: 407171-005-005-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: LIPIDS
Date Analyzed: 08/03/2004
Time Analyzed: 00:00
Analysis Batch: 70019

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Lipids	0.36	0	%		1

Summary of Analytical Results

Client ID: WBGTS20
GPL ID: 407171-006-006-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: LIPIDS
Date Analyzed: 08/03/2004
Time Analyzed: 00:00
Analysis Batch: 70019

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Lipids	0.11	0	%		1

Summary of Analytical Results

Client ID: WBGTS19
GPL ID: 407171-007-007-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: LIPIDS
Date Analyzed: 08/03/2004
Time Analyzed: 00:00
Analysis Batch: 70019

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Lipids	0.48	0	%		1

Summary of Analytical Results

Client ID: WBGTS17
GPL ID: 407171-008-008-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: LIPIDS
Date Analyzed: 08/03/2004
Time Analyzed: 00:00
Analysis Batch: 70019

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Lipids	0.67	0	%		1

Summary of Analytical Results

Client ID: WBGTS16
GPL ID: 407171-009-009-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: LIPIDS
Date Analyzed: 08/03/2004
Time Analyzed: 00:00
Analysis Batch: 70019

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Lipids	0.070	0	%		1

Summary of Analytical Results

Client ID: WBGTS07
GPL ID: 407171-010-010-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: LIPIDS
Date Analyzed: 08/03/2004
Time Analyzed: 00:00
Analysis Batch: 70019

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Lipids	3.2	0	%		1

Summary of Analytical Results

Client ID: WBGTS06
GPL ID: 407171-011-011-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: LIPIDS
Date Analyzed: 08/03/2004
Time Analyzed: 00:00
Analysis Batch: 70019

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Lipids	3.6	0	%		1

Summary of Analytical Results

Client ID: WBGTS05
GPL ID: 407171-012-012-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: LIPIDS
Date Analyzed: 08/03/2004
Time Analyzed: 00:00
Analysis Batch: 70019

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Lipids	0.82	0	%		1

GPL LABORATORIES, LLLP

Summary of Analytical Results

Client ID: WBGTS04
GPL ID: 407171-013-013-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: LIPIDS
Date Analyzed: 08/03/2004
Time Analyzed: 00:00
Analysis Batch: 70019

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Lipids	0.70	0	%		1

Summary of Analytical Results

Client ID: WBGTS03
GPL ID: 407171-014-014-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: LIPIDS
Date Analyzed: 08/03/2004
Time Analyzed: 00:00
Analysis Batch: 70019

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Lipids	0.87	0	%		1

Summary of Analytical Results

Client ID: WBGTS02
GPL ID: 407171-015-015-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: LIPIDS
Date Analyzed: 08/03/2004
Time Analyzed: 00:00
Analysis Batch: 70019

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Lipids	0.72	0	%		1

Summary of Analytical Results

Client ID: WBGTS01
GPL ID: 407171-016-016-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: LIPIDS
Date Analyzed: 08/03/2004
Time Analyzed: 00:00
Analysis Batch: 70019

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Lipids	0.71	0	%		1

Summary of Analytical Results

Client ID: WBGTS08
GPL ID: 407171-001-001-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 04:40
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	14.9	7.4	mg/kg		1
Antimony	BQL	.74	mg/kg	U	1
Arsenic	BQL	.74	mg/kg	U	1
Barium	0.75	.19	mg/kg		1
Beryllium	BQL	.074	mg/kg	U	1
Cadmium	BQL	.22	mg/kg	U	1
Calcium	5490	37	mg/kg	N	1
Chromium	0.42	.19	mg/kg		1
Cobalt	BQL	.19	mg/kg	U	1
Copper	0.80	.37	mg/kg		1
Iron	31.2	5.6	mg/kg		1
Lead	BQL	.37	mg/kg	U	1
Magnesium	270	9.3	mg/kg		1
Manganese	0.80	.19	mg/kg		1
Nickel	BQL	.37	mg/kg	U	1
Selenium	BQL	.74	mg/kg	U	1
Silver	BQL	.11	mg/kg	U	1
Sodium	717	92.6	mg/kg		1
Thallium	BQL	1.1	mg/kg	U	1
Vanadium	BQL	.37	mg/kg	U	1
Zinc	10.7	.74	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS08
GPL ID: 407171-001-001-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/10/2004
Time Analyzed: 17:08
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Potassium	2870	18.5	mg/kg	E	2

Summary of Analytical Results

Client ID: WBGTS22
GPL ID: 407171-002-002-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 04:48
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	BQL	7.4	mg/kg	U	1
Antimony	BQL	.74	mg/kg	U	1
Arsenic	BQL	.74	mg/kg	U	1
Barium	BQL	.18	mg/kg	U	1
Beryllium	BQL	.074	mg/kg	U	1
Cadmium	BQL	.22	mg/kg	U	1
Calcium	604	36.8	mg/kg	N	1
Chromium	BQL	.18	mg/kg	U	1
Cobalt	BQL	.18	mg/kg	U	1
Copper	0.52	.37	mg/kg		1
Iron	11.9	5.5	mg/kg		1
Lead	BQL	.37	mg/kg	U	1
Magnesium	206	9.2	mg/kg		1
Manganese	BQL	.18	mg/kg	U	1
Nickel	BQL	.37	mg/kg	U	1
Selenium	BQL	.74	mg/kg	U	1
Silver	BQL	.11	mg/kg	U	1
Sodium	418	91.9	mg/kg		1
Thallium	BQL	1.1	mg/kg	U	1
Vanadium	BQL	.37	mg/kg	U	1
Zinc	6.9	.74	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS22
GPL ID: 407171-002-002-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/10/2004
Time Analyzed: 17:57
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Potassium	2790	18.4	mg/kg	E	2

Summary of Analytical Results

Client ID: WBGTS18
GPL ID: 407171-003-003-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 05:47
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	BQL	7.4	mg/kg	U	1
Antimony	BQL	.74	mg/kg	U	1
Arsenic	BQL	.74	mg/kg	U	1
Barium	1.0	.18	mg/kg		1
Beryllium	BQL	.074	mg/kg	U	1
Cadmium	BQL	.22	mg/kg	U	1
Calcium	8720	36.8	mg/kg	N	1
Chromium	0.24	.18	mg/kg		1
Cobalt	BQL	.18	mg/kg	U	1
Copper	BQL	.37	mg/kg	U	1
Iron	BQL	5.5	mg/kg	U	1
Lead	BQL	.37	mg/kg	U	1
Magnesium	300	9.2	mg/kg		1
Manganese	0.76	.18	mg/kg		1
Nickel	BQL	.37	mg/kg	U	1
Selenium	BQL	.74	mg/kg	U	1
Silver	BQL	.11	mg/kg	U	1
Sodium	1070	91.9	mg/kg		1
Thallium	BQL	1.1	mg/kg	U	1
Vanadium	BQL	.37	mg/kg	U	1
Zinc	13.5	.74	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS18
GPL ID: 407171-003-003-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/10/2004
Time Analyzed: 18:36
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Potassium	2600	18.4	mg/kg	E	2

Summary of Analytical Results

Client ID: WBGTS15
GPL ID: 407171-004-004-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 05:55
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	BQL	7.8	mg/kg	U	1
Antimony	BQL	.78	mg/kg	U	1
Arsenic	BQL	.78	mg/kg	U	1
Barium	BQL	.19	mg/kg	U	1
Beryllium	BQL	.078	mg/kg	U	1
Cadmium	BQL	.23	mg/kg	U	1
Calcium	688	38.9	mg/kg	N	1
Chromium	BQL	.19	mg/kg	U	1
Cobalt	BQL	.19	mg/kg	U	1
Copper	BQL	.39	mg/kg	U	1
Iron	BQL	5.8	mg/kg	U	1
Lead	BQL	.39	mg/kg	U	1
Magnesium	262	9.7	mg/kg		1
Manganese	BQL	.19	mg/kg	U	1
Nickel	BQL	.39	mg/kg	U	1
Selenium	BQL	.78	mg/kg	U	1
Silver	BQL	.12	mg/kg	U	1
Sodium	693	97.3	mg/kg		1
Thallium	BQL	1.2	mg/kg	U	1
Vanadium	BQL	.39	mg/kg	U	1
Zinc	9.1	.78	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS15
GPL ID: 407171-004-004-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/10/2004
Time Analyzed: 18:44
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Potassium	3170	19.5	mg/kg	E	2

Summary of Analytical Results

Client ID: WBGTS21
GPL ID: 407171-005-005-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 06:03
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	BQL	7.4	mg/kg	U	1
Antimony	BQL	.74	mg/kg	U	1
Arsenic	BQL	.74	mg/kg	U	1
Barium	0.34	.19	mg/kg		1
Beryllium	BQL	.074	mg/kg	U	1
Cadmium	BQL	.22	mg/kg	U	1
Calcium	1130	37	mg/kg	N	1
Chromium	BQL	.19	mg/kg	U	1
Cobalt	BQL	.19	mg/kg	U	1
Copper	BQL	.37	mg/kg	U	1
Iron	BQL	5.6	mg/kg	U	1
Lead	BQL	.37	mg/kg	U	1
Magnesium	209	9.3	mg/kg		1
Manganese	0.53	.19	mg/kg		1
Nickel	BQL	.37	mg/kg	U	1
Selenium	BQL	.74	mg/kg	U	1
Silver	BQL	.11	mg/kg	U	1
Sodium	792	92.6	mg/kg		1
Thallium	BQL	1.1	mg/kg	U	1
Vanadium	BQL	.37	mg/kg	U	1
Zinc	8.6	.74	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS21
GPL ID: 407171-005-005-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/10/2004
Time Analyzed: 18:52
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Potassium	2850	18.5	mg/kg	E	2

Summary of Analytical Results

Client ID: WBGTS20
GPL ID: 407171-006-006-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 06:11
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	BQL	7.4	mg/kg	U	1
Antimony	BQL	.74	mg/kg	U	1
Arsenic	BQL	.74	mg/kg	U	1
Barium	0.38	.19	mg/kg		1
Beryllium	BQL	.074	mg/kg	U	1
Cadmium	BQL	.22	mg/kg	U	1
Calcium	2840	37.2	mg/kg	N	1
Chromium	BQL	.19	mg/kg	U	1
Cobalt	BQL	.19	mg/kg	U	1
Copper	BQL	.37	mg/kg	U	1
Iron	BQL	5.6	mg/kg	U	1
Lead	BQL	.37	mg/kg	U	1
Magnesium	234	9.3	mg/kg		1
Manganese	0.24	.19	mg/kg		1
Nickel	BQL	.37	mg/kg	U	1
Selenium	BQL	.74	mg/kg	U	1
Silver	BQL	.11	mg/kg	U	1
Sodium	764	92.9	mg/kg		1
Thallium	BQL	1.1	mg/kg	U	1
Vanadium	BQL	.37	mg/kg	U	1
Zinc	11.2	.74	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS20
GPL ID: 407171-006-006-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/10/2004
Time Analyzed: 18:59
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Potassium	2770	18.6	mg/kg	E	2

Summary of Analytical Results

Client ID: WBGTS19
GPL ID: 407171-007-007-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 06:19
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	BQL	7.4	mg/kg	U	1
Antimony	BQL	.74	mg/kg	U	1
Arsenic	BQL	.74	mg/kg	U	1
Barium	0.29	.18	mg/kg		1
Beryllium	BQL	.074	mg/kg	U	1
Cadmium	BQL	.22	mg/kg	U	1
Calcium	1650	36.9	mg/kg	N	1
Chromium	BQL	.18	mg/kg	U	1
Cobalt	BQL	.18	mg/kg	U	1
Copper	BQL	.37	mg/kg	U	1
Iron	BQL	5.5	mg/kg	U	1
Lead	BQL	.37	mg/kg	U	1
Magnesium	232	9.2	mg/kg		1
Manganese	BQL	.18	mg/kg	U	1
Nickel	BQL	.37	mg/kg	U	1
Selenium	BQL	.74	mg/kg	U	1
Silver	BQL	.11	mg/kg	U	1
Sodium	869	92.3	mg/kg		1
Thallium	BQL	1.1	mg/kg	U	1
Vanadium	BQL	.37	mg/kg	U	1
Zinc	9.0	.74	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS19
GPL ID: 407171-007-007-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/10/2004
Time Analyzed: 19:07
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Potassium	2900	18.5	mg/kg	E	2

Summary of Analytical Results

Client ID: WBGTS17
GPL ID: 407171-008-008-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 06:27
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	BQL	7.4	mg/kg	U	1
Antimony	BQL	.74	mg/kg	U	1
Arsenic	BQL	.74	mg/kg	U	1
Barium	0.25	.19	mg/kg		1
Beryllium	BQL	.074	mg/kg	U	1
Cadmium	BQL	.22	mg/kg	U	1
Calcium	1790	37.2	mg/kg	N	1
Chromium	BQL	.19	mg/kg	U	1
Cobalt	BQL	.19	mg/kg	U	1
Copper	BQL	.37	mg/kg	U	1
Iron	BQL	5.6	mg/kg	U	1
Lead	BQL	.37	mg/kg	U	1
Magnesium	232	9.3	mg/kg		1
Manganese	BQL	.19	mg/kg	U	1
Nickel	BQL	.37	mg/kg	U	1
Selenium	BQL	.74	mg/kg	U	1
Silver	BQL	.11	mg/kg	U	1
Sodium	858	92.9	mg/kg		1
Thallium	BQL	1.1	mg/kg	U	1
Vanadium	BQL	.37	mg/kg	U	1
Zinc	9.3	.74	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS17
GPL ID: 407171-008-008-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/10/2004
Time Analyzed: 19:33
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Potassium	2990	18.6	mg/kg	E	2

Summary of Analytical Results

Client ID: WBGTS16
GPL ID: 407171-009-009-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 06:35
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	BQL	7.5	mg/kg	U	1
Antimony	BQL	.75	mg/kg	U	1
Arsenic	BQL	.75	mg/kg	U	1
Barium	0.24	.19	mg/kg		1
Beryllium	BQL	.075	mg/kg	U	1
Cadmium	BQL	.22	mg/kg	U	1
Calcium	2180	37.3	mg/kg	N	1
Chromium	BQL	.19	mg/kg	U	1
Cobalt	BQL	.19	mg/kg	U	1
Copper	0.56	.37	mg/kg		1
Iron	BQL	5.6	mg/kg	U	1
Lead	BQL	.37	mg/kg	U	1
Magnesium	236	9.3	mg/kg		1
Manganese	0.23	.19	mg/kg		1
Nickel	BQL	.37	mg/kg	U	1
Selenium	BQL	.75	mg/kg	U	1
Silver	BQL	.11	mg/kg	U	1
Sodium	902	93.3	mg/kg		1
Thallium	BQL	1.1	mg/kg	U	1
Vanadium	BQL	.37	mg/kg	U	1
Zinc	11.5	.75	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS16
GPL ID: 407171-009-009-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/10/2004
Time Analyzed: 19:41
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Potassium	2840	18.7	mg/kg	E	2

Summary of Analytical Results

Client ID: WBGTS07
GPL ID: 407171-010-010-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 06:43
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	50.7	7.4	mg/kg		1
Antimony	BQL	.74	mg/kg	U	1
Arsenic	BQL	.74	mg/kg	U	1
Barium	2.4	.19	mg/kg		1
Beryllium	BQL	.074	mg/kg	U	1
Cadmium	BQL	.22	mg/kg	U	1
Calcium	6280	37	mg/kg	N	1
Chromium	0.63	.19	mg/kg		1
Cobalt	BQL	.19	mg/kg	U	1
Copper	0.47	.37	mg/kg		1
Iron	74.2	5.6	mg/kg		1
Lead	BQL	.37	mg/kg	U	1
Magnesium	262	9.3	mg/kg		1
Manganese	2.0	.19	mg/kg		1
Nickel	BQL	.37	mg/kg	U	1
Selenium	BQL	.74	mg/kg	U	1
Silver	BQL	.11	mg/kg	U	1
Sodium	1010	92.6	mg/kg		1
Thallium	BQL	1.1	mg/kg	U	1
Vanadium	BQL	.37	mg/kg	U	1
Zinc	12.5	.74	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS07
GPL ID: 407171-010-010-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/10/2004
Time Analyzed: 19:49
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Potassium	2670	18.5	mg/kg	E	2

Summary of Analytical Results

Client ID: WBGTS06
GPL ID: 407171-011-011-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 07:10
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	BQL	7.5	mg/kg	U	1
Antimony	BQL	.75	mg/kg	U	1
Arsenic	BQL	.75	mg/kg	U	1
Barium	2.0	.19	mg/kg		1
Beryllium	BQL	.075	mg/kg	U	1
Cadmium	BQL	.22	mg/kg	U	1
Calcium	10700	37.3	mg/kg	N	1
Chromium	0.30	.19	mg/kg		1
Cobalt	BQL	.19	mg/kg	U	1
Copper	0.45	.37	mg/kg		1
Iron	24	5.6	mg/kg		1
Lead	BQL	.37	mg/kg	U	1
Magnesium	294	9.3	mg/kg		1
Manganese	2.7	.19	mg/kg		1
Nickel	BQL	.37	mg/kg	U	1
Selenium	BQL	.75	mg/kg	U	1
Silver	BQL	.11	mg/kg	U	1
Sodium	962	93.3	mg/kg		1
Thallium	BQL	1.1	mg/kg	U	1
Vanadium	BQL	.37	mg/kg	U	1
Zinc	13.7	.75	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS06
GPL ID: 407171-011-011-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/10/2004
Time Analyzed: 19:56
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Potassium	2640	18.7	mg/kg	E	2

Summary of Analytical Results

Client ID: WBGTS05
GPL ID: 407171-012-012-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 07:18
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	34.7	7.3	mg/kg		1
Antimony	BQL	.73	mg/kg	U	1
Arsenic	BQL	.73	mg/kg	U	1
Barium	0.84	.18	mg/kg		1
Beryllium	BQL	.073	mg/kg	U	1
Cadmium	BQL	.22	mg/kg	U	1
Calcium	7390	36.5	mg/kg	N	1
Chromium	0.47	.18	mg/kg		1
Cobalt	BQL	.18	mg/kg	U	1
Copper	BQL	.36	mg/kg	U	1
Iron	70.6	5.5	mg/kg		1
Lead	BQL	.36	mg/kg	U	1
Magnesium	313	9.1	mg/kg		1
Manganese	1.0	.18	mg/kg		1
Nickel	BQL	.36	mg/kg	U	1
Selenium	BQL	.73	mg/kg	U	1
Silver	BQL	.11	mg/kg	U	1
Sodium	962	91.2	mg/kg		1
Thallium	BQL	1.1	mg/kg	U	1
Vanadium	BQL	.36	mg/kg	U	1
Zinc	16.8	.73	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS05
GPL ID: 407171-012-012-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/10/2004
Time Analyzed: 20:04
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Potassium	2750	18.2	mg/kg	E	2

Summary of Analytical Results

Client ID: WBGTS04
GPL ID: 407171-013-013-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 07:26
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	BQL	7.6	mg/kg	U	1
Antimony	BQL	.76	mg/kg	U	1
Arsenic	BQL	.76	mg/kg	U	1
Barium	0.88	.19	mg/kg		1
Beryllium	BQL	.076	mg/kg	U	1
Cadmium	BQL	.23	mg/kg	U	1
Calcium	9970	38.2	mg/kg	N	1
Chromium	0.65	.19	mg/kg		1
Cobalt	BQL	.19	mg/kg	U	1
Copper	0.44	.38	mg/kg		1
Iron	30.1	5.7	mg/kg		1
Lead	BQL	.38	mg/kg	U	1
Magnesium	275	9.5	mg/kg		1
Manganese	1.4	.19	mg/kg		1
Nickel	BQL	.38	mg/kg	U	1
Selenium	BQL	.76	mg/kg	U	1
Silver	BQL	.11	mg/kg	U	1
Sodium	1100	95.4	mg/kg		1
Thallium	BQL	1.1	mg/kg	U	1
Vanadium	BQL	.38	mg/kg	U	1
Zinc	17.2	.76	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS04
GPL ID: 407171-013-013-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/10/2004
Time Analyzed: 20:12
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Potassium	2720	19.1	mg/kg	E	2

Summary of Analytical Results

Client ID: WBGTS03
GPL ID: 407171-014-014-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 07:34
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	11.3	7.5	mg/kg		1
Antimony	BQL	.75	mg/kg	U	1
Arsenic	BQL	.75	mg/kg	U	1
Barium	1.0	.19	mg/kg		1
Beryllium	BQL	.075	mg/kg	U	1
Cadmium	BQL	.22	mg/kg	U	1
Calcium	9360	37.3	mg/kg	N	1
Chromium	0.35	.19	mg/kg		1
Cobalt	BQL	.19	mg/kg	U	1
Copper	BQL	.37	mg/kg	U	1
Iron	38.9	5.6	mg/kg		1
Lead	BQL	.37	mg/kg	U	1
Magnesium	356	9.3	mg/kg		1
Manganese	1.7	.19	mg/kg		1
Nickel	BQL	.37	mg/kg	U	1
Selenium	BQL	.75	mg/kg	U	1
Silver	BQL	.11	mg/kg	U	1
Sodium	1190	93.3	mg/kg		1
Thallium	BQL	1.1	mg/kg	U	1
Vanadium	BQL	.37	mg/kg	U	1
Zinc	20	.75	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS03
GPL ID: 407171-014-014-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/10/2004
Time Analyzed: 20:20
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Potassium	2650	18.7	mg/kg	E	2

Summary of Analytical Results

Client ID: WBGTS02
GPL ID: 407171-015-015-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 07:42
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	24.9	7.4	mg/kg		1
Antimony	BQL	.74	mg/kg	U	1
Arsenic	BQL	.74	mg/kg	U	1
Barium	2.1	.19	mg/kg		1
Beryllium	BQL	.074	mg/kg	U	1
Cadmium	BQL	.22	mg/kg	U	1
Calcium	14300	37.2	mg/kg	N	1
Chromium	0.44	.19	mg/kg		1
Cobalt	BQL	.19	mg/kg	U	1
Copper	0.47	.37	mg/kg		1
Iron	60.4	5.6	mg/kg		1
Lead	BQL	.37	mg/kg	U	1
Magnesium	402	9.3	mg/kg		1
Manganese	3.5	.19	mg/kg		1
Nickel	BQL	.37	mg/kg	U	1
Selenium	BQL	.74	mg/kg	U	1
Silver	BQL	.11	mg/kg	U	1
Sodium	1060	92.9	mg/kg		1
Thallium	BQL	1.1	mg/kg	U	1
Vanadium	BQL	.37	mg/kg	U	1
Zinc	25.1	.74	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS02
GPL ID: 407171-015-015-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/10/2004
Time Analyzed: 20:28
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Potassium	2590	18.6	mg/kg	E	2

Summary of Analytical Results

Client ID: WBGTS01
GPL ID: 407171-016-016-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/06/2004
Time Analyzed: 07:50
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	19.7	7	mg/kg		1
Antimony	BQL	.7	mg/kg	U	1
Arsenic	BQL	.7	mg/kg	U	1
Barium	1.8	.17	mg/kg		1
Beryllium	BQL	.07	mg/kg	U	1
Cadmium	BQL	.21	mg/kg	U	1
Calcium	8940	34.8	mg/kg	N	1
Chromium	0.26	.17	mg/kg		1
Cobalt	BQL	.17	mg/kg	U	1
Copper	0.56	.35	mg/kg		1
Iron	44.8	5.2	mg/kg		1
Lead	BQL	.35	mg/kg	U	1
Magnesium	286	8.7	mg/kg		1
Manganese	2.3	.17	mg/kg		1
Nickel	BQL	.35	mg/kg	U	1
Selenium	BQL	.7	mg/kg	U	1
Silver	BQL	.1	mg/kg	U	1
Sodium	1140	87.1	mg/kg		1
Thallium	BQL	1	mg/kg	U	1
Vanadium	BQL	.35	mg/kg	U	1
Zinc	15.3	.7	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS01
GPL ID: 407171-016-016-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3050B
Prep Date: 08/03/2004
Prep Time: 00:00
Prep Batch: 68044

Analytical Method: SW6010B
Date Analyzed: 08/10/2004
Time Analyzed: 20:35
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Potassium	2600	17.4	mg/kg	E	2

Summary of Analytical Results

Client ID: WBGTS08
GPL ID: 407171-001-001-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW7471_DIG
Prep Date: 08/07/2004
Prep Time: 11:00
Prep Batch: 68148

Analytical Method: SW7471A
Date Analyzed: 08/08/2004
Time Analyzed: 14:07
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.024	.02	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS22
GPL ID: 407171-002-002-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW7471_DIG
Prep Date: 08/07/2004
Prep Time: 11:00
Prep Batch: 68148

Analytical Method: SW7471A
Date Analyzed: 08/08/2004
Time Analyzed: 14:26
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.087	.02	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS18
GPL ID: 407171-003-003-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW7471_DIG
Prep Date: 08/07/2004
Prep Time: 11:00
Prep Batch: 68148

Analytical Method: SW7471A
Date Analyzed: 08/08/2004
Time Analyzed: 14:29
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.069	.02	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS15
GPL ID: 407171-004-004-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW7471_DIG
Prep Date: 08/07/2004
Prep Time: 11:00
Prep Batch: 68148

Analytical Method: SW7471A
Date Analyzed: 08/08/2004
Time Analyzed: 14:33
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.056	.019	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS21
GPL ID: 407171-005-005-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW7471_DIG
Prep Date: 08/07/2004
Prep Time: 11:00
Prep Batch: 68148

Analytical Method: SW7471A
Date Analyzed: 08/08/2004
Time Analyzed: 14:37
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.036	.02	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS20
GPL ID: 407171-006-006-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW7471_DIG
Prep Date: 08/07/2004
Prep Time: 11:00
Prep Batch: 68148

Analytical Method: SW7471A
Date Analyzed: 08/08/2004
Time Analyzed: 14:40
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.050	.02	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS19
GPL ID: 407171-007-007-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW7471_DIG
Prep Date: 08/07/2004
Prep Time: 11:00
Prep Batch: 68148

Analytical Method: SW7471A
Date Analyzed: 08/08/2004
Time Analyzed: 14:44
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.019	.019	mg/kg	B	1

Summary of Analytical Results

Client ID: WBGTS17
GPL ID: 407171-008-008-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW7471_DIG
Prep Date: 08/07/2004
Prep Time: 11:00
Prep Batch: 68148

Analytical Method: SW7471A
Date Analyzed: 08/08/2004
Time Analyzed: 14:48
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.030	.02	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS16
GPL ID: 407171-009-009-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW7471_DIG
Prep Date: 08/07/2004
Prep Time: 11:00
Prep Batch: 68148

Analytical Method: SW7471A
Date Analyzed: 08/08/2004
Time Analyzed: 14:51
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.087	.019	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS07
GPL ID: 407171-010-010-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW7471_DIG
Prep Date: 08/07/2004
Prep Time: 11:00
Prep Batch: 68148

Analytical Method: SW7471A
Date Analyzed: 08/08/2004
Time Analyzed: 14:55
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.028	.019	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS06
GPL ID: 407171-011-011-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW7471_DIG
Prep Date: 08/07/2004
Prep Time: 11:00
Prep Batch: 68148

Analytical Method: SW7471A
Date Analyzed: 08/08/2004
Time Analyzed: 15:06
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.028	.019	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS05
GPL ID: 407171-012-012-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW7471_DIG
Prep Date: 08/07/2004
Prep Time: 11:00
Prep Batch: 68148

Analytical Method: SW7471A
Date Analyzed: 08/08/2004
Time Analyzed: 15:10
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.047	.018	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS04
GPL ID: 407171-013-013-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW7471_DIG
Prep Date: 08/07/2004
Prep Time: 11:00
Prep Batch: 68148

Analytical Method: SW7471A
Date Analyzed: 08/08/2004
Time Analyzed: 15:13
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.078	.02	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS03
GPL ID: 407171-014-014-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW7471_DIG
Prep Date: 08/07/2004
Prep Time: 11:00
Prep Batch: 68148

Analytical Method: SW7471A
Date Analyzed: 08/08/2004
Time Analyzed: 15:17
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.071	.019	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS02
GPL ID: 407171-015-015-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW7471_DIG
Prep Date: 08/07/2004
Prep Time: 11:00
Prep Batch: 68148

Analytical Method: SW7471A
Date Analyzed: 08/08/2004
Time Analyzed: 15:21
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.040	.02	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS01
GPL ID: 407171-016-016-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW7471_DIG
Prep Date: 08/07/2004
Prep Time: 11:00
Prep Batch: 68148

Analytical Method: SW7471A
Date Analyzed: 08/08/2004
Time Analyzed: 15:25
Analysis Batch: 17332

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.037	.019	mg/kg		1

Summary of Analytical Results

Client ID: WBGTS08
GPL ID: 407171-001-001-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3540C
Prep Date: 08/02/2004
Prep Time: 00:00
Prep Batch: 68061

Analytical Method: SW8082
Date Analyzed: 08/04/2004
Time Analyzed: 10:31
Analysis Batch: 70104

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	50	ug/kg	U	1
PCB-1221	BQL	50	ug/kg	U	1
PCB-1232	BQL	50	ug/kg	U	1
PCB-1242	BQL	50	ug/kg	U	1
PCB-1248	BQL	50	ug/kg	U	1
PCB-1254	BQL	50	ug/kg	U	1
PCB-1260	BQL	50	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGTS22
GPL ID: 407171-002-002-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3540C
Prep Date: 08/02/2004
Prep Time: 00:00
Prep Batch: 68061

Analytical Method: SW8082
Date Analyzed: 08/04/2004
Time Analyzed: 11:00
Analysis Batch: 70104

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	50	ug/kg	U	1
PCB-1221	BQL	50	ug/kg	U	1
PCB-1232	BQL	50	ug/kg	U	1
PCB-1242	BQL	50	ug/kg	U	1
PCB-1248	BQL	50	ug/kg	U	1
PCB-1254	BQL	50	ug/kg	U	1
PCB-1260	BQL	50	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGTS18
GPL ID: 407171-003-003-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3540C
Prep Date: 08/02/2004
Prep Time: 00:00
Prep Batch: 68061

Analytical Method: SW8082
Date Analyzed: 08/04/2004
Time Analyzed: 12:27
Analysis Batch: 70104

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	50	ug/kg	U	1
PCB-1221	BQL	50	ug/kg	U	1
PCB-1232	BQL	50	ug/kg	U	1
PCB-1242	BQL	50	ug/kg	U	1
PCB-1248	BQL	50	ug/kg	U	1
PCB-1254	BQL	50	ug/kg	U	1
PCB-1260	BQL	50	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGTS15
GPL ID: 407171-004-004-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3540C
Prep Date: 08/02/2004
Prep Time: 00:00
Prep Batch: 68061

Analytical Method: SW8082
Date Analyzed: 08/04/2004
Time Analyzed: 12:56
Analysis Batch: 70104

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	50	ug/kg	U	1
PCB-1221	BQL	50	ug/kg	U	1
PCB-1232	BQL	50	ug/kg	U	1
PCB-1242	BQL	50	ug/kg	U	1
PCB-1248	BQL	50	ug/kg	U	1
PCB-1254	BQL	50	ug/kg	U	1
PCB-1260	BQL	50	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGTS21
GPL ID: 407171-005-005-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3540C
Prep Date: 08/02/2004
Prep Time: 00:00
Prep Batch: 68061

Analytical Method: SW8082
Date Analyzed: 08/04/2004
Time Analyzed: 13:25
Analysis Batch: 70104

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	50	ug/kg	U	1
PCB-1221	BQL	50	ug/kg	U	1
PCB-1232	BQL	50	ug/kg	U	1
PCB-1242	BQL	50	ug/kg	U	1
PCB-1248	BQL	50	ug/kg	U	1
PCB-1254	BQL	50	ug/kg	U	1
PCB-1260	BQL	50	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGTS20
GPL ID: 407171-006-006-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3540C
Prep Date: 08/02/2004
Prep Time: 00:00
Prep Batch: 68061

Analytical Method: SW8082
Date Analyzed: 08/04/2004
Time Analyzed: 13:54
Analysis Batch: 70104

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	50	ug/kg	U	1
PCB-1221	BQL	50	ug/kg	U	1
PCB-1232	BQL	50	ug/kg	U	1
PCB-1242	BQL	50	ug/kg	U	1
PCB-1248	BQL	50	ug/kg	U	1
PCB-1254	BQL	50	ug/kg	U	1
PCB-1260	BQL	50	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGTS19
GPL ID: 407171-007-007-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3540C
Prep Date: 08/02/2004
Prep Time: 00:00
Prep Batch: 68061

Analytical Method: SW8082
Date Analyzed: 08/04/2004
Time Analyzed: 15:21
Analysis Batch: 70104

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	50	ug/kg	U	1
PCB-1221	BQL	50	ug/kg	U	1
PCB-1232	BQL	50	ug/kg	U	1
PCB-1242	BQL	50	ug/kg	U	1
PCB-1248	BQL	50	ug/kg	U	1
PCB-1254	BQL	50	ug/kg	U	1
PCB-1260	BQL	50	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGTS17
GPL ID: 407171-008-008-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3540C
Prep Date: 08/02/2004
Prep Time: 00:00
Prep Batch: 68061

Analytical Method: SW8082
Date Analyzed: 08/04/2004
Time Analyzed: 15:50
Analysis Batch: 70104

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	50	ug/kg	U	1
PCB-1221	BQL	50	ug/kg	U	1
PCB-1232	BQL	50	ug/kg	U	1
PCB-1242	BQL	50	ug/kg	U	1
PCB-1248	BQL	50	ug/kg	U	1
PCB-1254	BQL	50	ug/kg	U	1
PCB-1260	BQL	50	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGTS16
GPL ID: 407171-009-009-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3540C
Prep Date: 08/02/2004
Prep Time: 00:00
Prep Batch: 68061

Analytical Method: SW8082
Date Analyzed: 08/04/2004
Time Analyzed: 16:19
Analysis Batch: 70104

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	50	ug/kg	U	1
PCB-1221	BQL	50	ug/kg	U	1
PCB-1232	BQL	50	ug/kg	U	1
PCB-1242	BQL	50	ug/kg	U	1
PCB-1248	BQL	50	ug/kg	U	1
PCB-1254	BQL	50	ug/kg	U	1
PCB-1260	BQL	50	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGTS07
GPL ID: 407171-010-010-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3540C
Prep Date: 08/02/2004
Prep Time: 00:00
Prep Batch: 68061

Analytical Method: SW8082
Date Analyzed: 08/04/2004
Time Analyzed: 16:48
Analysis Batch: 70104

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	50	ug/kg	U	1
PCB-1221	BQL	50	ug/kg	U	1
PCB-1232	BQL	50	ug/kg	U	1
PCB-1242	BQL	50	ug/kg	U	1
PCB-1248	BQL	50	ug/kg	U	1
PCB-1254	BQL	50	ug/kg	U	1
PCB-1260	BQL	50	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGTS06
GPL ID: 407171-011-011-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3540C
Prep Date: 08/02/2004
Prep Time: 00:00
Prep Batch: 68061

Analytical Method: SW8082
Date Analyzed: 08/04/2004
Time Analyzed: 17:17
Analysis Batch: 70104

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	50	ug/kg	U	1
PCB-1221	BQL	50	ug/kg	U	1
PCB-1232	BQL	50	ug/kg	U	1
PCB-1242	BQL	50	ug/kg	U	1
PCB-1248	BQL	50	ug/kg	U	1
PCB-1254	BQL	50	ug/kg	U	1
PCB-1260	BQL	50	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGTS05
GPL ID: 407171-012-012-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3540C
Prep Date: 08/02/2004
Prep Time: 00:00
Prep Batch: 68061

Analytical Method: SW8082
Date Analyzed: 08/04/2004
Time Analyzed: 17:46
Analysis Batch: 70104

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	50	ug/kg	U	1
PCB-1221	BQL	50	ug/kg	U	1
PCB-1232	BQL	50	ug/kg	U	1
PCB-1242	BQL	50	ug/kg	U	1
PCB-1248	BQL	50	ug/kg	U	1
PCB-1254	BQL	50	ug/kg	U	1
PCB-1260	BQL	50	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGTS04
GPL ID: 407171-013-013-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3540C
Prep Date: 08/02/2004
Prep Time: 00:00
Prep Batch: 68061

Analytical Method: SW8082
Date Analyzed: 08/04/2004
Time Analyzed: 18:15
Analysis Batch: 70104

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	50	ug/kg	U	1
PCB-1221	BQL	50	ug/kg	U	1
PCB-1232	BQL	50	ug/kg	U	1
PCB-1242	BQL	50	ug/kg	U	1
PCB-1248	BQL	50	ug/kg	U	1
PCB-1254	BQL	50	ug/kg	U	1
PCB-1260	BQL	50	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGTS03
GPL ID: 407171-014-014-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3540C
Prep Date: 08/02/2004
Prep Time: 00:00
Prep Batch: 68061

Analytical Method: SW8082
Date Analyzed: 08/04/2004
Time Analyzed: 18:44
Analysis Batch: 70104

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	50	ug/kg	U	1
PCB-1221	BQL	50	ug/kg	U	1
PCB-1232	BQL	50	ug/kg	U	1
PCB-1242	BQL	50	ug/kg	U	1
PCB-1248	BQL	50	ug/kg	U	1
PCB-1254	BQL	50	ug/kg	U	1
PCB-1260	BQL	50	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGTS02
GPL ID: 407171-015-015-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3540C
Prep Date: 08/02/2004
Prep Time: 00:00
Prep Batch: 68061

Analytical Method: SW8082
Date Analyzed: 08/04/2004
Time Analyzed: 19:13
Analysis Batch: 70104

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	50	ug/kg	U	1
PCB-1221	BQL	50	ug/kg	U	1
PCB-1232	BQL	50	ug/kg	U	1
PCB-1242	BQL	50	ug/kg	U	1
PCB-1248	BQL	50	ug/kg	U	1
PCB-1254	BQL	50	ug/kg	U	1
PCB-1260	BQL	50	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGTS01
GPL ID: 407171-016-016-1/1
Matrix: TISSUE
Date Collected: 07/21/2004
Date Received: 07/23/2004

Prep Method: SW3540C
Prep Date: 08/02/2004
Prep Time: 00:00
Prep Batch: 68061

Analytical Method: SW8082
Date Analyzed: 08/04/2004
Time Analyzed: 19:42
Analysis Batch: 70104

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	50	ug/kg	U	1
PCB-1221	BQL	50	ug/kg	U	1
PCB-1232	BQL	50	ug/kg	U	1
PCB-1242	BQL	50	ug/kg	U	1
PCB-1248	BQL	50	ug/kg	U	1
PCB-1254	BQL	50	ug/kg	U	1
PCB-1260	BQL	50	ug/kg	U	1

GPL LABORATORIES, LLP
ANALYTICAL RESULTS

Project Name : Radford

Date Printed August 11, 2004

GPL ID	Client ID
407171-016-016-1/1	WBGTS01
407171-015-015-1/1	WBGTS02
407171-014-014-1/1	WBGTS03
407171-013-013-1/1	WBGTS04
407171-012-012-1/1	WBGTS05
407171-011-011-1/1	WBGTS06
407171-010-010-1/1	WBGTS07
407171-001-001-1/1	WBGTS08
407171-004-004-1/1	WBGTS15
407171-009-009-1/1	WBGTS16
407171-008-008-1/1	WBGTS17
407171-003-003-1/1	WBGTS18
407171-007-007-1/1	WBGTS19
407171-006-006-1/1	WBGTS20
407171-005-005-1/1	WBGTS21
407171-002-002-1/1	WBGTS22

Analytical Report For 407172

for

Shaw Environmental & Infrastructure

Project Manager: Eric Malarek

Project Name : Radford

August 16, 2004

GPL

Laboratories

GPL Laboratories, LLLP Certifies that the test results meet all requirements of the NELAC Standards unless otherwise noted.

Reviewed by, Project Manager	Approved by, Laboratory Director

7210A Corporate CT Frederick, MD 21703 Phone (301) 694-5310 Fax: (301) 620-0731
www.gplab.com

Summary of Analytical Results

Client ID: DTSB89A
GPL ID: 407172-001-001-1/1
Matrix: SOIL
Date Collected: 07/23/2004
Date Received: 07/24/2004

Prep Method: SW3540C
Prep Date: 07/27/2004
Prep Time: 00:00
Prep Batch: 67957

Analytical Method: SW8082
Date Analyzed: 07/31/2004
Time Analyzed: 07:45
Analysis Batch: 70085

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	37	ug/kg	U	1
PCB-1221	BQL	37	ug/kg	U	1
PCB-1232	BQL	37	ug/kg	U	1
PCB-1242	BQL	37	ug/kg	U	1
PCB-1248	BQL	37	ug/kg	U	1
PCB-1254	BQL	37	ug/kg	U	1
PCB-1260	BQL	37	ug/kg	U	1

GPL LABORATORIES, LLP
ANALYTICAL RESULTS

Project Name : Radford

Date Printed August 16, 2004

GPL ID	Client ID
407172-001-001-1/1	DTSB89A

Analytical Report For 407173

for

Shaw Environmental & Infrastructure

Project Manager: Eric Malarek

Project Name : Radford

August 16, 2004

GPL

Laboratories

GPL Laboratories, LLLP Certifies that the test results meet all requirements of the NELAC Standards unless otherwise noted.

Reviewed by, Project Manager	Approved by, Laboratory Director

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Summary of Analytical Results

Client ID: NBGSB32A
GPL ID: 407173-001-001-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/11/2004
Prep Time: 15:00
Prep Batch: 68234

Analytical Method: SW7471A
Date Analyzed: 08/12/2004
Time Analyzed: 12:35
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.097	.033	mg/kg		1

GPL LABORATORIES, LLLP

Summary of Analytical Results

Client ID: NBGSB26A
GPL ID: 407173-002-002-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/11/2004
Prep Time: 15:00
Prep Batch: 68234

Analytical Method: SW7471A
Date Analyzed: 08/12/2004
Time Analyzed: 12:38
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.031	.031	mg/kg	B	1

GPL LABORATORIES, LLLP

Summary of Analytical Results

Client ID: NBGSB27A
GPL ID: 407173-003-003-1/1
Matrix: SOIL
Date Collected: 07/22/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/11/2004
Prep Time: 15:00
Prep Batch: 68234

Analytical Method: SW7471A
Date Analyzed: 08/12/2004
Time Analyzed: 13:55
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.048	.034	mg/kg		1

GPL LABORATORIES, LLLP

Summary of Analytical Results

Client ID: NBGSB29A
GPL ID: 407173-004-004-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/11/2004
Prep Time: 15:00
Prep Batch: 68234

Analytical Method: SW7471A
Date Analyzed: 08/12/2004
Time Analyzed: 12:49
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.045	.033	mg/kg		1

GPL LABORATORIES, LLLP

Summary of Analytical Results

Client ID: NBGSB31A
GPL ID: 407173-005-005-1/1
Matrix: SOIL
Date Collected: 07/22/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/11/2004
Prep Time: 15:00
Prep Batch: 68234

Analytical Method: SW7471A
Date Analyzed: 08/12/2004
Time Analyzed: 12:52
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.061	.036	mg/kg		1

GPL LABORATORIES, LLLP

Summary of Analytical Results

Client ID: NBGSB28A
GPL ID: 407173-006-006-1/1
Matrix: SOIL
Date Collected: 07/21/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/11/2004
Prep Time: 15:00
Prep Batch: 68234

Analytical Method: SW7471A
Date Analyzed: 08/12/2004
Time Analyzed: 12:55
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.041	.032	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB33A
GPL ID: 407173-007-007-1/1
Matrix: SOIL
Date Collected: 07/21/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/11/2004
Prep Time: 15:00
Prep Batch: 68234

Analytical Method: SW7471A
Date Analyzed: 08/12/2004
Time Analyzed: 13:03
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.049	.031	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB30A
GPL ID: 407173-008-008-1/1
Matrix: SOIL
Date Collected: 07/21/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/11/2004
Prep Time: 15:00
Prep Batch: 68234

Analytical Method: SW7471A
Date Analyzed: 08/12/2004
Time Analyzed: 13:06
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.070	.034	mg/kg		1

Summary of Analytical Results

Client ID: TBSB27A
GPL ID: 407173-009-009-1/1
Matrix: SOIL
Date Collected: 07/22/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/11/2004
Prep Time: 15:00
Prep Batch: 68234

Analytical Method: SW7471A
Date Analyzed: 08/12/2004
Time Analyzed: 13:09
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.039	.032	mg/kg		1

Summary of Analytical Results

Client ID: TBSB43A
GPL ID: 407173-010-010-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/11/2004
Prep Time: 15:00
Prep Batch: 68234

Analytical Method: SW7471A
Date Analyzed: 08/12/2004
Time Analyzed: 13:12
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.030	.034	mg/kg	B	1

GPL LABORATORIES, LLLP

Summary of Analytical Results

Client ID: TBSB49B
GPL ID: 407173-011-011-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/11/2004
Prep Time: 15:00
Prep Batch: 68234

Analytical Method: SW7471A
Date Analyzed: 08/12/2004
Time Analyzed: 13:15
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.057	.033	mg/kg		1

GPL LABORATORIES, LLLP

Summary of Analytical Results

Client ID: WBGSB29A
GPL ID: 407173-012-012-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/11/2004
Prep Time: 15:00
Prep Batch: 68234

Analytical Method: SW7471A
Date Analyzed: 08/12/2004
Time Analyzed: 13:17
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.12	.035	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB30A
GPL ID: 407173-013-013-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/11/2004
Prep Time: 15:00
Prep Batch: 68234

Analytical Method: SW7471A
Date Analyzed: 08/12/2004
Time Analyzed: 13:20
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.13	.035	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB31A
GPL ID: 407173-014-014-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/11/2004
Prep Time: 15:00
Prep Batch: 68234

Analytical Method: SW7471A
Date Analyzed: 08/12/2004
Time Analyzed: 13:23
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.080	.029	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB32A
GPL ID: 407173-015-015-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/11/2004
Prep Time: 15:00
Prep Batch: 68234

Analytical Method: SW7471A
Date Analyzed: 08/12/2004
Time Analyzed: 13:26
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.097	.035	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB33A
GPL ID: 407173-016-016-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/11/2004
Prep Time: 15:00
Prep Batch: 68234

Analytical Method: SW7471A
Date Analyzed: 08/12/2004
Time Analyzed: 13:29
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.085	.04	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB34A
GPL ID: 407173-017-017-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/11/2004
Prep Time: 15:00
Prep Batch: 68234

Analytical Method: SW7471A
Date Analyzed: 08/12/2004
Time Analyzed: 13:37
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.092	.032	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB35A
GPL ID: 407173-018-018-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/11/2004
Prep Time: 15:00
Prep Batch: 68234

Analytical Method: SW7471A
Date Analyzed: 08/12/2004
Time Analyzed: 13:40
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.11	.036	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB36A
GPL ID: 407173-019-019-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/11/2004
Prep Time: 15:00
Prep Batch: 68234

Analytical Method: SW7471A
Date Analyzed: 08/12/2004
Time Analyzed: 13:43
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.13	.036	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB37A
GPL ID: 407173-020-020-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/11/2004
Prep Time: 15:00
Prep Batch: 68234

Analytical Method: SW7471A
Date Analyzed: 08/12/2004
Time Analyzed: 13:51
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.10	.036	mg/kg		1

GPL LABORATORIES, LLP
ANALYTICAL RESULTS

Project Name : Radford

Date Printed August 16, 2004

GPL ID	Client ID
407173-001-001-1/1	NBGSB32A
407173-002-002-1/1	NBGSB26A
407173-003-003-1/1	NBGSB27A
407173-004-004-1/1	NBGSB29A
407173-005-005-1/1	NBGSB31A
407173-006-006-1/1	NBGSB28A
407173-007-007-1/1	NBGSB33A
407173-008-008-1/1	NBGSB30A
407173-009-009-1/1	TBSB27A
407173-010-010-1/1	TBSB43A
407173-011-011-1/1	TBSB49B
407173-012-012-1/1	WBGSB29A
407173-013-013-1/1	WBGSB30A
407173-014-014-1/1	WBGSB31A
407173-015-015-1/1	WBGSB32A
407173-016-016-1/1	WBGSB33A
407173-017-017-1/1	WBGSB34A
407173-018-018-1/1	WBGSB35A
407173-019-019-1/1	WBGSB36A
407173-020-020-1/1	WBGSB37A

Analytical Report For 407173

for

Shaw Environmental & Infrastructure

Project Manager: Eric Malarek

Project Name : Radford

August 16, 2004

GPL

Laboratories

GPL Laboratories, LLLP Certifies that the test results meet all requirements of the NELAC Standards unless otherwise noted.

Reviewed by, Project Manager	Approved by, Laboratory Director

7210A Corporate CT Frederick, MD 21703 Phone (301) 694-5310 Fax: (301) 620-0731
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Summary of Analytical Results

Client ID: NBGSB32A
GPL ID: 407173-001-001-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68299

Analytical Method: SW6010B
Date Analyzed: 08/13/2004
Time Analyzed: 04:11
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	22800	20.7	mg/kg		1
Antimony	0.68	2.1	mg/kg	BN	1
Arsenic	8.9	2.1	mg/kg		1
Barium	47	.52	mg/kg	N	1
Beryllium	0.68	.21	mg/kg		1
Cadmium	0.29	.62	mg/kg	B	1
Calcium	2640	104	mg/kg	*	1
Chromium	39.9	.52	mg/kg		1
Cobalt	6.8	.52	mg/kg		1
Copper	22.8	1	mg/kg		1
Iron	31400	15.5	mg/kg	*	1
Lead	159	1	mg/kg		1
Magnesium	1840	25.9	mg/kg	N	1
Manganese	211	.52	mg/kg	N	1
Nickel	14.8	1	mg/kg		1
Potassium	764	25.9	mg/kg	N	1
Selenium	BQL	2.1	mg/kg	U	1
Silver	BQL	.31	mg/kg	U	1
Sodium	99	259	mg/kg	B	1
Thallium	BQL	3.1	mg/kg	U	1
Vanadium	59.1	1	mg/kg		1
Zinc	204	2.1	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB26A
GPL ID: 407173-002-002-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68299

Analytical Method: SW6010B
Date Analyzed: 08/13/2004
Time Analyzed: 04:19
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	14500	19.3	mg/kg		1
Antimony	0.79	1.9	mg/kg	BN	1
Arsenic	5.2	1.9	mg/kg		1
Barium	52.9	.48	mg/kg	N	1
Beryllium	0.53	.19	mg/kg		1
Cadmium	0.24	.58	mg/kg	B	1
Calcium	978	96.6	mg/kg	*	1
Chromium	24.8	.48	mg/kg		1
Cobalt	5.2	.48	mg/kg		1
Copper	10.2	.97	mg/kg		1
Iron	17900	14.5	mg/kg	*	1
Lead	80.1	.97	mg/kg		1
Magnesium	908	24.2	mg/kg	N	1
Manganese	409	.48	mg/kg	N	1
Nickel	8.2	.97	mg/kg		1
Potassium	458	24.2	mg/kg	N	1
Selenium	BQL	1.9	mg/kg	U	1
Silver	BQL	.29	mg/kg	U	1
Sodium	69.3	242	mg/kg	B	1
Thallium	BQL	2.9	mg/kg	U	1
Vanadium	37.6	.97	mg/kg		1
Zinc	95.4	1.9	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB27A
GPL ID: 407173-003-003-1/1
Matrix: SOIL
Date Collected: 07/22/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68299

Analytical Method: SW6010B
Date Analyzed: 08/13/2004
Time Analyzed: 04:27
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	10500	22.1	mg/kg		1
Antimony	BQL	2.2	mg/kg	UN	1
Arsenic	4.0	2.2	mg/kg		1
Barium	52.8	.55	mg/kg	N	1
Beryllium	0.47	.22	mg/kg		1
Cadmium	0.086	.66	mg/kg	B	1
Calcium	1450	110	mg/kg	*	1
Chromium	21.7	.55	mg/kg		1
Cobalt	7.5	.55	mg/kg		1
Copper	8.9	1.1	mg/kg		1
Iron	11700	16.6	mg/kg	*	1
Lead	110	1.1	mg/kg		1
Magnesium	983	27.6	mg/kg	N	1
Manganese	252	.55	mg/kg	N	1
Nickel	7.2	1.1	mg/kg		1
Potassium	509	27.6	mg/kg	N	1
Selenium	BQL	2.2	mg/kg	U	1
Silver	BQL	.33	mg/kg	U	1
Sodium	79.9	276	mg/kg	B	1
Thallium	BQL	3.3	mg/kg	U	1
Vanadium	23.8	1.1	mg/kg		1
Zinc	99.5	2.2	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB29A
GPL ID: 407173-004-004-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68299

Analytical Method: SW6010B
Date Analyzed: 08/13/2004
Time Analyzed: 05:08
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	15000	17.6	mg/kg		1
Antimony	0.37	1.8	mg/kg	BN	1
Arsenic	2.4	1.8	mg/kg		1
Barium	158	.44	mg/kg	N	1
Beryllium	0.74	.18	mg/kg		1
Cadmium	0.42	.53	mg/kg	B	1
Chromium	26.4	.44	mg/kg		1
Cobalt	8.3	.44	mg/kg		1
Copper	39.7	.88	mg/kg		1
Lead	79.5	.88	mg/kg		1
Manganese	204	.44	mg/kg	N	1
Nickel	15.4	.88	mg/kg		1
Potassium	3680	22	mg/kg	N	1
Selenium	BQL	1.8	mg/kg	U	1
Silver	BQL	.26	mg/kg	U	1
Sodium	210	220	mg/kg	B	1
Thallium	BQL	2.6	mg/kg	U	1
Vanadium	35.5	.88	mg/kg		1
Zinc	158	1.8	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB29A
GPL ID: 407173-004-004-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68299

Analytical Method: SW6010B
Date Analyzed: 08/13/2004
Time Analyzed: 18:49
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Calcium	129000	879	mg/kg	*	10
Iron	16100	132	mg/kg	*	10
Magnesium	58500	220	mg/kg	N	10

Summary of Analytical Results

Client ID: NBGSB31A
GPL ID: 407173-005-005-1/1
Matrix: SOIL
Date Collected: 07/22/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68299

Analytical Method: SW6010B
Date Analyzed: 08/13/2004
Time Analyzed: 05:36
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	16500	18.8	mg/kg		1
Antimony	0.41	1.9	mg/kg	BN	1
Arsenic	5.9	1.9	mg/kg		1
Barium	40.6	.47	mg/kg	N	1
Beryllium	0.39	.19	mg/kg		1
Cadmium	0.24	.56	mg/kg	B	1
Calcium	22500	93.9	mg/kg	*	1
Chromium	23.6	.47	mg/kg		1
Cobalt	3.2	.47	mg/kg		1
Copper	11	.94	mg/kg		1
Iron	19100	14.1	mg/kg	*	1
Lead	53.9	.94	mg/kg		1
Magnesium	11800	23.5	mg/kg	N	1
Manganese	122	.47	mg/kg	N	1
Nickel	7.8	.94	mg/kg		1
Potassium	856	23.5	mg/kg	N	1
Selenium	BQL	1.9	mg/kg	U	1
Silver	BQL	.28	mg/kg	U	1
Sodium	126	235	mg/kg	B	1
Thallium	BQL	2.8	mg/kg	U	1
Vanadium	40.4	.94	mg/kg		1
Zinc	143	1.9	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB28A
GPL ID: 407173-006-006-1/1
Matrix: SOIL
Date Collected: 07/21/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68299

Analytical Method: SW6010B
Date Analyzed: 08/13/2004
Time Analyzed: 05:44
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	17700	19.8	mg/kg		1
Antimony	0.83	2	mg/kg	BN	1
Arsenic	4.3	2	mg/kg		1
Barium	126	.5	mg/kg	N	1
Beryllium	0.57	.2	mg/kg		1
Cadmium	0.52	.59	mg/kg	B	1
Chromium	25.8	.5	mg/kg		1
Cobalt	6.7	.5	mg/kg		1
Copper	26.9	.99	mg/kg		1
Iron	16800	14.9	mg/kg	*	1
Lead	124	.99	mg/kg		1
Magnesium	39900	24.8	mg/kg	N	1
Manganese	221	.5	mg/kg	N	1
Nickel	13.1	.99	mg/kg		1
Potassium	2210	24.8	mg/kg	N	1
Selenium	BQL	2	mg/kg	U	1
Silver	BQL	.3	mg/kg	U	1
Sodium	187	248	mg/kg	B	1
Thallium	BQL	3	mg/kg	U	1
Vanadium	35.7	.99	mg/kg		1
Zinc	199	2	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB28A
GPL ID: 407173-006-006-1/1
Matrix: SOIL
Date Collected: 07/21/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68299

Analytical Method: SW6010B
Date Analyzed: 08/13/2004
Time Analyzed: 18:57
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Calcium	81900	198	mg/kg	*	2

Summary of Analytical Results

Client ID: NBGSB33A
GPL ID: 407173-007-007-1/1
Matrix: SOIL
Date Collected: 07/21/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68299

Analytical Method: SW6010B
Date Analyzed: 08/13/2004
Time Analyzed: 05:52
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	17500	17.8	mg/kg		1
Antimony	0.39	1.8	mg/kg	BN	1
Arsenic	8.1	1.8	mg/kg		1
Barium	34.1	.44	mg/kg	N	1
Beryllium	0.45	.18	mg/kg		1
Cadmium	0.15	.53	mg/kg	B	1
Calcium	2790	88.8	mg/kg	*	1
Chromium	28	.44	mg/kg		1
Cobalt	4.0	.44	mg/kg		1
Copper	11.3	.89	mg/kg		1
Iron	23200	13.3	mg/kg	*	1
Lead	20.8	.89	mg/kg		1
Magnesium	2150	22.2	mg/kg	N	1
Manganese	137	.44	mg/kg	N	1
Nickel	8.9	.89	mg/kg		1
Potassium	1010	22.2	mg/kg	N	1
Selenium	0.58	1.8	mg/kg	B	1
Silver	BQL	.27	mg/kg	U	1
Sodium	59.4	222	mg/kg	B	1
Thallium	BQL	2.7	mg/kg	U	1
Vanadium	46.3	.89	mg/kg		1
Zinc	38.3	1.8	mg/kg		1

Summary of Analytical Results

Client ID: NBGSB30A
GPL ID: 407173-008-008-1/1
Matrix: SOIL
Date Collected: 07/21/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68299

Analytical Method: SW6010B
Date Analyzed: 08/13/2004
Time Analyzed: 06:00
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	26600	18.8	mg/kg		1
Antimony	0.65	1.9	mg/kg	BN	1
Arsenic	11	1.9	mg/kg		1
Barium	35.1	.47	mg/kg	N	1
Beryllium	0.71	.19	mg/kg		1
Cadmium	0.19	.56	mg/kg	B	1
Calcium	1370	93.9	mg/kg	*	1
Chromium	36.8	.47	mg/kg		1
Cobalt	5.1	.47	mg/kg		1
Copper	16.9	.94	mg/kg		1
Iron	34300	14.1	mg/kg	*	1
Lead	51	.94	mg/kg		1
Magnesium	1220	23.5	mg/kg	N	1
Manganese	116	.47	mg/kg	N	1
Nickel	13.8	.94	mg/kg		1
Potassium	732	23.5	mg/kg	N	1
Selenium	0.94	1.9	mg/kg	B	1
Silver	BQL	.28	mg/kg	U	1
Sodium	65	235	mg/kg	B	1
Thallium	BQL	2.8	mg/kg	U	1
Vanadium	66.2	.94	mg/kg		1
Zinc	34.8	1.9	mg/kg		1

Summary of Analytical Results

Client ID: TBSB27A
GPL ID: 407173-009-009-1/1
Matrix: SOIL
Date Collected: 07/22/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68299

Analytical Method: SW6010B
Date Analyzed: 08/13/2004
Time Analyzed: 06:08
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	11000	18.3	mg/kg		1
Antimony	0.41	1.8	mg/kg	BN	1
Arsenic	3.8	1.8	mg/kg		1
Barium	55.7	.46	mg/kg	N	1
Beryllium	0.48	.18	mg/kg		1
Cadmium	0.15	.55	mg/kg	B	1
Calcium	1420	91.6	mg/kg	*	1
Chromium	31.8	.46	mg/kg		1
Cobalt	7.9	.46	mg/kg		1
Copper	8.9	.92	mg/kg		1
Iron	11400	13.7	mg/kg	*	1
Lead	172	.92	mg/kg		1
Magnesium	950	22.9	mg/kg	N	1
Manganese	280	.46	mg/kg	N	1
Nickel	7.3	.92	mg/kg		1
Potassium	523	22.9	mg/kg	N	1
Selenium	BQL	1.8	mg/kg	U	1
Silver	BQL	.27	mg/kg	U	1
Sodium	65	229	mg/kg	B	1
Thallium	BQL	2.7	mg/kg	U	1
Vanadium	24	.92	mg/kg		1
Zinc	107	1.8	mg/kg		1

Summary of Analytical Results

Client ID: TBSB43A
GPL ID: 407173-010-010-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68299

Analytical Method: SW6010B
Date Analyzed: 08/13/2004
Time Analyzed: 06:16
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	16500	18.8	mg/kg		1
Antimony	0.58	1.9	mg/kg	BN	1
Arsenic	4.7	1.9	mg/kg		1
Barium	93.9	.47	mg/kg	N	1
Beryllium	1.2	.19	mg/kg		1
Cadmium	0.22	.56	mg/kg	B	1
Calcium	3760	94	mg/kg	*	1
Chromium	33.3	.47	mg/kg		1
Cobalt	11.4	.47	mg/kg		1
Copper	12.7	.94	mg/kg		1
Iron	17900	14.1	mg/kg	*	1
Lead	19.7	.94	mg/kg		1
Magnesium	5130	23.5	mg/kg	N	1
Manganese	430	.47	mg/kg	N	1
Nickel	14.6	.94	mg/kg		1
Potassium	925	23.5	mg/kg	N	1
Selenium	BQL	1.9	mg/kg	U	1
Silver	BQL	.28	mg/kg	U	1
Sodium	81.8	235	mg/kg	B	1
Thallium	BQL	2.8	mg/kg	U	1
Vanadium	39.3	.94	mg/kg		1
Zinc	44	1.9	mg/kg		1

Summary of Analytical Results

Client ID: TBSB49B
GPL ID: 407173-011-011-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68299

Analytical Method: SW6010B
Date Analyzed: 08/13/2004
Time Analyzed: 06:24
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	24000	18.1	mg/kg		1
Antimony	0.65	1.8	mg/kg	BN	1
Arsenic	9.2	1.8	mg/kg		1
Barium	29.8	.45	mg/kg	N	1
Beryllium	0.98	.18	mg/kg		1
Cadmium	0.20	.54	mg/kg	B	1
Calcium	691	90.3	mg/kg	*	1
Chromium	34.6	.45	mg/kg		1
Cobalt	9.1	.45	mg/kg		1
Copper	18.2	.9	mg/kg		1
Iron	33200	13.6	mg/kg	*	1
Lead	21.8	.9	mg/kg		1
Magnesium	807	22.6	mg/kg	N	1
Manganese	176	.45	mg/kg	N	1
Nickel	16.9	.9	mg/kg		1
Potassium	1020	22.6	mg/kg	N	1
Selenium	0.95	1.8	mg/kg	B	1
Silver	BQL	.27	mg/kg	U	1
Sodium	88.4	226	mg/kg	B	1
Thallium	BQL	2.7	mg/kg	U	1
Vanadium	64.5	.9	mg/kg		1
Zinc	30.6	1.8	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB29A
GPL ID: 407173-012-012-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68299

Analytical Method: SW6010B
Date Analyzed: 08/13/2004
Time Analyzed: 06:32
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	40000	18.8	mg/kg		1
Antimony	0.83	1.9	mg/kg	BN	1
Arsenic	10.8	1.9	mg/kg		1
Barium	72.9	.47	mg/kg	N	1
Beryllium	2.8	.19	mg/kg		1
Cadmium	0.42	.56	mg/kg	B	1
Calcium	5740	94.1	mg/kg	*	1
Chromium	59.5	.47	mg/kg		1
Cobalt	21.1	.47	mg/kg		1
Copper	31.2	.94	mg/kg		1
Iron	37800	14.1	mg/kg	*	1
Lead	33.5	.94	mg/kg		1
Magnesium	9210	23.5	mg/kg	N	1
Manganese	280	.47	mg/kg	N	1
Nickel	35.2	.94	mg/kg		1
Potassium	2910	23.5	mg/kg	N	1
Selenium	0.83	1.9	mg/kg	B	1
Sodium	72	235	mg/kg	B	1
Thallium	BQL	2.8	mg/kg	U	1
Vanadium	80.9	.94	mg/kg		1
Zinc	55.9	1.9	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB29A
GPL ID: 407173-012-012-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68299

Analytical Method: SW6010B
Date Analyzed: 08/13/2004
Time Analyzed: 19:05
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Silver	BQL	.56	mg/kg	U	2

Summary of Analytical Results

Client ID: WBGSB30A
GPL ID: 407173-013-013-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68299

Analytical Method: SW6010B
Date Analyzed: 08/13/2004
Time Analyzed: 06:40
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	34300	21.7	mg/kg		1
Antimony	0.61	2.2	mg/kg	BN	1
Arsenic	13.3	2.2	mg/kg		1
Barium	55.8	.54	mg/kg	N	1
Beryllium	2.9	.22	mg/kg		1
Cadmium	0.37	.65	mg/kg	B	1
Calcium	4330	109	mg/kg	*	1
Chromium	54.8	.54	mg/kg		1
Cobalt	30.6	.54	mg/kg		1
Copper	28.3	1.1	mg/kg		1
Iron	37000	16.3	mg/kg	*	1
Lead	41	1.1	mg/kg		1
Magnesium	4710	27.2	mg/kg	N	1
Manganese	283	.54	mg/kg	N	1
Nickel	33.6	1.1	mg/kg		1
Potassium	2050	27.2	mg/kg	N	1
Selenium	1.0	2.2	mg/kg	B	1
Sodium	72.5	272	mg/kg	B	1
Thallium	BQL	3.3	mg/kg	U	1
Vanadium	74.2	1.1	mg/kg		1
Zinc	51.6	2.2	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB30A
GPL ID: 407173-013-013-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68299

Analytical Method: SW6010B
Date Analyzed: 08/13/2004
Time Analyzed: 19:13
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Silver	BQL	.65	mg/kg	U	2

Summary of Analytical Results

Client ID: WBGSB31A
GPL ID: 407173-014-014-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68299

Analytical Method: SW6010B
Date Analyzed: 08/13/2004
Time Analyzed: 06:48
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	24200	18.2	mg/kg		1
Antimony	0.85	1.8	mg/kg	BN	1
Arsenic	9.4	1.8	mg/kg		1
Barium	34.1	.46	mg/kg	N	1
Beryllium	0.63	.18	mg/kg		1
Cadmium	0.20	.55	mg/kg	B	1
Calcium	1230	91.1	mg/kg	*	1
Chromium	35.6	.46	mg/kg		1
Cobalt	10.8	.46	mg/kg		1
Copper	17.5	.91	mg/kg		1
Iron	30900	13.7	mg/kg	*	1
Lead	19.6	.91	mg/kg		1
Magnesium	752	22.8	mg/kg	N	1
Manganese	180	.46	mg/kg	N	1
Nickel	12.1	.91	mg/kg		1
Potassium	792	22.8	mg/kg	N	1
Selenium	0.74	1.8	mg/kg	B	1
Silver	BQL	.27	mg/kg	U	1
Sodium	75.8	228	mg/kg	B	1
Thallium	BQL	2.7	mg/kg	U	1
Vanadium	63.5	.91	mg/kg		1
Zinc	28.7	1.8	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB32A
GPL ID: 407173-015-015-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68299

Analytical Method: SW6010B
Date Analyzed: 08/13/2004
Time Analyzed: 07:17
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	28500	20.6	mg/kg		1
Antimony	0.47	2.1	mg/kg	BN	1
Arsenic	9.8	2.1	mg/kg		1
Barium	74.1	.52	mg/kg	N	1
Beryllium	1.4	.21	mg/kg		1
Cadmium	0.40	.62	mg/kg	B	1
Calcium	4030	103	mg/kg	*	1
Chromium	43.4	.52	mg/kg		1
Cobalt	13.6	.52	mg/kg		1
Copper	21	1	mg/kg		1
Iron	31100	15.5	mg/kg	*	1
Lead	31.8	1	mg/kg		1
Magnesium	6230	25.8	mg/kg	N	1
Manganese	364	.52	mg/kg	N	1
Nickel	22.6	1	mg/kg		1
Potassium	1620	25.8	mg/kg	N	1
Selenium	BQL	2.1	mg/kg	U	1
Silver	BQL	.31	mg/kg	U	1
Sodium	80.7	258	mg/kg	B	1
Thallium	BQL	3.1	mg/kg	U	1
Vanadium	63	1	mg/kg		1
Zinc	51.9	2.1	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB33A
GPL ID: 407173-016-016-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68299

Analytical Method: SW6010B
Date Analyzed: 08/13/2004
Time Analyzed: 07:25
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	20100	23.2	mg/kg		1
Antimony	0.76	2.3	mg/kg	BN	1
Arsenic	7.9	2.3	mg/kg		1
Barium	53.8	.58	mg/kg	N	1
Beryllium	1.3	.23	mg/kg		1
Cadmium	0.30	.7	mg/kg	B	1
Calcium	5320	116	mg/kg	*	1
Chromium	32.7	.58	mg/kg		1
Cobalt	11.1	.58	mg/kg		1
Copper	20.5	1.2	mg/kg		1
Iron	21600	17.4	mg/kg	*	1
Lead	43.1	1.2	mg/kg		1
Magnesium	3010	29	mg/kg	N	1
Manganese	224	.58	mg/kg	N	1
Nickel	16.6	1.2	mg/kg		1
Potassium	1200	29	mg/kg	N	1
Selenium	BQL	2.3	mg/kg	U	1
Silver	BQL	.35	mg/kg	U	1
Sodium	101	290	mg/kg	B	1
Thallium	BQL	3.5	mg/kg	U	1
Vanadium	46.1	1.2	mg/kg		1
Zinc	56.3	2.3	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB34A
GPL ID: 407173-017-017-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68299

Analytical Method: SW6010B
Date Analyzed: 08/13/2004
Time Analyzed: 07:33
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	30400	18.2	mg/kg		1
Antimony	0.52	1.8	mg/kg	BN	1
Arsenic	10.8	1.8	mg/kg		1
Barium	54.9	.45	mg/kg	N	1
Beryllium	1.6	.18	mg/kg		1
Cadmium	0.39	.55	mg/kg	B	1
Calcium	3390	90.9	mg/kg	*	1
Chromium	49.6	.45	mg/kg		1
Cobalt	16.5	.45	mg/kg		1
Copper	22.6	.91	mg/kg		1
Iron	33300	13.6	mg/kg	*	1
Lead	85.6	.91	mg/kg		1
Magnesium	4230	22.7	mg/kg	N	1
Manganese	212	.45	mg/kg	N	1
Nickel	24.3	.91	mg/kg		1
Potassium	1690	22.7	mg/kg	N	1
Selenium	0.73	1.8	mg/kg	B	1
Silver	BQL	.27	mg/kg	U	1
Sodium	70.6	227	mg/kg	B	1
Thallium	BQL	2.7	mg/kg	U	1
Vanadium	66.5	.91	mg/kg		1
Zinc	48.7	1.8	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB35A
GPL ID: 407173-018-018-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68056

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 21:26
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	33700	18.2	mg/kg		1
Antimony	BQL	1.8	mg/kg	UN	1
Arsenic	8.6	1.8	mg/kg		1
Barium	83.5	.46	mg/kg		1
Beryllium	2.3	.18	mg/kg		1
Cadmium	0.082	.55	mg/kg	B	1
Calcium	7550	91.2	mg/kg		1
Chromium	51.8	.46	mg/kg	N*	1
Cobalt	16.6	.46	mg/kg		1
Copper	24	.91	mg/kg		1
Iron	30000	13.7	mg/kg		1
Lead	54.9	.91	mg/kg		1
Magnesium	12200	22.8	mg/kg		1
Manganese	233	.46	mg/kg		1
Nickel	29.6	.91	mg/kg		1
Potassium	2530	22.8	mg/kg	N	1
Selenium	BQL	1.8	mg/kg	U	1
Silver	BQL	.27	mg/kg	U	1
Sodium	51.2	228	mg/kg	B	1
Thallium	BQL	2.7	mg/kg	U	1
Vanadium	62.1	.91	mg/kg		1
Zinc	45.5	1.8	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB36A
GPL ID: 407173-019-019-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68299

Analytical Method: SW6010B
Date Analyzed: 08/13/2004
Time Analyzed: 07:41
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	39000	21.7	mg/kg		1
Antimony	0.80	2.2	mg/kg	BN	1
Arsenic	15.8	2.2	mg/kg		1
Barium	56.4	.54	mg/kg	N	1
Beryllium	3.1	.22	mg/kg		1
Cadmium	0.59	.65	mg/kg	B	1
Calcium	7950	108	mg/kg	*	1
Chromium	58.5	.54	mg/kg		1
Cobalt	30.6	.54	mg/kg		1
Copper	31.4	1.1	mg/kg		1
Iron	41400	16.3	mg/kg	*	1
Lead	45.8	1.1	mg/kg		1
Magnesium	6750	27.1	mg/kg	N	1
Manganese	282	.54	mg/kg	N	1
Nickel	36.8	1.1	mg/kg		1
Potassium	2820	27.1	mg/kg	N	1
Selenium	0.85	2.2	mg/kg	B	1
Sodium	82.7	271	mg/kg	B	1
Thallium	BQL	3.3	mg/kg	U	1
Vanadium	84.7	1.1	mg/kg		1
Zinc	52	2.2	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB36A
GPL ID: 407173-019-019-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68299

Analytical Method: SW6010B
Date Analyzed: 08/13/2004
Time Analyzed: 19:21
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Silver	BQL	.65	mg/kg	U	2

Summary of Analytical Results

Client ID: WBGSB37A
GPL ID: 407173-020-020-1/1
Matrix: SOIL
Date Collected: 07/20/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68056

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 21:34
Analysis Batch: 17353

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	26300	17.8	mg/kg		1
Antimony	0.53	1.8	mg/kg	BN	1
Arsenic	10.2	1.8	mg/kg		1
Barium	34.4	.44	mg/kg		1
Beryllium	1.4	.18	mg/kg		1
Cadmium	BQL	.53	mg/kg	U	1
Calcium	3130	88.8	mg/kg		1
Chromium	39.7	.44	mg/kg	N*	1
Cobalt	17.4	.44	mg/kg		1
Copper	25.2	.89	mg/kg		1
Iron	32000	13.3	mg/kg		1
Lead	29.1	.89	mg/kg		1
Magnesium	2750	22.2	mg/kg		1
Manganese	154	.44	mg/kg		1
Nickel	21.1	.89	mg/kg		1
Potassium	1600	22.2	mg/kg	N	1
Selenium	0.78	1.8	mg/kg	B	1
Silver	BQL	.27	mg/kg	U	1
Sodium	54.2	222	mg/kg	B	1
Thallium	BQL	2.7	mg/kg	U	1
Vanadium	63.4	.89	mg/kg		1
Zinc	41	1.8	mg/kg		1

GPL LABORATORIES, LLP
ANALYTICAL RESULTS

Project Name : Radford

Date Printed August 16, 2004

GPL ID	Client ID
407173-001-001-1/1	NBGSB32A
407173-002-002-1/1	NBGSB26A
407173-003-003-1/1	NBGSB27A
407173-004-004-1/1	NBGSB29A
407173-004-004-1/1	NBGSB29A
407173-005-005-1/1	NBGSB31A
407173-006-006-1/1	NBGSB28A
407173-006-006-1/1	NBGSB28A
407173-007-007-1/1	NBGSB33A
407173-008-008-1/1	NBGSB30A
407173-009-009-1/1	TBSB27A
407173-010-010-1/1	TBSB43A
407173-011-011-1/1	TBSB49B
407173-012-012-1/1	WBGSB29A
407173-012-012-1/1	WBGSB29A
407173-013-013-1/1	WBGSB30A
407173-013-013-1/1	WBGSB30A
407173-014-014-1/1	WBGSB31A
407173-015-015-1/1	WBGSB32A
407173-016-016-1/1	WBGSB33A
407173-017-017-1/1	WBGSB34A
407173-018-018-1/1	WBGSB35A
407173-019-019-1/1	WBGSB36A
407173-019-019-1/1	WBGSB36A
407173-020-020-1/1	WBGSB37A

Analytical Report For 407174

for

Shaw Environmental & Infrastructure

Project Manager : Eric Malarek

Project Name : Radford

August 11, 2004

GPL

Laboratories

GPL Laboratories, LLLP Certifies that the test results meet all requirements of the NELAC Standards unless otherwise noted.

Reviewed by, Project Manager	Approved by, Laboratory Director

7210A Corporate CT Frederick, MD 21703 Phone (301) 694-5310 Fax: (301) 620-0731
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Summary of Analytical Results

Client ID: WBGSB38A
GPL ID: 407174-001-001-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/27/2004
Time Analyzed: 20:00
Analysis Batch: 69798

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	82	1.0	%		1

Summary of Analytical Results

Client ID: WBGSB39A
GPL ID: 407174-002-002-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/27/2004
Time Analyzed: 20:00
Analysis Batch: 69798

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	76	1.0	%		1

Summary of Analytical Results

Client ID: WBGSB40A
GPL ID: 407174-003-003-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/27/2004
Time Analyzed: 20:00
Analysis Batch: 69798

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	83	1.0	%		1

Summary of Analytical Results

Client ID: WBGSB41A
GPL ID: 407174-004-004-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/27/2004
Time Analyzed: 20:00
Analysis Batch: 69798

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	84	1.0	%		1

Summary of Analytical Results

Client ID: WBGSB42A
GPL ID: 407174-005-005-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/27/2004
Time Analyzed: 20:00
Analysis Batch: 69798

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	77	1.0	%		1

Summary of Analytical Results

Client ID: WBGSB43A
GPL ID: 407174-006-006-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/27/2004
Time Analyzed: 20:00
Analysis Batch: 69798

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	82	1.0	%		1

Summary of Analytical Results

Client ID: WBGSB44A
GPL ID: 407174-007-007-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/27/2004
Time Analyzed: 20:00
Analysis Batch: 69798

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	83	1.0	%		1

Summary of Analytical Results

Client ID: WBGSB45A
GPL ID: 407174-008-008-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/27/2004
Time Analyzed: 20:00
Analysis Batch: 69798

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	84	1.0	%		1

Summary of Analytical Results

Client ID: WBGSB43B
GPL ID: 407174-009-009-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/27/2004
Time Analyzed: 20:00
Analysis Batch: 69798

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	78	1.0	%		1

Summary of Analytical Results

Client ID: WBGSB44B
GPL ID: 407174-010-010-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/27/2004
Time Analyzed: 20:00
Analysis Batch: 69798

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	89	1.0	%		1

Summary of Analytical Results

Client ID: WBGSB45B
GPL ID: 407174-011-011-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/27/2004
Time Analyzed: 20:00
Analysis Batch: 69798

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	80	1.0	%		1

Summary of Analytical Results

Client ID: WBGSB46C
GPL ID: 407174-012-012-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/27/2004
Time Analyzed: 20:00
Analysis Batch: 69798

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	76	1.0	%		1

Summary of Analytical Results

Client ID: WBGSB47C
GPL ID: 407174-013-013-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/27/2004
Time Analyzed: 20:00
Analysis Batch: 69798

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	77	1.0	%		1

Summary of Analytical Results

Client ID: WBGSB48C
GPL ID: 407174-014-014-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/27/2004
Time Analyzed: 20:00
Analysis Batch: 69798

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	79	1.0	%		1

Summary of Analytical Results

Client ID: WBGSB49B
GPL ID: 407174-015-015-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method:
Prep Date:
Prep Time:
Prep Batch:

Analytical Method: CLP_SOLIDS
Date Analyzed: 07/27/2004
Time Analyzed: 20:00
Analysis Batch: 69798

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	78	1.0	%		1

Summary of Analytical Results

Client ID: WBGSB38A
GPL ID: 407174-001-001-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68056

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 22:00
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	24400	18.4	mg/kg		1
Antimony	0.42	1.8	mg/kg	BN	1
Arsenic	9.0	1.8	mg/kg		1
Barium	43.5	.46	mg/kg		1
Beryllium	1.1	.18	mg/kg		1
Cadmium	BQL	.55	mg/kg	U	1
Calcium	2920	91.8	mg/kg		1
Chromium	37.4	.46	mg/kg	N*	1
Cobalt	13.6	.46	mg/kg		1
Copper	19.3	.92	mg/kg		1
Iron	29200	13.8	mg/kg		1
Lead	27.8	.92	mg/kg		1
Magnesium	2800	23	mg/kg		1
Manganese	166	.46	mg/kg		1
Nickel	19.2	.92	mg/kg		1
Potassium	1470	23	mg/kg	N	1
Selenium	BQL	1.8	mg/kg	U	1
Silver	BQL	.28	mg/kg	U	1
Sodium	46	230	mg/kg	B	1
Thallium	BQL	2.8	mg/kg	U	1
Vanadium	58.4	.92	mg/kg		1
Zinc	37.2	1.8	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB39A
GPL ID: 407174-002-002-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68056

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 22:08
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	16500	19.9	mg/kg		1
Antimony	BQL	2	mg/kg	UN	1
Arsenic	6.1	2	mg/kg		1
Barium	72.5	.5	mg/kg		1
Beryllium	0.87	.2	mg/kg		1
Cadmium	0.078	.6	mg/kg	B	1
Calcium	2400	99.5	mg/kg		1
Chromium	24.2	.5	mg/kg	N*	1
Cobalt	7.5	.5	mg/kg		1
Copper	16.2	1	mg/kg		1
Iron	17600	14.9	mg/kg		1
Lead	38	1	mg/kg		1
Magnesium	1530	24.9	mg/kg		1
Manganese	292	.5	mg/kg		1
Nickel	12.3	1	mg/kg		1
Potassium	612	24.9	mg/kg	N	1
Selenium	BQL	2	mg/kg	U	1
Silver	BQL	.3	mg/kg	U	1
Sodium	58.4	249	mg/kg	B	1
Thallium	BQL	3	mg/kg	U	1
Vanadium	37.5	1	mg/kg		1
Zinc	67.5	2	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB40A
GPL ID: 407174-003-003-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68056

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 22:16
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	15700	18.6	mg/kg		1
Antimony	0.49	1.9	mg/kg	BN	1
Arsenic	5.6	1.9	mg/kg		1
Barium	39.2	.47	mg/kg		1
Beryllium	0.74	.19	mg/kg		1
Cadmium	BQL	.56	mg/kg	U	1
Calcium	1150	93.1	mg/kg		1
Chromium	25	.47	mg/kg	N*	1
Cobalt	16	.47	mg/kg		1
Copper	11.7	.93	mg/kg		1
Iron	18300	14	mg/kg		1
Lead	28.7	.93	mg/kg		1
Magnesium	1780	23.3	mg/kg		1
Manganese	449	.47	mg/kg		1
Nickel	12.9	.93	mg/kg		1
Potassium	764	23.3	mg/kg	N	1
Selenium	BQL	1.9	mg/kg	U	1
Silver	BQL	.28	mg/kg	U	1
Sodium	75.8	233	mg/kg	B	1
Thallium	BQL	2.8	mg/kg	U	1
Vanadium	43	.93	mg/kg		1
Zinc	34.1	1.9	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB41A
GPL ID: 407174-004-004-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68056

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 22:24
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	27000	16.5	mg/kg		1
Antimony	0.36	1.6	mg/kg	BN	1
Arsenic	7.2	1.6	mg/kg		1
Barium	51.6	.41	mg/kg		1
Beryllium	1.6	.16	mg/kg		1
Cadmium	BQL	.49	mg/kg	U	1
Calcium	1600	82.4	mg/kg		1
Chromium	46.8	.41	mg/kg	N*	1
Cobalt	13.3	.41	mg/kg		1
Copper	19.3	.82	mg/kg		1
Iron	32400	12.4	mg/kg		1
Lead	19.3	.82	mg/kg		1
Magnesium	4850	20.6	mg/kg		1
Manganese	193	.41	mg/kg		1
Nickel	24.1	.82	mg/kg		1
Potassium	1270	20.6	mg/kg	N	1
Selenium	0.74	1.6	mg/kg	B	1
Silver	BQL	.25	mg/kg	U	1
Sodium	43	206	mg/kg	B	1
Thallium	BQL	2.5	mg/kg	U	1
Vanadium	65.6	.82	mg/kg		1
Zinc	32.1	1.6	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB42A
GPL ID: 407174-005-005-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68056

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 22:32
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	29800	19.2	mg/kg		1
Antimony	BQL	1.9	mg/kg	UN	1
Arsenic	12.9	1.9	mg/kg		1
Barium	43	.48	mg/kg		1
Beryllium	1.9	.19	mg/kg		1
Cadmium	BQL	.57	mg/kg	U	1
Calcium	3840	95.8	mg/kg		1
Chromium	46.1	.48	mg/kg	N*	1
Cobalt	25	.48	mg/kg		1
Copper	24.6	.96	mg/kg		1
Iron	37100	14.4	mg/kg		1
Lead	35.5	.96	mg/kg		1
Magnesium	3490	23.9	mg/kg		1
Manganese	238	.48	mg/kg		1
Nickel	27.1	.96	mg/kg		1
Potassium	1600	23.9	mg/kg	N	1
Selenium	BQL	1.9	mg/kg	U	1
Silver	BQL	.29	mg/kg	U	1
Sodium	47.9	239	mg/kg	B	1
Thallium	BQL	2.9	mg/kg	U	1
Vanadium	73.1	.96	mg/kg		1
Zinc	41.8	1.9	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB43A
GPL ID: 407174-006-006-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68056

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 22:40
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	17500	17.4	mg/kg		1
Antimony	0.53	1.7	mg/kg	BN	1
Arsenic	4.5	1.7	mg/kg		1
Barium	90	.43	mg/kg		1
Beryllium	1.3	.17	mg/kg		1
Cadmium	0.066	.52	mg/kg	B	1
Calcium	3860	86.9	mg/kg		1
Chromium	102	.43	mg/kg	N*	1
Cobalt	11	.43	mg/kg		1
Copper	12.9	.87	mg/kg		1
Iron	19300	13	mg/kg		1
Lead	19.4	.87	mg/kg		1
Magnesium	5340	21.7	mg/kg		1
Manganese	416	.43	mg/kg		1
Nickel	20.4	.87	mg/kg		1
Potassium	929	21.7	mg/kg	N	1
Selenium	BQL	1.7	mg/kg	U	1
Silver	BQL	.26	mg/kg	U	1
Sodium	58.1	217	mg/kg	B	1
Thallium	BQL	2.6	mg/kg	U	1
Vanadium	46.9	.87	mg/kg		1
Zinc	41.9	1.7	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB44A
GPL ID: 407174-007-007-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68056

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 23:39
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	23600	18.6	mg/kg		1
Antimony	0.32	1.9	mg/kg	BN	1
Arsenic	9.8	1.9	mg/kg		1
Barium	31	.46	mg/kg		1
Beryllium	0.89	.19	mg/kg		1
Cadmium	BQL	.56	mg/kg	U	1
Calcium	1220	92.9	mg/kg		1
Chromium	43.9	.46	mg/kg	N*	1
Cobalt	13.4	.46	mg/kg		1
Copper	23.1	.93	mg/kg		1
Iron	40600	13.9	mg/kg		1
Lead	59.6	.93	mg/kg		1
Magnesium	1260	23.2	mg/kg		1
Manganese	158	.46	mg/kg		1
Nickel	16.4	.93	mg/kg		1
Potassium	1030	23.2	mg/kg	N	1
Selenium	BQL	1.9	mg/kg	U	1
Silver	BQL	.28	mg/kg	U	1
Sodium	58.9	232	mg/kg	B	1
Thallium	BQL	2.8	mg/kg	U	1
Vanadium	67.5	.93	mg/kg		1
Zinc	68.6	1.9	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB45A
GPL ID: 407174-008-008-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68056

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 23:47
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	19600	18	mg/kg		1
Antimony	0.56	1.8	mg/kg	BN	1
Arsenic	8.7	1.8	mg/kg		1
Barium	33.6	.45	mg/kg		1
Beryllium	0.81	.18	mg/kg		1
Cadmium	BQL	.54	mg/kg	U	1
Calcium	1020	89.8	mg/kg		1
Chromium	33.2	.45	mg/kg	N*	1
Cobalt	11.5	.45	mg/kg		1
Copper	16.6	.9	mg/kg		1
Iron	28200	13.5	mg/kg		1
Lead	29.1	.9	mg/kg		1
Magnesium	865	22.4	mg/kg		1
Manganese	184	.45	mg/kg		1
Nickel	13.3	.9	mg/kg		1
Potassium	745	22.4	mg/kg	N	1
Selenium	0.74	1.8	mg/kg	B	1
Silver	BQL	.27	mg/kg	U	1
Sodium	57.2	224	mg/kg	B	1
Thallium	BQL	2.7	mg/kg	U	1
Vanadium	56.5	.9	mg/kg		1
Zinc	42.7	1.8	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB43B
GPL ID: 407174-009-009-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68056

Analytical Method: SW6010B
Date Analyzed: 07/30/2004
Time Analyzed: 23:55
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	31700	20.9	mg/kg		1
Antimony	BQL	2.1	mg/kg	UN	1
Arsenic	12.6	2.1	mg/kg		1
Barium	20.6	.52	mg/kg		1
Beryllium	1.1	.21	mg/kg		1
Cadmium	BQL	.63	mg/kg	U	1
Calcium	1060	104	mg/kg		1
Chromium	49.4	.52	mg/kg	N*	1
Cobalt	20.2	.52	mg/kg		1
Copper	25.8	1	mg/kg		1
Iron	47400	15.7	mg/kg		1
Lead	27.2	1	mg/kg		1
Magnesium	1190	26.1	mg/kg		1
Manganese	146	.52	mg/kg		1
Nickel	22.7	1	mg/kg		1
Potassium	1060	26.1	mg/kg	N	1
Selenium	1.4	2.1	mg/kg	B	1
Silver	BQL	.31	mg/kg	U	1
Sodium	48.6	261	mg/kg	B	1
Thallium	BQL	3.1	mg/kg	U	1
Vanadium	88.5	1	mg/kg		1
Zinc	43.8	2.1	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB44B
GPL ID: 407174-010-010-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68056

Analytical Method: SW6010B
Date Analyzed: 07/31/2004
Time Analyzed: 00:03
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	13200	16.4	mg/kg		1
Antimony	0.33	1.6	mg/kg	BN	1
Arsenic	5.3	1.6	mg/kg		1
Barium	35.1	.41	mg/kg		1
Beryllium	0.55	.16	mg/kg		1
Cadmium	BQL	.49	mg/kg	U	1
Calcium	1460	81.8	mg/kg		1
Chromium	21.5	.41	mg/kg	N*	1
Cobalt	7.2	.41	mg/kg		1
Copper	9.5	.82	mg/kg		1
Iron	19500	12.3	mg/kg		1
Lead	19.5	.82	mg/kg		1
Magnesium	583	20.5	mg/kg		1
Manganese	171	.41	mg/kg		1
Nickel	8.0	.82	mg/kg		1
Potassium	602	20.5	mg/kg	N	1
Selenium	BQL	1.6	mg/kg	U	1
Silver	BQL	.25	mg/kg	U	1
Sodium	55.6	205	mg/kg	B	1
Thallium	BQL	2.5	mg/kg	U	1
Vanadium	38.7	.82	mg/kg		1
Zinc	61.6	1.6	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB45B
GPL ID: 407174-011-011-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68056

Analytical Method: SW6010B
Date Analyzed: 07/31/2004
Time Analyzed: 00:11
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	31900	19.8	mg/kg		1
Antimony	0.60	2	mg/kg	BN	1
Arsenic	12.7	2	mg/kg		1
Barium	39.6	.49	mg/kg		1
Beryllium	1.4	.2	mg/kg		1
Cadmium	BQL	.59	mg/kg	U	1
Calcium	1310	99	mg/kg		1
Chromium	44.8	.49	mg/kg	N*	1
Cobalt	16.5	.49	mg/kg		1
Copper	24.6	.99	mg/kg		1
Iron	44800	14.8	mg/kg		1
Lead	24.3	.99	mg/kg		1
Magnesium	1350	24.7	mg/kg		1
Manganese	203	.49	mg/kg		1
Nickel	26.8	.99	mg/kg		1
Potassium	1160	24.7	mg/kg	N	1
Selenium	1.1	2	mg/kg	B	1
Silver	BQL	.3	mg/kg	U	1
Sodium	51.4	247	mg/kg	B	1
Thallium	BQL	3	mg/kg	U	1
Vanadium	83.4	.99	mg/kg		1
Zinc	38.2	2	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB46C
GPL ID: 407174-012-012-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68056

Analytical Method: SW6010B
Date Analyzed: 07/31/2004
Time Analyzed: 00:19
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	31000	20.8	mg/kg		1
Antimony	BQL	2.1	mg/kg	UN	1
Arsenic	5.9	2.1	mg/kg		1
Barium	58.6	.52	mg/kg		1
Beryllium	2.7	.21	mg/kg		1
Cadmium	BQL	.62	mg/kg	U	1
Calcium	1800	104	mg/kg		1
Chromium	75.3	.52	mg/kg	N*	1
Cobalt	23.2	.52	mg/kg		1
Copper	40.9	1	mg/kg		1
Iron	52100	15.6	mg/kg		1
Lead	17.4	1	mg/kg		1
Magnesium	3270	26	mg/kg		1
Manganese	489	.52	mg/kg		1
Nickel	38.2	1	mg/kg		1
Potassium	1020	26	mg/kg	N	1
Selenium	BQL	2.1	mg/kg	U	1
Silver	BQL	.31	mg/kg	U	1
Sodium	BQL	260	mg/kg	U	1
Thallium	BQL	3.1	mg/kg	U	1
Vanadium	96	1	mg/kg		1
Zinc	32	2.1	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB47C
GPL ID: 407174-013-013-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68056

Analytical Method: SW6010B
Date Analyzed: 07/31/2004
Time Analyzed: 00:27
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	53700	20.3	mg/kg		1
Antimony	0.95	2	mg/kg	BN	1
Arsenic	10.1	2	mg/kg		1
Barium	181	.51	mg/kg		1
Beryllium	3.3	.2	mg/kg		1
Cadmium	0.090	.61	mg/kg	B	1
Calcium	5180	102	mg/kg		1
Chromium	80.6	.51	mg/kg	N*	1
Cobalt	12.9	.51	mg/kg		1
Copper	35.5	1	mg/kg		1
Iron	47700	15.2	mg/kg		1
Lead	19.8	1	mg/kg		1
Magnesium	38500	25.4	mg/kg		1
Manganese	294	.51	mg/kg		1
Nickel	47.5	1	mg/kg		1
Potassium	2230	25.4	mg/kg	N	1
Selenium	BQL	2	mg/kg	U	1
Silver	BQL	.3	mg/kg	U	1
Sodium	77.6	254	mg/kg	B	1
Thallium	BQL	3	mg/kg	U	1
Vanadium	99.8	1	mg/kg		1
Zinc	67.1	2	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB48C
GPL ID: 407174-014-014-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68056

Analytical Method: SW6010B
Date Analyzed: 07/31/2004
Time Analyzed: 00:35
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	31600	18.5	mg/kg		1
Antimony	1.1	1.8	mg/kg	BN	1
Arsenic	10.3	1.8	mg/kg		1
Barium	95.6	.46	mg/kg		1
Beryllium	1.4	.18	mg/kg		1
Cadmium	0.074	.55	mg/kg	B	1
Calcium	7160	92.3	mg/kg		1
Chromium	57.3	.46	mg/kg	N*	1
Cobalt	12.5	.46	mg/kg		1
Copper	258	.92	mg/kg		1
Iron	38800	13.8	mg/kg		1
Lead	163	.92	mg/kg		1
Magnesium	7490	23.1	mg/kg		1
Manganese	230	.46	mg/kg		1
Nickel	26.7	.92	mg/kg		1
Potassium	1380	23.1	mg/kg	N	1
Selenium	0.61	1.8	mg/kg	B	1
Silver	BQL	.28	mg/kg	U	1
Sodium	99.8	231	mg/kg	B	1
Thallium	BQL	2.8	mg/kg	U	1
Vanadium	73.3	.92	mg/kg		1
Zinc	315	1.8	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB49B
GPL ID: 407174-015-015-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3050B
Prep Date: 07/29/2004
Prep Time: 00:00
Prep Batch: 68056

Analytical Method: SW6010B
Date Analyzed: 07/31/2004
Time Analyzed: 00:43
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Aluminum	23800	17.3	mg/kg		1
Antimony	0.39	1.7	mg/kg	BN	1
Arsenic	9.9	1.7	mg/kg		1
Barium	27	.43	mg/kg		1
Beryllium	0.88	.17	mg/kg		1
Cadmium	BQL	.52	mg/kg	U	1
Calcium	733	86.7	mg/kg		1
Chromium	35.6	.43	mg/kg	N*	1
Cobalt	7.2	.43	mg/kg		1
Copper	18.1	.87	mg/kg		1
Iron	35000	13	mg/kg		1
Lead	18.6	.87	mg/kg		1
Magnesium	758	21.7	mg/kg		1
Manganese	127	.43	mg/kg		1
Nickel	16.1	.87	mg/kg		1
Potassium	990	21.7	mg/kg	N	1
Selenium	0.84	1.7	mg/kg	B	1
Silver	BQL	.26	mg/kg	U	1
Sodium	53.9	217	mg/kg	B	1
Thallium	BQL	2.6	mg/kg	U	1
Vanadium	68.5	.87	mg/kg		1
Zinc	31.3	1.7	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB38A
GPL ID: 407174-001-001-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/10/2004
Prep Time: 16:30
Prep Batch: 68194

Analytical Method: SW7471A
Date Analyzed: 08/11/2004
Time Analyzed: 10:31
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.076	.029	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB39A
GPL ID: 407174-002-002-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/10/2004
Prep Time: 16:30
Prep Batch: 68194

Analytical Method: SW7471A
Date Analyzed: 08/11/2004
Time Analyzed: 10:34
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.036	.034	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB40A
GPL ID: 407174-003-003-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/10/2004
Prep Time: 16:30
Prep Batch: 68194

Analytical Method: SW7471A
Date Analyzed: 08/11/2004
Time Analyzed: 10:37
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.041	.034	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB41A
GPL ID: 407174-004-004-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/10/2004
Prep Time: 16:30
Prep Batch: 68194

Analytical Method: SW7471A
Date Analyzed: 08/11/2004
Time Analyzed: 10:39
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.053	.033	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB42A
GPL ID: 407174-005-005-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/10/2004
Prep Time: 16:30
Prep Batch: 68194

Analytical Method: SW7471A
Date Analyzed: 08/11/2004
Time Analyzed: 10:42
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.11	.035	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB43A
GPL ID: 407174-006-006-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/10/2004
Prep Time: 16:30
Prep Batch: 68194

Analytical Method: SW7471A
Date Analyzed: 08/11/2004
Time Analyzed: 10:45
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.032	.034	mg/kg	B	1

Summary of Analytical Results

Client ID: WBGSB44A
GPL ID: 407174-007-007-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/10/2004
Prep Time: 16:30
Prep Batch: 68194

Analytical Method: SW7471A
Date Analyzed: 08/11/2004
Time Analyzed: 10:59
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.064	.033	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB45A
GPL ID: 407174-008-008-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/10/2004
Prep Time: 16:30
Prep Batch: 68194

Analytical Method: SW7471A
Date Analyzed: 08/11/2004
Time Analyzed: 11:02
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.059	.032	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB43B
GPL ID: 407174-009-009-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/10/2004
Prep Time: 16:30
Prep Batch: 68194

Analytical Method: SW7471A
Date Analyzed: 08/11/2004
Time Analyzed: 11:05
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.11	.034	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB44B
GPL ID: 407174-010-010-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/10/2004
Prep Time: 16:30
Prep Batch: 68194

Analytical Method: SW7471A
Date Analyzed: 08/11/2004
Time Analyzed: 11:07
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.041	.03	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB45B
GPL ID: 407174-011-011-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/10/2004
Prep Time: 16:30
Prep Batch: 68194

Analytical Method: SW7471A
Date Analyzed: 08/11/2004
Time Analyzed: 11:10
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.086	.03	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB46C
GPL ID: 407174-012-012-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/10/2004
Prep Time: 16:30
Prep Batch: 68194

Analytical Method: SW7471A
Date Analyzed: 08/11/2004
Time Analyzed: 11:13
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.050	.032	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB47C
GPL ID: 407174-013-013-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/10/2004
Prep Time: 16:30
Prep Batch: 68194

Analytical Method: SW7471A
Date Analyzed: 08/11/2004
Time Analyzed: 11:16
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.033	.037	mg/kg	B	1

Summary of Analytical Results

Client ID: WBGSB48C
GPL ID: 407174-014-014-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/10/2004
Prep Time: 16:30
Prep Batch: 68194

Analytical Method: SW7471A
Date Analyzed: 08/11/2004
Time Analyzed: 11:19
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.030	.034	mg/kg	B	1

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Summary of Analytical Results

Client ID: WBGSB49B
GPL ID: 407174-015-015-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW7471_DIG
Prep Date: 08/10/2004
Prep Time: 16:30
Prep Batch: 68194

Analytical Method: SW7471A
Date Analyzed: 08/11/2004
Time Analyzed: 11:21
Analysis Batch: 17336

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Mercury	0.11	.033	mg/kg		1

Summary of Analytical Results

Client ID: WBGSB38A
GPL ID: 407174-001-001-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3540C
Prep Date: 07/30/2004
Prep Time: 00:00
Prep Batch: 68009

Analytical Method: SW8082
Date Analyzed: 08/01/2004
Time Analyzed: 14:32
Analysis Batch: 70102

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	41	ug/kg	U	1
PCB-1221	BQL	41	ug/kg	U	1
PCB-1232	BQL	41	ug/kg	U	1
PCB-1242	BQL	41	ug/kg	U	1
PCB-1248	BQL	41	ug/kg	U	1
PCB-1254	BQL	41	ug/kg	U	1
PCB-1260	BQL	41	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGSB39A
GPL ID: 407174-002-002-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3540C
Prep Date: 07/30/2004
Prep Time: 00:00
Prep Batch: 68009

Analytical Method: SW8082
Date Analyzed: 08/01/2004
Time Analyzed: 15:01
Analysis Batch: 70102

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	44	ug/kg	U	1
PCB-1221	BQL	44	ug/kg	U	1
PCB-1232	BQL	44	ug/kg	U	1
PCB-1242	BQL	44	ug/kg	U	1
PCB-1248	BQL	44	ug/kg	U	1
PCB-1254	BQL	44	ug/kg	U	1
PCB-1260	BQL	44	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGSB40A
GPL ID: 407174-003-003-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3540C
Prep Date: 07/30/2004
Prep Time: 00:00
Prep Batch: 68009

Analytical Method: SW8082
Date Analyzed: 08/01/2004
Time Analyzed: 15:30
Analysis Batch: 70102

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	40	ug/kg	U	1
PCB-1221	BQL	40	ug/kg	U	1
PCB-1232	BQL	40	ug/kg	U	1
PCB-1242	BQL	40	ug/kg	U	1
PCB-1248	BQL	40	ug/kg	U	1
PCB-1254	BQL	40	ug/kg	U	1
PCB-1260	BQL	40	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGSB41A
GPL ID: 407174-004-004-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3540C
Prep Date: 07/30/2004
Prep Time: 00:00
Prep Batch: 68009

Analytical Method: SW8082
Date Analyzed: 08/01/2004
Time Analyzed: 15:59
Analysis Batch: 70102

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	40	ug/kg	U	1
PCB-1221	BQL	40	ug/kg	U	1
PCB-1232	BQL	40	ug/kg	U	1
PCB-1242	BQL	40	ug/kg	U	1
PCB-1248	BQL	40	ug/kg	U	1
PCB-1254	BQL	40	ug/kg	U	1
PCB-1260	BQL	40	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGSB42A
GPL ID: 407174-005-005-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3540C
Prep Date: 07/30/2004
Prep Time: 00:00
Prep Batch: 68009

Analytical Method: SW8082
Date Analyzed: 08/01/2004
Time Analyzed: 16:28
Analysis Batch: 70102

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	43	ug/kg	U	1
PCB-1221	BQL	43	ug/kg	U	1
PCB-1232	BQL	43	ug/kg	U	1
PCB-1242	BQL	43	ug/kg	U	1
PCB-1248	BQL	43	ug/kg	U	1
PCB-1254	BQL	43	ug/kg	U	1
PCB-1260	BQL	43	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGSB43A
GPL ID: 407174-006-006-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3540C
Prep Date: 07/30/2004
Prep Time: 00:00
Prep Batch: 68009

Analytical Method: SW8082
Date Analyzed: 08/01/2004
Time Analyzed: 16:57
Analysis Batch: 70102

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	41	ug/kg	U	1
PCB-1221	BQL	41	ug/kg	U	1
PCB-1232	BQL	41	ug/kg	U	1
PCB-1242	BQL	41	ug/kg	U	1
PCB-1248	BQL	41	ug/kg	U	1
PCB-1254	BQL	41	ug/kg	U	1
PCB-1260	BQL	41	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGSB44A
GPL ID: 407174-007-007-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3540C
Prep Date: 07/30/2004
Prep Time: 00:00
Prep Batch: 68009

Analytical Method: SW8082
Date Analyzed: 08/01/2004
Time Analyzed: 19:22
Analysis Batch: 70102

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	40	ug/kg	U	1
PCB-1221	BQL	40	ug/kg	U	1
PCB-1232	BQL	40	ug/kg	U	1
PCB-1242	BQL	40	ug/kg	U	1
PCB-1248	BQL	40	ug/kg	U	1
PCB-1254	BQL	40	ug/kg	U	1
PCB-1260	BQL	40	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGSB45A
GPL ID: 407174-008-008-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3540C
Prep Date: 07/30/2004
Prep Time: 00:00
Prep Batch: 68009

Analytical Method: SW8082
Date Analyzed: 08/01/2004
Time Analyzed: 19:51
Analysis Batch: 70102

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	40	ug/kg	U	1
PCB-1221	BQL	40	ug/kg	U	1
PCB-1232	BQL	40	ug/kg	U	1
PCB-1242	BQL	40	ug/kg	U	1
PCB-1248	BQL	40	ug/kg	U	1
PCB-1254	BQL	40	ug/kg	U	1
PCB-1260	BQL	40	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGSB43B
GPL ID: 407174-009-009-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3540C
Prep Date: 07/30/2004
Prep Time: 00:00
Prep Batch: 68009

Analytical Method: SW8082
Date Analyzed: 08/01/2004
Time Analyzed: 20:20
Analysis Batch: 70102

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	43	ug/kg	U	1
PCB-1221	BQL	43	ug/kg	U	1
PCB-1232	BQL	43	ug/kg	U	1
PCB-1242	BQL	43	ug/kg	U	1
PCB-1248	BQL	43	ug/kg	U	1
PCB-1254	BQL	43	ug/kg	U	1
PCB-1260	BQL	43	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGSB44B
GPL ID: 407174-010-010-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3540C
Prep Date: 07/30/2004
Prep Time: 00:00
Prep Batch: 68009

Analytical Method: SW8082
Date Analyzed: 08/01/2004
Time Analyzed: 20:49
Analysis Batch: 70102

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	37	ug/kg	U	1
PCB-1221	BQL	37	ug/kg	U	1
PCB-1232	BQL	37	ug/kg	U	1
PCB-1242	BQL	37	ug/kg	U	1
PCB-1248	BQL	37	ug/kg	U	1
PCB-1254	BQL	37	ug/kg	U	1
PCB-1260	BQL	37	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGSB45B
GPL ID: 407174-011-011-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3540C
Prep Date: 07/30/2004
Prep Time: 00:00
Prep Batch: 68009

Analytical Method: SW8082
Date Analyzed: 08/01/2004
Time Analyzed: 21:18
Analysis Batch: 70102

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	42	ug/kg	U	1
PCB-1221	BQL	42	ug/kg	U	1
PCB-1232	BQL	42	ug/kg	U	1
PCB-1242	BQL	42	ug/kg	U	1
PCB-1248	BQL	42	ug/kg	U	1
PCB-1254	BQL	42	ug/kg	U	1
PCB-1260	BQL	42	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGSB46C
GPL ID: 407174-012-012-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3540C
Prep Date: 07/30/2004
Prep Time: 00:00
Prep Batch: 68009

Analytical Method: SW8082
Date Analyzed: 08/01/2004
Time Analyzed: 21:47
Analysis Batch: 70102

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	44	ug/kg	U	1
PCB-1221	BQL	44	ug/kg	U	1
PCB-1232	BQL	44	ug/kg	U	1
PCB-1242	BQL	44	ug/kg	U	1
PCB-1248	BQL	44	ug/kg	U	1
PCB-1254	BQL	44	ug/kg	U	1
PCB-1260	BQL	44	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGSB47C
GPL ID: 407174-013-013-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3540C
Prep Date: 07/30/2004
Prep Time: 00:00
Prep Batch: 68009

Analytical Method: SW8082
Date Analyzed: 08/01/2004
Time Analyzed: 22:16
Analysis Batch: 70102

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	43	ug/kg	U	1
PCB-1221	BQL	43	ug/kg	U	1
PCB-1232	BQL	43	ug/kg	U	1
PCB-1242	BQL	43	ug/kg	U	1
PCB-1248	BQL	43	ug/kg	U	1
PCB-1254	BQL	43	ug/kg	U	1
PCB-1260	BQL	43	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGSB48C
GPL ID: 407174-014-014-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3540C
Prep Date: 07/30/2004
Prep Time: 00:00
Prep Batch: 68009

Analytical Method: SW8082
Date Analyzed: 08/01/2004
Time Analyzed: 22:45
Analysis Batch: 70102

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	43	ug/kg	U	1
PCB-1221	BQL	43	ug/kg	U	1
PCB-1232	BQL	43	ug/kg	U	1
PCB-1242	BQL	43	ug/kg	U	1
PCB-1248	BQL	43	ug/kg	U	1
PCB-1254	BQL	43	ug/kg	U	1
PCB-1260	BQL	43	ug/kg	U	1

Summary of Analytical Results

Client ID: WBGSB49B
GPL ID: 407174-015-015-1/1
Matrix: SOIL
Date Collected: 07/19/2004
Date Received: 07/24/2004

Prep Method: SW3540C
Prep Date: 07/30/2004
Prep Time: 00:00
Prep Batch: 68009

Analytical Method: SW8082
Date Analyzed: 08/01/2004
Time Analyzed: 23:14
Analysis Batch: 70102

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
PCB-1016	BQL	43	ug/kg	U	1
PCB-1221	BQL	43	ug/kg	U	1
PCB-1232	BQL	43	ug/kg	U	1
PCB-1242	BQL	43	ug/kg	U	1
PCB-1248	BQL	43	ug/kg	U	1
PCB-1254	BQL	43	ug/kg	U	1
PCB-1260	BQL	43	ug/kg	U	1

GPL LABORATORIES, LLP
ANALYTICAL RESULTS

Project Name : Radford

Date Printed August 11, 2004

GPL ID	Client ID
407174-001-001-1/1	WBGSB38A
407174-002-002-1/1	WBGSB39A
407174-003-003-1/1	WBGSB40A
407174-004-004-1/1	WBGSB41A
407174-005-005-1/1	WBGSB42A
407174-006-006-1/1	WBGSB43A
407174-009-009-1/1	WBGSB43B
407174-007-007-1/1	WBGSB44A
407174-010-010-1/1	WBGSB44B
407174-008-008-1/1	WBGSB45A
407174-011-011-1/1	WBGSB45B
407174-012-012-1/1	WBGSB46C
407174-013-013-1/1	WBGSB47C
407174-014-014-1/1	WBGSB48C
407174-015-015-1/1	WBGSB49B

Shaw Environmental, Inc.
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MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Dioxin Furans
SGS Paradigm Analytical Laboratories, Inc. SDG G383-574
(Accutest SDG F50408)

DATE: August 29, 2007

The purpose of this memorandum is to present the data validation report for the sample collected at New River Unit (NRU) Groundwater Investigation at RFAAP on June 18, 2007. The sample was analyzed for Dioxin Furan compounds using USEPA SW-846 Method 8290 High Resolution Gas Chromatography/High Resolution Mass Spectroscopy (HRGC/HRMS). A total of one aqueous sample was validated. The sample Id is:

Field Sample ID	Lab Sample ID
WBGMW02	F50408-2

Data were reviewed and validated using a combination of project QAPP, *DOD Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *USEPA Region III Dioxin/Furan Data Validation Guidance* (March, 1999). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
X		Blank Analysis
	X	Instrument Performance Check
	X	Initial Calibration
	X	Continuing Calibration
	X	Internal Standards (IS) Recovery Standard Solutions
	X	Cleanup Standards
	X	Laboratory Control Standard or Ongoing Precision Result (OPR)
	X	Matrix Spike and Spike Duplicate
	X	Field Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

8/29/07
Date

RFAAP VALIDATION REPORT
DIOXIN FURAN REVIEW
SDG G383-574
(Accutest SDG F50408)

I-Holding Times and Preservation

The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For dioxin furan compounds in cooled @4°C ± 2°C aqueous samples, the maximum holding time is 30 days from sample collection to preparative extraction and 45 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 06/18/07, 06/19/07, 06/20/07, and 06/21/07, the coolers were received by the primary laboratory (Accutest) on 06/22/06 at 1.0°C, 1.2°C, 1.8°C, 2.0°C, 1.4°C, and 1.0°C. The herbicides were subcontracted to Accutest TX and were received the samples at 1.4°C, 3.0°C, 2.2°C, and 3.4°C. The TOX were subcontracted to Accutest NJ and were received at 3.6°C, 4.8°C, and 2.8°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the samples at 5.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 4.8°C, 4.5°C, 5.8°C, 3.2°C, and 1.4°C. Even though several of the temperatures were below criteria, there were no impacts regarding the sample analysis. No qualifiers were applied based upon these outliers.

- Holding Time Review: The aqueous sample was collected on 06/18/07. For samples collected 06/18/07, the dioxins and furans were extracted on 06/22/07 and analyzed on 06/26/07. Sample collection dates may be found on the attached form 1s. All criteria were met. No qualifiers were applied.

II-Blank Analysis

The purpose of laboratory (or field) blank analyses is to determine the existence and magnitude of contamination problems resulting from field and laboratory activities. No contamination should be found in any of the blanks >EDL (estimated detection limit). The DoD QSM criteria specifies all concentrations should be less than ½ MRL (<MRL for common laboratory contaminants OCDD and OCDF) and <2EDL for the calibration blanks. Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤10 times (10x) the maximum amount in any blank for the common laboratory contaminants OCDD or OCDF, or 5 times (5X) the maximum amount for other target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank 062007R (F50408-8) (low-flow pump) applies to all samples in this SDG. The excess number of hits in the laboratory and field blanks are probably due to the low levels the laboratory reported the data (i.e. at estimated detection limit (EDL) and <MRL).

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. ng/L	Action Level ng/L	B qualified samples
06/26/07	LMB14322	1,2,3,4,6,7,8-HpCDF	0.0210J	0.105	WBGMW02
06/26/07	LMB14322	1,2,3,4,7,8-HxCDF	0.0105J	0.525	WBGMW02
06/26/07	LMB14322	1,2,3,6,7,8-HxCDF	0.00264J	0.0132	None
06/26/07	LMB14322	2,3,4,7,8-PeCDF	0.00328J	0.0164	WBGMW02
06/26/07	LMB14322	OCDD	0.0101J	0.101	WBGMW02
06/26/07	LMB14322	OCDF	0.0450J	0.450	WBGMW02
06/26/07	LMB14322	Total HpCDFs	0.0210J	0.105	WBGMW02
06/26/07	LMB14322	Total HxCDFs	0.0210J	0.105	WBGMW02
06/26/07	LMB14322	Total PeCDFs	0.0116J	0.0580	WBGMW02
07/11/07	062007R	1,2,3,4,6,7,8-HpCDF	0.00550J	0.0275	WBGMW02
07/11/07	062007R	1,2,3,4,7,8-HxCDD	0.00232J	0.0116	None
07/11/07	062007R	1,2,3,4,7,8-HxCDF	0.00350J	0.0175	WBGMW02
07/11/07	062007R	1,2,3,6,7,8-HxCDD	0.00239J	0.0120	None
07/11/07	062007R	1,2,3,6,7,8-HxCDF	0.00301J	0.0151	None
07/11/07	062007R	1,2,3,7,8,9-HxCDD	0.00221J, EMPC	0.0111	None
07/11/07	062007R	1,2,3,7,8,9-HxCDF	0.00226J	0.0113	None
07/11/07	062007R	1,2,3,7,8-PeCDD	0.00325J, EMPC	0.0163	None
07/11/07	062007R	1,2,3,7,8-PeCDF	0.00433J	0.0217	None
07/11/07	062007R	2,3,4,6,7,8-HxCDF	0.00223J	0.0112	None
07/11/07	062007R	2,3,4,7,8-PeCDF	0.00364J	0.0182	WBGMW02
07/11/07	062007R	2,3,7,8-TCDF	0.00212J	0.0106	None
07/11/07	062007R	OCDF	0.0101J	0.101	WBGMW02
07/11/07	062007R	Total HpCDFs	0.00550J	0.0275	WBGMW02
07/11/07	062007R	Total HxCDDs	0.00693J	0.0347	None
07/11/07	062007R	Total HxCDFs	0.0110J	0.0550	WBGMW02
07/11/07	062007R	Total PeCDDs	0.00325J, EMPC	0.0163	None
07/11/07	062007R	Total PeCDFs	0.00796J	0.0398	WBGMW02
07/11/07	062007R	Total TCDFs	0.00212J	0.0106	None

J = Estimated value <MRL and >EDL.
EMPC = Estimated Maximum Possible Concentration.

III-Instrument Performance Check

Instrument must be tuned with perfluorokerosene (PFK) to achieve a static resolving power of at least 10,000 (10% valley) and lock-mass ion between lowest and highest masses for each descriptor and level of reference compound ≤10%. Documentation of the mass spectrometer resolving power is accomplished by recording the peak profile of the high-mass reference signal (typically m/z 330.9792) obtained during a peak examination by using the low-mass PFK ion at m/z 292.9825 or lower in mass as reference. At the beginning of the each 12-hour period, the chromatographic resolution is verified in the same fashion as in the initial calibration through the analysis of HRCC solution on the DB-5 (or equivalent) column or through the analysis of the column performance solution on the SP-2331 or SP-225 (or equivalent) column. A 25% valley must be achieved between the close eluters.

- All PFK forms were verified and found to be in compliance with method specification. No qualifiers were applied.

IV-Initial Calibration
Once the window defining mix has been analyzed and the descriptor switching times have been verified, the five point calibration solutions can be analyzed prior to sample analysis. Per method and DoD QSM, the initial calibration criteria are as follows:

- The percent relative standard deviations for the mean response factors RRF(n) from the 17 unlabeled standards must not exceed ±20%, and those for the labeled reference compounds must not exceed ±30%;
- The signal to noise ratio ≥10% for all target ions;
- Ion abundance ratios must be within the specified control limits in Table 8 (SW846 Method 8290).

- For initial calibration performed on 07/10/06 for all target compounds on instrument HRMS1, all criteria were met. No qualifiers were applied. Sample WBGMW02 (F50408-2) applies to this initial calibration.

V-Continuing Calibration
The continuing calibration consists of two parts: evaluation of the mass resolution and retention time check. Per method and DoD QSM, the following stipulates the continuing calibration criteria.

- The signal signal-to-noise ratio (S/N) must be at least 10:1 for each selected ion current profile (SICP) and for each GC signal representing the elution of a target analyte or labeled standard for each analyte.
- The relative response factor of each analyte for the unlabeled standard must be within ±20% of the average RF obtained from the initial calibration, and the RRF of each labeled standard must be within ±30% of the average RRF established during initial calibration. This is expressed in term of percent difference %D.
- Ion abundance ratios must be within the specified control limits in Table 8 (SW846 Method 8290).

- For continuing calibration performed on 06/25/07 @16:14 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 06/26/07 @03:16 on instrument HRMS1, all criteria were met. No qualifiers were applied. Sample WBGMW02 (F50408-2) applies to this continuing calibration.

- For continuing calibration performed on 06/26/07 @14:23 on instrument HRMS1, all criteria were met. No qualifiers were applied. Sample WBGMW02 (F50408-2) applies to this continuing calibration.

VI-Internal Standards (IS) Recovery Standard Solutions
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Specific criteria include: Recoveries of the isotopically-labeled recovery standards to fall within the 40 to 135 percent range for the tetra- through octachlorinated congeners, or as stated in the data package (DoD QSM limits 40-135%).

- All criteria were met. No qualifiers were applied.

VII-Cleanup Standards
Cleanup standards are added to every sample, blank, quality control sample, and calibration solution. This compound is added to the samples after extraction but prior to cleanup and is used to verify the percent recovery obtained using the isotope dilution technique. The control limits are 40 to 135 percent (DoD QSM limits 40-135%).

- All criteria were met. No qualifiers were applied.

VIII-Laboratory Control Standard (LCS) or Ongoing Precision Result (OPR)
LCSs are used to monitor laboratory accuracy and precision by calculating the percent recoveries of the spiked compounds. Per DOD QSM and method criteria, acceptable performance is determined by:

1. Recoveries of the isotopically-labeled extraction standards to fall within 40-135% control limits for the tetra- through octachlorinated congeners, or as stated in the data package;

2. Recoveries (accuracy) of the unlabeled compounds should be within $\pm$35% when spiked at the method quantitation limit and within $\pm$30% when spiked above 20 times the method quantitation limit, or as stated in the data package;

3. When duplicate OPR are required, the relative percent difference (RPD) of the unlabeled analytes concentrations should be within 30% when spiked at the method quantitation limit and within $\pm$20% when spiked above 20 times the method quantitation limit.

- Sample OPR14322 was used as LCS and LCSD on 06/26/07 analytical run. All criteria were met. No qualifiers were applied. Sample WBGMW02 (F50408-2) applies to this LCS.

IX-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. Per DoD QSM, MS/MSD recoveries must be within in-house laboratory limits and RPD $\leq$20%.

- No project specific MS/MSD was performed; therefore, it was not evaluated.

X-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- No field groundwater sample duplicate was analyzed with this SDG.

XI-Quantitation Verification

The accuracy of analytical results was verified through the calculation of at least one the several parameters such as the %D, %RSD, % recovery, and/or compound concentration. Values were found to be within 10%. Any value reported by the laboratory as estimated "A" based on an analyte to internal standard ratio below the calibration curve was qualified as estimated "J". The signal signal-to-noise ratio (S/N) must be greater than 2.5 for each selected ion current profile (SICP) and for each GC signal representing the elution of a target analyte or labeled standard. Any detected value with ether interference (I-lab flag) was qualified as estimated "J". For where the ion ratio failed the 25% criteria (*-lab flag), the estimated maximum possible concentration (EMPC) was reported and flagged estimated "J".

Sample: NBGMW02 (F50408-5), OCDD

A(x) = sum of the integrated ion abundances of the quantitation ions for the unlabeled ions;
A(is) = sum of the integrated ion abundances of the quantitation ions for the labeled ions;
Q(is) = quantity, in ng/ul, of the internal standard added to the sample before extraction;
W = weight, in g, of the sample (solid or organic liquid) as dry weight, or volume in mL of an aqueous sample; and
Avg. RRF(n) = calculated mean relative response factor for the unlabeled analyte.

$$\text{Conc. (ng/L)} = \frac{(A(x)) * Q(is) * 1000}{A(is) * W * \text{Avg. RRF}} = \frac{(37500+37500) * 4.0 * 1000}{(20000000+22700000) * 927 * 1.0989} = 0.00689 \text{ ng/L}$$

Reported Value = 0.00688 ng/L = 0.00000688 µg/L
% Difference = 0.2%
Values were within 10% difference

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ EDL and <MRL or <3*EDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥EDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ EDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Form I Copy

Method 8290
F50408-2
Accutest

Analytical Data Summary Sheet

Analyte	Amount (ng/L)	EDL (ng/L)	EMPC (ng/L)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	ND	0.00512				
1,2,3,7,8-PeCDD	ND	0.00539				
1,2,3,4,7,8-HxCDD	ND	0.00539				
1,2,3,6,7,8-HxCDD	ND	0.00539				
1,2,3,7,8,9-HxCDD	ND	0.00539				
1,2,3,4,6,7,8-HpCDD	ND	0.00539				
OCDD	0.00688 B			43:06	1.00	A
2,3,7,8-TCDF	ND	0.00356				
1,2,3,7,8-PeCDF	ND	0.00539				
2,3,4,7,8-PeCDF	EMPC	~~0.00539~~	0.00205 B	33:22	1.25 *	A
1,2,3,4,7,8-HxCDF	0.00641 B			35:19	1.35	A
1,2,3,6,7,8-HxCDF	ND	0.00539				
2,3,4,6,7,8-HxCDF	ND	0.00539				
1,2,3,7,8,9-HxCDF	ND	0.00539				
1,2,3,4,6,7,8-HpCDF	0.0128 B			38:00	0.94	A
1,2,3,4,7,8,9-HpCDF	ND	0.00615				
OCDF	0.0395 B			43:22	0.86	A
Total TCDDs	ND	0.00512				
Total PeCDDs	ND	0.00539				
Total HxCDDs	ND	0.00539				
Total HpCDDs	ND	0.00539				
Total TCDFs	ND	0.00356				
Total PeCDFs	0.0103 B					
Total HxCDFs	~~0.00777~~		0.0121 B			
Total HpCDFs	0.0128 B					
WHO-2005 TEQ (ND=0)	0.000783		0.00140			
WHO-2005 TEQ (ND=½)	0.00878		0.00859			

Client Information			**Sample Information**	
Project Name:	F50408		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F50408-2		Weight / Volume:	927 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14322
Project ID:	G383-574		Instrument:	HRMS1
Sample ID:	G383-574-1B		Filename:	a25jun07a_2-6
Collection Date/Time:	06/18/07	14:15	Retchk:	a25jun07a-15
Receipt Date/Time:	06/20/07	10:10	Begin ConCal:	a25jun07a-15
Extraction Date:	06/22/07		End ConCal:	a25jun07a_2-14
Analysis Date/Time:	06/26/07	8:04	Initial Cal:	m8290-071006e

Form I Copy

Method 8290
F50408-2
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.40	69.8	30:10	0.77	
13C12-1,2,3,7,8-PeCDD	2.0	1.41	70.6	33:31	1.56	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.63	81.4	36:04	1.24	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.53	76.3	39:09	1.05	
13C12-OCDD	4.0	2.69	67.2	43:04	0.88	
13C12-2,3,7,8-TCDF	2.0	1.58	78.9	29:16	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.25	62.3	32:45	1.56	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.47	73.7	35:25	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.39	69.5	37:58	0.44	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.8	0.701	87.6	30:13	-	
13C12-2,3,4,7,8-PeCDF	0.8	0.637	79.6	33:21	1.54	
13C12-1,2,3,4,7,8-HxCDD	0.8	0.771	96.4	35:58	1.26	
13C12-1,2,3,4,7,8-HxCDF	0.8	0.692	86.5	35:19	0.51	
13C12-1,2,3,4,7,8,9-HpCDF	0.8	0.668	83.5	39:46	0.43	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	29:27	0.78	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	36:18	1.24	

Client Information			**Sample Information**	
Project Name:	F50408		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F50408-2		Weight / Volume:	927 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14322
Project ID:	G383-574		Instrument:	HRMS1
Sample ID:	G383-574-1B		Filename:	a25jun07a_2-6
Collection Date/Time:	06/18/07	14:15	Retchk:	a25jun07a-15
Receipt Date/Time:	06/20/07	10:10	Begin ConCal:	a25jun07a-15
Extraction Date:	06/22/07		End ConCal:	a25jun07a_2-14
Analysis Date/Time:	06/26/07	8:04	Initial Cal:	m8290-071006e

Form Version:[8290_DB_2.14]Report

Analyzed by: _____
Date: 06-26-07

Reviewed by: _____
Date: 6/28/07

Shaw Environmental, Inc.
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Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Dioxin Furans
SGS Paradigm Analytical Laboratories, Inc. SDGs G383-577 and G383-579
(Accutest SDG F50408)

DATE: August 28, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at New River Unit (NRU) Groundwater Investigation at RFAAP on June 18, 2007, June 19, 2007, June 20, 2007, and June 21, 2007. The samples were analyzed for Dioxin Furan compounds using USEPA SW-846 Method 8290 High Resolution Gas Chromatography/High Resolution Mass Spectroscopy (HRGC/HRMS). A total of ten aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
WBGMW03	F50408-3	BLAMW01	F50408-10
NBGMW01	F50408-4	IAAMW02	F50408-11
NBGMW02	F50408-5	IAAMW04	F50408-14
TMMW01	F50408-6	WBGMW01	F50408-16
IAAMW03	F50408-9	BLAMW02	F50408-17

Data were reviewed and validated using a combination of project QAPP, *DOD Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *USEPA Region III Dioxin/Furan Data Validation Guidance* (March, 1999). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
X		Blank Analysis
	X	Instrument Performance Check
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	X	Continuing Calibration
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	X	Cleanup Standards
X		Laboratory Control Standard or Ongoing Precision Result (OPR)
	X	Matrix Spike and Spike Duplicate
X		Field Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

8/28/07
Date

RFAAP VALIDATION REPORT
DIOXIN FURAN REVIEW
SDGs G383-577 and G383-579
(Accutest SDG F50408)

I-Holding Times and Preservation

The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For dioxin furan compounds in cooled @4°C ± 2°C aqueous samples, the maximum holding time is 30 days from sample collection to preparative extraction and 45 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 06/18/07, 06/19/07, 06/20/07, and 06/21/07, the coolers were received by the primary laboratory (Accutest) on 06/22/06 at 1.0°C, 1.2°C, 1.8°C, 2.0°C, 1.4°C, and 1.0°C. The herbicides were subcontracted to Accutest TX and were received the samples at 1.4°C, 3.0°C, 2.2°C, and 3.4°C. The TOX were subcontracted to Accutest NJ and were received at 3.6°C, 4.8°C, and 2.8°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the samples at 5.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 4.8°C, 4.5°C, 5.8°C, 3.2°C, and 1.4°C. Even though several of the temperatures were below criteria, there were no impacts regarding the sample analysis. No qualifiers were applied based upon these outliers.

- Holding Time Review: The aqueous samples were collected on 06/18/07, 06/19/07, 06/20/07, and 06/21/07. For samples collected 06/18/07, the Dioxins and Furans were extracted on 06/22/07 and analyzed on 06/26/07. For samples collected 06/19/07, the Dioxins and Furans were extracted on 06/26/07 and analyzed on 07/08/07. For samples collected 06/19/07, 06/20/07, and 06/21/07, the Dioxins and Furans were extracted on 07/04/07 and analyzed on 07/11/07. Sample collection dates may be found on the attached form 1s. All criteria were met. No qualifiers were applied.

II-Blank Analysis

The purpose of laboratory (or field) blank analyses is to determine the existence and magnitude of contamination problems resulting from field and laboratory activities. No contamination should be found in any of the blanks >EDL (estimated detection limit). The DoD QSM criteria specifies all concentrations should be less than ½ MRL (<MRL for common laboratory contaminants OCDD and OCDF) and <2EDL for the calibration blanks. Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤10 times (10x) the maximum amount in any blank for the common laboratory contaminants OCDD or OCDF, or 5 times (5X) the maximum amount for other target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank 062007R (F50408-8) (low-flow pump) applies to all samples in this SDG. The excess number of hits in the laboratory and field blanks are probably due to the low levels the laboratory reported the data (i.e. at estimated detection limit (EDL) and <MRL).

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. ng/L	Action Level ng/L	B qualified samples
06/28/07	LMB14330	1,2,3,4,6,7,8-HpCDD	0.0529	0.265	WBGMW01
06/28/07	LMB14330	1,2,3,4,6,7,8-HpCDF	0.173	0.865	WBGMW01
06/28/07	LMB14330	1,2,3,4,7,8,9-HpCDF	0.0155J	0.078	None
06/28/07	LMB14330	1,2,3,4,7,8-HxCDF	0.0371J	0.186	WBGMW01
06/28/07	LMB14330	1,2,3,6,7,8-HxCDF	0.0210J	0.105	WBGMW01
06/28/07	LMB14330	1,2,3,7,8-PeCDF	0.00746J	0.037	None
06/28/07	LMB14330	2,3,4,6,7,8-HxCDF	0.0210J	0.105	None
06/28/07	LMB14330	2,3,4,7,8-PeCDF	0.00682J	0.034	None
06/28/07	LMB14330	OCDD	0.440	4.40	WBGMW01
06/28/07	LMB14330	OCDF	0.253	2.53	WBGMW01
06/28/07	LMB14330	Total HpCDFs	0.221J	1.105	WBGMW01
06/28/07	LMB14330	Total HpCDDs	0.0815J	0.408	WBGMW01
06/28/07	LMB14330	Total HxCDFs	0.126J	0.630	WBGMW01
06/28/07	LMB14330	Total PeCDFs	0.0611J	0.306	WBGMW01
06/28/07	LMB14330	Total TCDFs	0.0158J, EMPC	0.079	None
07/11/07	LMB14343	1,2,3,4,7,8-HxCDF	0.00238J	0.0119	NBGMW01, NBGMW02, TMMW01, BLAMW01, IAAMW02, IAAMW04, BLAMW02
07/11/07	LMB14343	1,2,3,6,7,8-HxCDF	0.00204J	0.0102	NBGMW01, NBGMW02, TMMW01, BLAMW01, IAAMW02, IAAMW04, BLAMW02
07/11/07	LMB14343	1,2,3,7,8-PeCDD	0.00260J	0.0130	NBGMW01, NBGMW02, TMMW01, IAAMW04, BLAMW02
07/11/07	LMB14343	1,2,3,7,8-PeCDF	0.00312J	0.0156	NBGMW01, NBGMW02, TMMW01, IAAMW03, IAAMW02, IAAMW04, BLAMW02
07/11/07	LMB14343	2,3,4,6,7,8-HxCDF	0.00186J, EMPC	0.0093	NBGMW01, NBGMW02, TMMW01, IAAMW04, BLAMW02
07/11/07	LMB14343	2,3,4,7,8-PeCDF	0.00244J	0.0122	NBGMW01, NBGMW02, TMMW01, IAAMW03, BLAMW01, IAAMW02, IAAMW04, BLAMW02
07/11/07	LMB14343	Total HxCDFs	0.00442J	0.0221	NBGMW02, TMMW01, BLAMW01, IAAMW02, IAAMW04, BLAMW02
07/11/07	LMB14343	Total PeCDDs	0.00260J	0.0130	NBGMW01, NBGMW02, TMMW01, IAAMW04, BLAMW02
07/11/07	LMB14343	Total PeCDFs	0.00556J	0.0278	NBGMW01, NBGMW02, TMMW01, IAAMW03, BLAMW01, IAAMW02, IAAMW04

Table 2 Blank Contamination Analysis Summary, Continued

Analysis Date	QC Blank ID	Compound	Max Conc. ng/L	Action Level ng/L	B qualified samples
07/11/07	062007R	1,2,3,4,6,7,8-HpCDF	0.00550J	0.0275	WBGMW03, NBGMW01, NBGMW02, TMMW01, BLAMW01, IAAMW02, IAAMW04, WBGMW01,BLAMW02
07/11/07	062007R	1,2,3,4,7,8-HxCDD	0.00232J	0.0116	NBGMW01, NBGMW02
07/11/07	062007R	1,2,3,4,7,8-HxCDF	0.00350J	0.0175	NBGMW01, NBGMW02, TMMW01, BLAMW01, IAAMW02, IAAMW04, WBGMW01, BLAMW02
07/11/07	062007R	1,2,3,6,7,8-HxCDD	0.00239J	0.0120	NBGMW01, NBGMW02
07/11/07	062007R	1,2,3,6,7,8-HxCDF	0.00301J	0.0151	NBGMW01, NBGMW02, TMMW01, BLAMW01, IAAMW02, IAAMW04, WBGMW01, BLAMW02
07/11/07	062007R	1,2,3,7,8,9-HxCDD	0.00221J, EMPC	0.0111	NBGMW01, NBGMW02
07/11/07	062007R	1,2,3,7,8,9-HxCDF	0.00226J	0.0113	NBGMW01, NBGMW02, TMMW01
07/11/07	062007R	1,2,3,7,8-PeCDD	0.00325J, EMPC	0.0163	NBGMW01, NBGMW02, TMMW01, IAAMW04, BLAMW02
07/11/07	062007R	1,2,3,7,8-PeCDF	0.00433J	0.0217	NBGMW01, NBGMW02, TMMW01, IAAMW03, IAAMW02, IAAMW04, BLAMW02
07/11/07	062007R	2,3,4,6,7,8-HxCDF	0.00223J	0.0112	NBGMW01, NBGMW02, TMMW01, IAAMW04, BLAMW02
07/11/07	062007R	2,3,4,7,8-PeCDF	0.00364J	0.0182	NBGMW01, NBGMW02, TMMW01, IAAMW03, BLAMW01, IAAMW02, IAAMW04, BLAMW02
07/11/07	062007R	2,3,7,8-TCDF	0.00212J	0.0106	NBGMW01, NBGMW02, IAAMW02, IAAMW04
07/11/07	062007R	OCDF	0.0101J	0.101	WBGMW03, NBGMW01, NBGMW02, TMMW01, BLAMW01, IAAMW02, WBGMW01
07/11/07	062007R	Total HpCDFs	0.00550J	0.0275	WBGMW03, NBGMW01, NBGMW02, TMMW01, BLAMW01, IAAMW02, IAAMW04, BLAMW02
07/11/07	062007R	Total HxCDDs	0.00693J	0.0347	NBGMW01, NBGMW02, WBGMW01
07/11/07	062007R	Total HxCDFs	0.0110J	0.0550	NBGMW01, NBGMW02, TMMW01, BLAMW01, IAAMW02, IAAMW04, WBGMW01, BLAMW02
07/11/07	062007R	Total PeCDDs	0.00325J, EMPC	0.0163	NBGMW01, NBGMW02, TMMW01, IAAMW04, BLAMW02
07/11/07	062007R	Total PeCDFs	0.00796J	0.0398	NBGMW01, NBGMW02, TMMW01, IAAMW03, BLAMW01, IAAMW02, IAAMW04, WBGMW01, BLAMW02
07/11/07	062007R	Total TCDFs	0.00212J	0.0106	NBGMW01, NBGMW02, IAAMW02, IAAMW04, BLAMW02

J = Estimated value <MRL and >EDL.
EMPC = Estimated Maximum Possible Concentration.

III-Instrument Performance Check

Instrument must be tuned with perfluorokerosene (PFK) to achieve a static resolving power of at least 10,000 (10% valley) and lock-mass ion between lowest and highest masses for each descriptor and level of reference compound ≤10%. Documentation of the mass spectrometer resolving power is accomplished by recording the peak profile of the high-mass reference signal (typically m/z 330.9792) obtained during a peak examination by using the low-mass PFK ion at m/z 292.9825 or lower in mass as reference. At the beginning of the each 12-hour period, the chromatographic resolution is verified in the same fashion as in the initial calibration through the analysis of HRCC solution on the DB-5 (or equivalent) column or through the analysis of the column performance solution on the SP-2331 or SP-225 (or equivalent) column. A 25% valley must be achieved between the close eluters.

- All PFK forms were verified and found to be in compliance with method specification. No qualifiers were applied.

IV-Initial Calibration
Once the window defining mix has been analyzed and the descriptor switching times have been verified, the five point calibration solutions can be analyzed prior to sample analysis. Per method and DoD QSM, the initial calibration criteria are as follows:

- The percent relative standard deviations for the mean response factors RRF(n) from the 17 unlabeled standards must not exceed ±20%, and those for the labeled reference compounds must not exceed ±30%;
- The signal to noise ratio ≥10% for all target ions;
- Ion abundance ratios must be within the specified control limits in Table 8 (SW846 Method 8290).

- For initial calibration performed on 07/10/06 for all target compounds on instrument HRMS1, all criteria were met. No qualifiers were applied. Sample WBGMW01 (F50408-16) applies to this initial calibration.

- For initial calibration performed on 07/10/07 for all target compounds on instrument HRMS1, all criteria were met. No qualifiers were applied. Samples WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) apply to this initial calibration.

V-Continuing Calibration
The continuing calibration consists of two parts: evaluation of the mass resolution and retention time check. Per method and DoD QSM, the following stipulates the continuing calibration criteria.

- The signal signal-to-noise ratio (S/N) must be at least 10:1 for each selected ion current profile (SICP) and for each GC signal representing the elution of a target analyte or labeled standard for each analyte.
- The relative response factor of each analyte for the unlabeled standard must be within ±20% of the average RF obtained from the initial calibration, and the RRF of each labeled standard must be within ±30% of the average RRF established during initial calibration. This is expressed in term of percent difference %D.
- Ion abundance ratios must be within the specified control limits in Table 8 (SW846 Method 8290).

- For continuing calibration performed on 06/26/07 @16:55 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 06/27/07 @03:57 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 06/28/07 @02:11 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 06/28/07 @13:18 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 06/29/07 @08:07 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 06/29/07 @11:33 on instrument HRMS1, all criteria were met. 1,2,3,4,7,8-HxCDF (21.8%) and 1,2,3,7,8,9-HxCDF (21.7%) were outside criteria; however, no samples were run using this continuing calibration. No qualifiers were applied based upon these outliers. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 07/08/07 @11:13 on instrument HRMS1, all criteria were met. No qualifiers were applied. Sample WBGMW01 (F50408-16) applies to this continuing calibration.

- For continuing calibration performed on 07/08/07 @22:30 on instrument HRMS1, all criteria were met. No qualifiers were applied. Sample WBGMW01 (F50408-16) applies to this continuing calibration.

- For continuing calibration performed on 07/10/07 @21:08 on instrument HRMS1, all criteria were met. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For continuing calibration performed on 07/11/07 @02:47 on instrument HRMS1, all criteria were met. No qualifiers were applied. Samples WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) apply to this continuing calibration.

- For continuing calibration performed on 07/11/07 @14:09 on instrument HRMS1, all criteria were met. No qualifiers were applied. Samples WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) apply to this continuing calibration.

VI-Internal Standards (IS) Recovery Standard Solutions

Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Specific criteria include: Recoveries of the isotopically-labeled recovery standards to fall within the 40 to 135 percent range for the tetra- through octachlorinated congeners, or as stated in the data package (DoD QSM limits 40-135%).

- All criteria were met. No qualifiers were applied.

VII-Cleanup Standards

Cleanup standards are added to every sample, blank, quality control sample, and calibration solution. This compound is added to the samples after extraction but prior to cleanup and is used to verify the percent recovery obtained using the isotope dilution technique. The control limits are 40 to 135 percent (DoD QSM limits 40-135%).

- All criteria were met. No qualifiers were applied.

VIII-Laboratory Control Standard (LCS) or Ongoing Precision Result (OPR)
LCSs are used to monitor laboratory accuracy and precision by calculating the percent recoveries of the spiked compounds. Per DOD QSM and method criteria, acceptable performance is determined by:

1. Recoveries of the isotopically-labeled extraction standards to fall within 40-135% control limits for the tetra- through octachlorinated congeners, or as stated in the data package;

2. Recoveries (accuracy) of the unlabeled compounds should be within ±35% when spiked at the method quantitation limit and within ±30% when spiked above 20 times the method quantitation limit, or as stated in the data package;

3. When duplicate OPR are required, the relative percent difference (RPD) of the unlabeled analytes concentrations should be within 30% when spiked at the method quantitation limit and within ±20% when spiked above 20 times the method quantitation limit.

- Sample OPR14330 was used as LCS and LCSD on 06/28/07 analytical run. 1,2,3,4,6,7,8-HpCDF (131%) was above criteria. For all other congeners, all criteria were met. All RPDs were within criteria. 1,2,3,4,6,7,8-HpCDF was qualified bias high "K" for detects and no qualifier for non-detects based upon the high %R. Sample WBGMW01 (F50408-16) applies to this LCS.

- Sample OPR14343 was used as LCS and LCSD on 07/11/07 analytical run. All criteria were met. No qualifiers were applied. Samples WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) apply to this LCS.

IX-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. Per DoD QSM, MS/MSD recoveries must be within in-house laboratory limits and RPD ≤20%.

- No project specific MS/MSD was performed; therefore, it was not evaluated.

X-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field groundwater sample duplicate pair NBGMW01 (F50408-4) and TMMW01 (F50408-6) was collected for dioxin and furans. All detected metals found in the sample and its duplicate pair and associated %RPD are noted in **Table 3**. All other dioxin and furans were non-detect. Congeners 1,2,3,4,7,8-HxCDF (61.5%), 1,2,3,6,7,8-HxCDF (74.4%), 1,2,3,7,8,9-HxCDF (90.1%), 1,2,3,7,8-PeCDD (71.7%), 1,2,3,7,8-PeCDF (84.7%), 2,3,4,6,7,8-HxCDF (64.4%), 2,3,4,7,8-PeCDF (68.9%), Total HxCDFs (72.8%), Total PeCDDs (71.7%), and Total PeCDFs (93.5%) were outside criteria probably due to the high variance with the low concentration levels (i.e. >EDL and <MRL) reported. See Section II for the congeners that were "B" blank qualified. All other detected dioxin and furans were within criteria.

Table 3 Field Precision Hits Analysis Summary for Metals for Duplicate Pair NBGMW01 (F50408-4) and TMMW01 (F50408-6)

Compound	Original Sample (ng/L)	Duplicate Pair (ng/L)	%RPD
1,2,3,4,6,7,8-HpCDD	0.00367J	0.00577U	NA
1,2,3,4,6,7,8-HpCDF	0.00609J	0.00693J	12.9
1,2,3,4,7,8,9-HpCDF	0.00412J	0.00577U	NA
1,2,3,4,7,8-HxCDD	0.00575J	0.00577U	NA
1,2,3,4,7,8-HxCDF	0.00710J	0.00376J	61.5
1,2,3,6,7,8-HxCDD	0.00513J	0.00577U	NA
1,2,3,6,7,8-HxCDF	0.00625J	0.00286J	74.4
1,2,3,7,8,9-HxCDD	0.00554J	0.00577U	NA
1,2,3,7,8,9-HxCDF	0.00623J	0.00236J, EMPC	90.1
1,2,3,7,8-PeCDD	0.00777J	0.00367J	71.7
1,2,3,7,8-PeCDF	0.00946J	0.00383J	84.7
2,3,4,6,7,8-HxCDF	0.00419J	0.00215J, EMPC	64.4
2,3,4,7,8-PeCDF	0.00738J	0.00360J	68.9
2,3,7,8-TCDD	0.00318J	0.00292U	NA
2,3,7,8-TCDF	0.0038J	0.00231U	NA
OCDD	0.0102J, EMPC	0.00940J	8.2
OCDF	0.00763J, EMPC	0.0121J	45.3
Total HpCDDs	0.00367J	0.00577U	NA
Total HpCDFs	0.0102J	0.00693J	38.2
Total HxCDDs	0.0164J	0.00577U	NA
Total HxCDFs	0.0238J	0.0111J	72.8
Total PeCDDs	0.00777J	0.00367J	71.7
Total PeCDFs	0.0205J, EMPC	0.00744J	93.5
Total TCDDs	0.00318J	0.00292U	NA
Total TCDFs	0.0038J	0.00231U	NA

U = Value non-detect as <EDL.
J = Estimated value <MRL and >EDL. Data point qualified was estimated "J".
NA = Not Applicable.

XI-Quantitation Verification

The accuracy of analytical results was verified through the calculation of at least one the several parameters such as the %D, %RSD, % recovery, and/or compound concentration. Values were found to be within 10%. Any value reported by the laboratory as estimated "A" based on an analyte to internal standard ratio below the calibration curve was qualified as estimated "J". The signal signal-to-noise ratio (S/N) must be greater than 2.5 for each selected ion current profile (SICP) and for each GC signal representing the elution of a target analyte or labeled standard. Any detected value with ether interference (I-lab flag) was qualified as estimated "J". For where the ion ratio failed the 25% criteria (*-lab flag), the estimated maximum possible concentration (EMPC) was reported and flagged estimated "J".

- For sample BLAMW02 (F50408-17), congener 1,2,3,7,8,9-HxCDD was qualified estimated non-detect "UJ" based upon the presence of quantitation interference.

Sample: NBGMW02 (F50408-5), OCDD

A(x) = sum of the integrated ion abundances of the quantitation ions for the unlabeled ions;
A(is) = sum of the integrated ion abundances of the quantitation ions for the labeled ions;
Q(is) = quantity, in ng/ul, of the internal standard added to the sample before extraction;
W = weight, in g, of the sample (solid or organic liquid) as dry weight, or volume in mL of an aqueous sample; and
Avg. RRF(n) = calculated mean relative response factor for the unlabeled analyte.

$$\text{Conc. (ng/L)} = \frac{(A(x)) * Q(is) * 1000}{A(is) * W * \text{Avg. RRF}} = \frac{(192000+217000) * 4.0 * 1000}{(37100000+41200000) * 858 * 1.0783} = 0.0226 \text{ ng/L}$$

Reported Value = 0.0226 ng/L = 0.0000226 µg/L
% Difference = 0.0%
Values were within 10% difference

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ EDL and <MRL or <3*EDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥EDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ EDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Form I COA

Method 8290
F50408-3
Accutest

Analytical Data Summary Sheet

Analyte	Amount (ng/L)	EDL (ng/L)	EMPC (ng/L)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	ND	0.00356				
1,2,3,7,8-PeCDD	ND	0.00546				
1,2,3,4,7,8-HxCDD	ND	0.00546				
1,2,3,6,7,8-HxCDD	ND	0.00546				
1,2,3,7,8,9-HxCDD	ND	0.00546				
1,2,3,4,6,7,8-HpCDD	ND	0.00546				
OCDD	ND	0.0109				
2,3,7,8-TCDF	ND	0.00245				
1,2,3,7,8-PeCDF	ND	0.00546				
2,3,4,7,8-PeCDF	ND	0.00546				
1,2,3,4,7,8-HxCDF	ND	0.00546				
1,2,3,6,7,8-HxCDF	ND	0.00546				
2,3,4,6,7,8-HxCDF	ND	0.00546				
1,2,3,7,8,9-HxCDF	ND	0.00546				
1,2,3,4,6,7,8-HpCDF	0.00830 B			39:12	1.03	A
1,2,3,4,7,8,9-HpCDF	ND	0.00546				
OCDF	0.0101 B			45:10	1.00	A
Total TCDDs	ND	0.00356				
Total PeCDDs	ND	0.00546				
Total HxCDDs	ND	0.00546				
Total HpCDDs	ND	0.00546				
Total TCDFs	ND	0.00245				
Total PeCDFs	ND	0.00546				
Total HxCDFs	ND	0.00546				
Total HpCDFs	0.00830 B					
WHO-2005 TEQ (ND=0)	0.0000860		0.0000860			
WHO-2005 TEQ (ND=½)	0.00758		0.00758			

Client Information			**Sample Information**	
Project Name:	F50408		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F50408-3		Weight / Volume:	916 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14343
Project ID:	G383-579		Instrument:	HRMS1
Sample ID:	G383-579-1B		Filename:	a10jul07b_2-4
Collection Date/Time:	06/19/07	8:15	Retchk:	a10jul07b-8
Receipt Date/Time:	07/03/07	10:10	Begin ConCal:	a10jul07b-8
Extraction Date:	07/04/07		End ConCal:	a10jul07b_2-14
Analysis Date/Time:	07/11/07	6:05	Initial Cal:	m8290-071007a

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Method 8290
F50408-3
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.61	80.4	31:34	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.86	93.1	34:21	1.58	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.72	85.8	37:04	1.26	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.73	86.4	40:28	1.06	
13C12-OCDD	4.0	3.23	80.8	44:51	0.90	
13C12-2,3,7,8-TCDF	2.0	1.87	93.7	31:01	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.88	93.9	33:33	1.59	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.69	84.6	36:22	0.53	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.74	86.9	39:12	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.397	99.4	31:36	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.433	108	34:10	1.59	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.378	94.5	37:00	1.26	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.434	108	36:16	0.52	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.382	95.4	41:10	0.45	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:10	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:19	1.25	

Client Information			**Sample Information**	
Project Name:	F50408		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F50408-3		Weight / Volume:	916 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14343
Project ID:	G383-579		Instrument:	HRMS1
Sample ID:	G383-579-1B		Filename:	a10jul07b_2-4
Collection Date/Time:	06/19/07	8:15	Retchk:	a10jul07b-8
Receipt Date/Time:	07/03/07	10:10	Begin ConCal:	a10jul07b-8
Extraction Date:	07/04/07		End ConCal:	a10jul07b_2-14
Analysis Date/Time:	07/11/07	6:05	Initial Cal:	m8290-071007a

Form Version:[8290_DB_2.14]Report

Analyzed by: _____
Date: 07-11-07

Reviewed by: _____
Date: 7/11/07

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Method 8290
F50408-4
Accutest

Analytical Data Summary Sheet

Analyte	Amount (ng/L)	EDL (ng/L)	EMPC (ng/L)	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	0.00318 J			31:34	0.72		A
1,2,3,7,8-PeCDD	0.00777 B			34:22	1.44		A
1,2,3,4,7,8-HxCDD	0.00575 B			37:01	1.20		A
1,2,3,6,7,8-HxCDD	0.00513 B			37:06	1.27		A
1,2,3,7,8,9-HxCDD	0.00554 B			37:21	1.19		A
1,2,3,4,6,7,8-HpCDD	0.00367 J			40:30	1.05		A
OCDD	EMPC	~~0.0115~~	0.0102 J	44:52	1.08	*	A
2,3,7,8-TCDF	0.00380 B			31:01	0.82		A
1,2,3,7,8-PeCDF	0.00946 B			33:34	1.44		A
2,3,4,7,8-PeCDF	0.00738 B			34:10	1.55		A
1,2,3,4,7,8-HxCDF	0.00710 B			36:16	1.21		A
1,2,3,6,7,8-HxCDF	0.00625 B			36:22	1.29		A
2,3,4,6,7,8-HxCDF	0.00419 B			36:52	1.18		A
1,2,3,7,8,9-HxCDF	0.00623 B			37:40	1.33		A
1,2,3,4,6,7,8-HpCDF	0.00609 B			39:12	1.03		A
1,2,3,4,7,8,9-HpCDF	0.00412 J			41:10	0.98		A
OCDF	EMPC	~~0.0115~~	0.00763 B	45:10	1.03	*	A
Total TCDDs	0.00318 J						
Total PeCDDs	0.00777 B						
Total HxCDDs	0.0164 B						
Total HpCDDs	0.00367 J						
Total TCDFs	0.00380 B						
Total PeCDFs	~~0.0187~~		0.0205 B				
Total HxCDFs	0.0238 B						
Total HpCDFs	0.0102 B						
WHO-2005 TEQ (ND=0)	0.0180		0.0180				
WHO-2005 TEQ (ND=½)	0.0180		0.0180				

Client Information			**Sample Information**	
Project Name:	F50408		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F50408-4		Weight / Volume:	873 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14343
Project ID:	G383-579		Instrument:	HRMS1
Sample ID:	G383-579-2B		Filename:	a10jul07b_2-5
Collection Date/Time:	06/19/07	13:25	Retchk:	a10jul07b-8
Receipt Date/Time:	07/03/07	10:10	Begin ConCal:	a10jul07b-8
Extraction Date:	07/04/07		End ConCal:	a10jul07b_2-14
Analysis Date/Time:	07/11/07	6:53	Initial Cal:	m8290-071007a

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Method 8290
F50408-4
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.86	92.8	31:34	0.79	
13C12-1,2,3,7,8-PeCDD	2.0	1.91	95.6	34:21	1.59	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.83	91.5	37:04	1.26	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.82	91.0	40:28	1.07	
13C12-OCDD	4.0	3.53	88.3	44:52	0.90	
13C12-2,3,7,8-TCDF	2.0	2.07	104	31:01	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.95	97.5	33:33	1.58	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.79	89.7	36:22	0.53	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.86	93.1	39:10	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.450	112	31:36	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.446	111	34:10	1.60	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.407	102	37:00	1.27	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.468	117	36:16	0.52	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.405	101	41:10	0.45	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:10	0.78	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:19	1.24	

Client Information			**Sample Information**	
Project Name:	F50408		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F50408-4		Weight / Volume:	873 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14343
Project ID:	G383-579		Instrument:	HRMS1
Sample ID:	G383-579-2B		Filename:	a10jul07b_2-5
Collection Date/Time:	06/19/07	13:25	Retchk:	a10jul07b-8
Receipt Date/Time:	07/03/07	10:10	Begin ConCal:	a10jul07b-8
Extraction Date:	07/04/07		End ConCal:	a10jul07b_2-14
Analysis Date/Time:	07/11/07	6:53	Initial Cal:	m8290-071007a

Form Version:[8290_DB_2.14]Report

Analyzed by: JMS
Date: 07/11/07

Reviewed by: CW
Date: 7/11/07

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SGS Environmental Services

Method 8290
F50408-5
Accutest

Analytical Data Summary Sheet

Analyte	Amount (ng/L)	EDL (ng/L)	EMPC (ng/L)	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	ND	0.00201					
1,2,3,7,8-PeCDD	0.00455 B			34:22	1.49		A
1,2,3,4,7,8-HxCDD	0.00284 B			37:01	1.29		A
1,2,3,6,7,8-HxCDD	0.00324 B			37:06	1.22		A
1,2,3,7,8,9-HxCDD	0.00333 B			37:21	1.18		A
1,2,3,4,6,7,8-HpCDD	0.00373 J			40:30	1.01		A
OCDD	0.0226 J			44:52	0.88		A
2,3,7,8-TCDF	EMPC	~~0.00169~~	0.00156 B	31:01	0.89	*	A
1,2,3,7,8-PeCDF	0.00513 B			33:34	1.47		A
2,3,4,7,8-PeCDF	0.00431 B			34:10	1.58		A
1,2,3,4,7,8-HxCDF	0.00434 B			36:16	1.15		A
1,2,3,6,7,8-HxCDF	0.00347 B			36:22	1.21		A
2,3,4,6,7,8-HxCDF	0.00261 B			36:52	1.39		A
1,2,3,7,8,9-HxCDF	0.00340 B			37:40	1.41		A
1,2,3,4,6,7,8-HpCDF	0.00457 B			39:12	1.11		A
1,2,3,4,7,8,9-HpCDF	ND	0.00583					
OCDF	0.00758 B			45:12	0.92		A
Total TCDDs	ND	0.00201					
Total PeCDDs	0.00455 B						
Total HxCDDs	0.00942 B						
Total HpCDDs	0.00373 J						
Total TCDFs	ND	~~0.00169~~	0.00156 B				
Total PeCDFs	0.00944 B						
Total HxCDFs	0.0138 B						
Total HpCDFs	0.00457 B						
WHO-2005 TEQ (ND=0)	0.00841		0.00857				
WHO-2005 TEQ (ND=½)	0.00953		0.00960				

Client Information			**Sample Information**	
Project Name:	F50408		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F50408-5		Weight / Volume:	858 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14343
Project ID:	G383-579		Instrument:	HRMS1
Sample ID:	G383-579-3B		Filename:	a10jul07b_2-6
Collection Date/Time:	06/19/07	11:35	Retchk:	a10jul07b-8
Receipt Date/Time:	07/03/07	10:10	Begin ConCal:	a10jul07b-8
Extraction Date:	07/04/07		End ConCal:	a10jul07b_2-14
Analysis Date/Time:	07/11/07	7:42	Initial Cal:	m8290-071007a

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Method 8290
F50408-5
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.60	80.2	31:34	0.79	
13C12-1,2,3,7,8-PeCDD	2.0	1.75	87.7	34:21	1.58	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.55	77.7	37:06	1.25	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.45	72.6	40:28	1.07	
13C12-OCDD	4.0	2.73	68.3	44:52	0.90	
13C12-2,3,7,8-TCDF	2.0	1.80	90.0	31:01	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.73	86.6	33:33	1.59	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.49	74.3	36:22	0.53	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.47	73.4	39:10	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.419	105	31:36	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.426	107	34:10	1.60	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.333	83.2	37:00	1.26	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.416	104	36:16	0.52	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.332	83.1	41:10	0.44	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:10	0.80	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:21	1.24	

Client Information			**Sample Information**	
Project Name:	F50408		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F50408-5		Weight / Volume:	858 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14343
Project ID:	G383-579		Instrument:	HRMS1
Sample ID:	G383-579-3B		Filename:	a10jul07b_2-6
Collection Date/Time:	06/19/07	11:35	Retchk:	a10jul07b-8
Receipt Date/Time:	07/03/07	10:10	Begin ConCal:	a10jul07b-8
Extraction Date:	07/04/07		End ConCal:	a10jul07b_2-14
Analysis Date/Time:	07/11/07	7:42	Initial Cal:	m8290-071007a

Form Version:[8290_DB_2.14]Report

Analyzed by: _____
Date: 07-11-07

Reviewed by: _____
Date: 7/11/07

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Method 8290
F50408-6
Accutest

Analytical Data Summary Sheet

Analyte	Amount (ng/L)	EDL (ng/L)	EMPC (ng/L)	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	ND	0.00292					
1,2,3,7,8-PeCDD	0.00367 B			34:21	1.42		A
1,2,3,4,7,8-HxCDD	ND	0.00577					
1,2,3,6,7,8-HxCDD	ND	0.00577					
1,2,3,7,8,9-HxCDD	ND	0.00577					
1,2,3,4,6,7,8-HpCDD	ND	0.00577					
OCDD	0.00940 J			44:52	0.98		A
2,3,7,8-TCDF	ND	0.00231					
1,2,3,7,8-PeCDF	0.00383 B			33:34	1.73		A
2,3,4,7,8-PeCDF	0.00360 B			34:10	1.49		A
1,2,3,4,7,8-HxCDF	0.00376 B			36:16	1.11		A
1,2,3,6,7,8-HxCDF	0.00286 B			36:22	1.13		A
2,3,4,6,7,8-HxCDF	EMPC	~~0.00577~~	0.00215 B	36:52	1.45	*	A
1,2,3,7,8,9-HxCDF	EMPC	~~0.00577~~	0.00236 B	37:40	1.05	*	A
1,2,3,4,6,7,8-HpCDF	0.00693 B			39:12	1.01		A
1,2,3,4,7,8,9-HpCDF	ND	0.00577					
OCDF	0.0121 B			45:10	0.82		A
Total TCDDs	ND	0.00292					
Total PeCDDs	0.00367 B						
Total HxCDDs	ND	0.00577					
Total HpCDDs	ND	0.00577					
Total TCDFs	ND	0.00231					
Total PeCDFs	0.00744 B						
Total HxCDFs	0.0111 B						
Total HpCDFs	0.00693 B						
WHO-2005 TEQ (ND=0)	0.00560		0.00605				
WHO-2005 TEQ (ND=½)	0.00868		0.00855				

Client Information			**Sample Information**	
Project Name:	F50408		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F50408-6		Weight / Volume:	866 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14343
Project ID:	G383-579		Instrument:	HRMS1
Sample ID:	G383-579-4B		Filename:	a10jul07b_2-7
Collection Date/Time:	06/19/07	13:25	Retchk:	a10jul07b-8
Receipt Date/Time:	07/03/07	10:10	Begin ConCal:	a10jul07b-8
Extraction Date:	07/04/07		End ConCal:	a10jul07b_2-14
Analysis Date/Time:	07/11/07	8:30	Initial Cal:	m8290-071007a

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Method 8290
F50408-6
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.56	77.9	31:34	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.67	83.6	34:21	1.57	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.62	80.9	37:04	1.25	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.64	82.2	40:28	1.06	
13C12-OCDD	4.0	2.98	74.5	44:52	0.90	
13C12-2,3,7,8-TCDF	2.0	1.72	85.8	31:01	0.80	
13C12-1,2,3,7,8-PeCDF	2.0	1.68	83.9	33:33	1.57	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.60	79.9	36:22	0.53	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.68	84.1	39:10	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.383	95.7	31:36	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.402	101	34:10	1.58	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.357	89.3	37:00	1.27	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.423	106	36:16	0.51	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.380	95.0	41:10	0.44	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:10	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:19	1.25	

Client Information			**Sample Information**	
Project Name:	F50408		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F50408-6		Weight / Volume:	866 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14343
Project ID:	G383-579		Instrument:	HRMS1
Sample ID:	G383-579-4B		Filename:	a10jul07b_2-7
Collection Date/Time:	06/19/07	13:25	Retchk:	a10jul07b-8
Receipt Date/Time:	07/03/07	10:10	Begin ConCal:	a10jul07b-8
Extraction Date:	07/04/07		End ConCal:	a10jul07b_2-14
Analysis Date/Time:	07/11/07	8:30	Initial Cal:	m8290-071007a

Form Version:[8290_DB_2.14]Report

Analyzed by: JL
Date: 07-11-07

Reviewed by: [signature]
Date: 7/11/07

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Method 8290
F50408-8
Accutest

Analytical Data Summary Sheet

Analyte	Amount (ng/L)	EDL (ng/L)	EMPC (ng/L)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	ND	0.00163				
1,2,3,7,8-PeCDD	EMPC	~~0.00575~~	0.00325 J	34:22	1.81 *	A
1,2,3,4,7,8-HxCDD	0.00232 J			37:01	1.20	A
1,2,3,6,7,8-HxCDD	0.00239 J			37:06	1.13	A
1,2,3,7,8,9-HxCDD	EMPC	~~0.00575~~	0.00221 J	37:21	1.70 *	A
1,2,3,4,6,7,8-HpCDD	ND	0.00575				
OCDD	ND	0.0115				
2,3,7,8-TCDF	0.00212 J			31:01	0.83	A
1,2,3,7,8-PeCDF	0.00433 J			33:34	1.51	A
2,3,4,7,8-PeCDF	0.00364 J			34:10	1.58	A
1,2,3,4,7,8-HxCDF	0.00350 J			36:16	1.31	A
1,2,3,6,7,8-HxCDF	0.00301 J			36:22	1.13	A
2,3,4,6,7,8-HxCDF	0.00223 J			36:52	1.33	A
1,2,3,7,8,9-HxCDF	0.00226 J			37:40	1.14	A
1,2,3,4,6,7,8-HpCDF	0.00550 J			39:12	1.06	A
1,2,3,4,7,8,9-HpCDF	ND	0.00575				
OCDF	0.0101 J			45:10	0.83	A
Total TCDDs	ND	0.00163				
Total PeCDDs	~~ND~~	~~0.00575~~	0.00325 J			
Total HxCDDs	0.00693 J					
Total HpCDDs	ND	0.00575				
Total TCDFs	0.00212 J					
Total PeCDFs	0.00796 J					
Total HxCDFs	0.0110 J					
Total HpCDFs	0.00550 J					
WHO-2005 TEQ (ND=0)	0.00306		0.00653			
WHO-2005 TEQ (ND=½)	0.00710		0.00741			

Client Information			**Sample Information**	
Project Name:	F50408		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F50408-8		Weight / Volume:	869 mL
			Solids / Lipids:	NA %
			Original pH :	5
Laboratory Information			Batch ID:	WG14343
Project ID:	G383-579		Instrument:	HRMS1
Sample ID:	G383-579-5B		Filename:	a10jul07b_2-8
Collection Date/Time:	06/20/07	7:30	Retchk:	a10jul07b-8
Receipt Date/Time:	07/03/07	10:10	Begin ConCal:	a10jul07b-8
Extraction Date:	07/04/07		End ConCal:	a10jul07b_2-14
Analysis Date/Time:	07/11/07	9:18	Initial Cal:	m8290-071007a

Form 1 Copy

Method 8290
F50408-8
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.87	93.7	31:34	0.77	
13C12-1,2,3,7,8-PeCDD	2.0	1.89	94.7	34:21	1.58	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.82	91.2	37:04	1.25	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.84	91.8	40:28	1.07	
13C12-OCDD	4.0	3.47	86.8	44:51	0.89	
13C12-2,3,7,8-TCDF	2.0	2.01	100	31:01	0.80	
13C12-1,2,3,7,8-PeCDF	2.0	1.95	97.4	33:33	1.59	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.86	93.0	36:22	0.53	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.92	96.2	39:12	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.450	112	31:36	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.430	108	34:10	1.60	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.400	99.9	37:00	1.25	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.462	116	36:16	0.52	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.401	100	41:10	0.46	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:09	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:19	1.25	

Client Information			**Sample Information**	
Project Name:	F50408		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F50408-8		Weight / Volume:	869 mL
			Solids / Lipids:	NA %
			Original pH :	5
Laboratory Information			Batch ID:	WG14343
Project ID:	G383-579		Instrument:	HRMS1
Sample ID:	G383-579-5B		Filename:	a10jul07b_2-8
Collection Date/Time:	06/20/07	7:30	Retchk:	a10jul07b-8
Receipt Date/Time:	07/03/07	10:10	Begin ConCal:	a10jul07b-8
Extraction Date:	07/04/07		End ConCal:	a10jul07b_2-14
Analysis Date/Time:	07/11/07	9:18	Initial Cal:	m8290-071007a

Form Version:[8290_DB_2.14]Report

Analyzed by: _____
Date: 07-11-07

Reviewed by: _____
Date: 7/11/07

Form I Copy

Method 8290
F50408-9
Accutest

Analytical Data Summary Sheet

Analyte	Amount (ng/L)	EDL (ng/L)	EMPC (ng/L)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	ND	0.00309				
1,2,3,7,8-PeCDD	ND	0.00598				
1,2,3,4,7,8-HxCDD	ND	0.00598				
1,2,3,6,7,8-HxCDD	ND	0.00598				
1,2,3,7,8,9-HxCDD	ND	0.00598				
1,2,3,4,6,7,8-HpCDD	ND	0.00598				
OCDD	0.0144 J			44:52	0.86	A
2,3,7,8-TCDF	ND	0.00251				
1,2,3,7,8-PeCDF	EMPC	~~0.00598~~	0.00268 B	33:34	1.88 *	A
2,3,4,7,8-PeCDF	0.00211 B			34:10	1.45	A
1,2,3,4,7,8-HxCDF	ND	0.00598				
1,2,3,6,7,8-HxCDF	ND	0.00598				
2,3,4,6,7,8-HxCDF	ND	0.00598				
1,2,3,7,8,9-HxCDF	ND	0.00598				
1,2,3,4,6,7,8-HpCDF	ND	0.00598				
1,2,3,4,7,8,9-HpCDF	ND	0.00598				
OCDF	ND	0.0120				
Total TCDDs	ND	0.00309				
Total PeCDDs	ND	0.00598				
Total HxCDDs	ND	0.00598				
Total HpCDDs	ND	0.00598				
Total TCDFs	ND	0.00251				
Total PeCDFs	~~0.00211~~		0.00478 B			
Total HxCDFs	ND	0.00598				
Total HpCDFs	ND	0.00598				
WHO-2005 TEQ (ND=0)	0.000637		0.000718			
WHO-2005 TEQ (ND=½)	0.00757		0.00757			

Client Information			**Sample Information**	
Project Name:	F50408		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F50408-9		Weight / Volume:	836 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14343
Project ID:	G383-579		Instrument:	HRMS1
Sample ID:	G383-579-6B		Filename:	a10jul07b_2-9
Collection Date/Time:	06/20/07	9:15	Retchk:	a10jul07b-8
Receipt Date/Time:	07/03/07	10:10	Begin ConCal:	a10jul07b-8
Extraction Date:	07/04/07		End ConCal:	a10jul07b_2-14
Analysis Date/Time:	07/11/07	10:07	Initial Cal:	m8290-071007a

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Method 8290
F50408-9
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.52	76.1	31:34	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.55	77.4	34:21	1.59	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.60	79.8	37:04	1.26	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.65	82.4	40:28	1.07	
13C12-OCDD	4.0	3.21	80.2	44:52	0.89	
13C12-2,3,7,8-TCDF	2.0	1.72	85.8	31:01	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.59	79.4	33:33	1.58	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.59	79.4	36:22	0.53	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.68	84.2	39:10	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.395	98.6	31:36	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.390	97.4	34:10	1.60	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.359	89.8	37:00	1.26	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.429	107	36:16	0.52	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.381	95.3	41:10	0.44	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:10	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:19	1.25	

Client Information			**Sample Information**	
Project Name:	F50408		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F50408-9		Weight / Volume:	836 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14343
Project ID:	G383-579		Instrument:	HRMS1
Sample ID:	G383-579-6B		Filename:	a10jul07b_2-9
Collection Date/Time:	06/20/07	9:15	Retchk:	a10jul07b-8
Receipt Date/Time:	07/03/07	10:10	Begin ConCal:	a10jul07b-8
Extraction Date:	07/04/07		End ConCal:	a10jul07b_2-14
Analysis Date/Time:	07/11/07	10:07	Initial Cal:	m8290-071007a

Save Version:[8290_DB_2.14]Report

Analyzed by: _____
Date: 07-JUL-07

Reviewed by: _____
Date: 7/11/07

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Method 8290
F50408-10
Accutest

Analytical Data Summary Sheet

Analyte	Amount (ng/L)	EDL (ng/L)	EMPC (ng/L)	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	ND	0.00188					
1,2,3,7,8-PeCDD	ND	0.00576					
1,2,3,4,7,8-HxCDD	ND	0.00576					
1,2,3,6,7,8-HxCDD	ND	0.00576					
1,2,3,7,8,9-HxCDD	ND	0.00576					
1,2,3,4,6,7,8-HpCDD	ND	0.00576					
OCDD	0.00816 J			44:52	0.94		A
2,3,7,8-TCDF	ND	0.00156					
1,2,3,7,8-PeCDF	ND	0.00576					
2,3,4,7,8-PeCDF	EMPC	0.00576	0.000968 B	34:10	1.18	*	A
1,2,3,4,7,8-HxCDF	0.00272 B			36:16	1.36		A
1,2,3,6,7,8-HxCDF	0.00177 B			36:22	1.32		A
2,3,4,6,7,8-HxCDF	ND	0.00576					
1,2,3,7,8,9-HxCDF	ND	0.00576					
1,2,3,4,6,7,8-HpCDF	0.0121 B			39:12	1.02		A
1,2,3,4,7,8,9-HpCDF	ND	0.00576					
OCDF	0.0236 B			45:10	0.88		A
Total TCDDs	ND	0.00188					
Total PeCDDs	ND	0.00576					
Total HxCDDs	ND	0.00576					
Total HpCDDs	ND	0.00576					
Total TCDFs	ND	0.00156					
Total PeCDFs	0.00258 B						
Total HxCDFs	0.00592 B						
Total HpCDFs	0.0147 B						
WHO-2005 TEQ (ND=0)	0.000580		0.000870				
WHO-2005 TEQ (ND=½)	0.00692		0.00635				

Client Information			**Sample Information**	
Project Name:	F50408		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F50408-10		Weight / Volume:	868 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14343
Project ID:	G383-579		Instrument:	HRMS1
Sample ID:	G383-579-7B		Filename:	a10jul07b_2-10
Collection Date/Time:	06/20/07	12:35	Retchk:	a10jul07b-8
Receipt Date/Time:	07/03/07	10:10	Begin ConCal:	a10jul07b-8
Extraction Date:	07/04/07		End ConCal:	a10jul07b_2-14
Analysis Date/Time:	07/11/07	10:55	Initial Cal:	m8290-071007a

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Method 8290
F50408-10
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.66	82.9	31:34	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.67	83.4	34:21	1.58	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.50	75.2	37:04	1.25	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.42	71.2	40:28	1.06	
13C12-OCDD	4.0	2.79	69.7	44:52	0.90	
13C12-2,3,7,8-TCDF	2.0	1.76	88.1	31:01	0.80	
13C12-1,2,3,7,8-PeCDF	2.0	1.68	84.0	33:33	1.59	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.47	73.3	36:22	0.53	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.49	74.6	39:12	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.420	105	31:36	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.402	101	34:10	1.58	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.328	81.9	37:00	1.25	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.423	106	36:16	0.52	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.324	81.1	41:10	0.44	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:10	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:21	1.25	

Client Information			**Sample Information**	
Project Name:	F50408		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F50408-10		Weight / Volume:	868 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14343
Project ID:	G383-579		Instrument:	HRMS1
Sample ID:	G383-579-7B		Filename:	a10jul07b_2-10
Collection Date/Time:	06/20/07	12:35	Retchk:	a10jul07b-8
Receipt Date/Time:	07/03/07	10:10	Begin ConCal:	a10jul07b-8
Extraction Date:	07/04/07		End ConCal:	a10jul07b_2-14
Analysis Date/Time:	07/11/07	10:55	Initial Cal:	m8290-071007a

Form Version:[8290_DB_2.14]Report

Analyzed by: _____
Date: 7/11/07

Reviewed by: _____
Date: 7/11/07

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Method 8290
F50408-11
Accutest

Analytical Data Summary Sheet

Analyte	Amount (ng/L)	EDL (ng/L)	EMPC (ng/L)	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	ND	0.00113					
1,2,3,7,8-PeCDD	ND	0.00563					
1,2,3,4,7,8-HxCDD	ND	0.00563					
1,2,3,6,7,8-HxCDD	ND	0.00563					
1,2,3,7,8,9-HxCDD	ND	0.00563					
1,2,3,4,6,7,8-HpCDD	ND	0.00563					
OCDD	0.00628 J			44:52	0.88		A
2,3,7,8-TCDF	EMPC	~~0.00113~~	0.000743 B	31:01	1.13	*	A
1,2,3,7,8-PeCDF	EMPC	~~0.00563~~	0.000901 B	33:34	1.25	*	A
2,3,4,7,8-PeCDF	0.00115 B			34:10	1.47		A
1,2,3,4,7,8-HxCDF	0.00173 B			36:16	1.24		A
1,2,3,6,7,8-HxCDF	0.00110 B			36:22	1.41		A
2,3,4,6,7,8-HxCDF	ND	0.00563					
1,2,3,7,8,9-HxCDF	ND	0.00563					
1,2,3,4,6,7,8-HpCDF	0.00426 B			39:12	1.02		A
1,2,3,4,7,8,9-HpCDF	ND	0.00563					
OCDF	0.00505 B			45:10	0.95		A
Total TCDDs	ND	0.00113					
Total PeCDDs	ND	0.00563					
Total HxCDDs	ND	0.00563					
Total HpCDDs	ND	0.00563					
Total TCDFs	0.000743 B						
Total PeCDFs	~~0.00173~~		0.00264 B				
Total HxCDFs	0.00399 B						
Total HpCDFs	0.00426 B						
WHO-2005 TEQ (ND=0)	0.000674		0.000775				
WHO-2005 TEQ (ND=½)	0.00566		0.00562				

Client Information			**Sample Information**	
Project Name:	F50408		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F50408-11		Weight / Volume:	888 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14343
Project ID:	G383-579		Instrument:	HRMS1
Sample ID:	G383-579-8B		Filename:	a10jul07b_2-11
Collection Date/Time:	06/20/07	15:10	Retchk:	a10jul07b-8
Receipt Date/Time:	07/03/07	10:10	Begin ConCal:	a10jul07b-8
Extraction Date:	07/04/07		End ConCal:	a10jul07b_2-14
Analysis Date/Time:	07/11/07	11:44	Initial Cal:	m8290-071007a

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Method 8290
F50408-11
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.76	88.0	31:34	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.91	95.4	34:21	1.58	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.70	85.0	37:06	1.25	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.58	78.9	40:28	1.06	
13C12-OCDD	4.0	2.98	74.4	44:52	0.90	
13C12-2,3,7,8-TCDF	2.0	1.85	92.5	31:01	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.91	95.5	33:33	1.59	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.58	79.2	36:22	0.53	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.61	80.5	39:12	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.453	113	31:36	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.451	113	34:10	1.59	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.351	87.8	37:00	1.26	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.443	111	36:16	0.52	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.349	87.2	41:10	0.45	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:10	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:21	1.25	

Client Information			**Sample Information**	
Project Name:	F50408		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F50408-11		Weight / Volume:	888 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14343
Project ID:	G383-579		Instrument:	HRMS1
Sample ID:	G383-579-8B		Filename:	a10jul07b_2-11
Collection Date/Time:	06/20/07	15:10	Retchk:	a10jul07b-8
Receipt Date/Time:	07/03/07	10:10	Begin ConCal:	a10jul07b-8
Extraction Date:	07/04/07		End ConCal:	a10jul07b_2-14
Analysis Date/Time:	07/11/07	11:44	Initial Cal:	m8290-071007a

Form Version:[8290_DB_2.14]Report

Analyzed by: _____
Date: 07-11-07

Reviewed by: _____
Date: 7/11/07

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Method 8290
F50408-14
Accutest

Analytical Data Summary Sheet

Analyte	Amount (ng/L)	EDL (ng/L)	EMPC (ng/L)	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	EMPC	~~0.00115~~	0.00315 J	31:34	0.64	*	A
1,2,3,7,8-PeCDD	0.00294 B			34:22	1.33		A
1,2,3,4,7,8-HxCDD	ND	0.00575					
1,2,3,6,7,8-HxCDD	ND	0.00575					
1,2,3,7,8,9-HxCDD	ND	0.00575					
1,2,3,4,6,7,8-HpCDD	ND	0.00575					
OCDD	0.0229 J			44:52	0.91		A
2,3,7,8-TCDF	0.00913 B			31:01	0.75		A
1,2,3,7,8-PeCDF	0.0122 B			33:34	1.55		A
2,3,4,7,8-PeCDF	0.00975 B			34:10	1.50		A
1,2,3,4,7,8-HxCDF	EMPC	~~0.00575~~	0.00221 B	36:16	1.62	*	A
1,2,3,6,7,8-HxCDF	0.00129 B			36:22	1.21		A
2,3,4,6,7,8-HxCDF	EMPC	~~0.00575~~	0.000989 B	36:52	1.61	*	A
1,2,3,7,8,9-HxCDF	ND	0.00575					
1,2,3,4,6,7,8-HpCDF	0.00138 B			39:12	1.06		A
1,2,3,4,7,8,9-HpCDF	ND	0.00575					
OCDF	ND	0.0115					
Total TCDDs	~~ND~~	~~0.00115~~	0.00315 B				
Total PeCDDs	0.00294 J						
Total HxCDDs	ND	0.00575					
Total HpCDDs	ND	0.00575					
Total TCDFs	0.00913 B						
Total PeCDFs	~~0.0220~~		0.0227 B				
Total HxCDFs	~~0.00228~~		0.00448 B				
Total HpCDFs	0.00138 B						
WHO-2005 TEQ (ND=0)	0.00729		0.0108				
WHO-2005 TEQ (ND=½)	0.00965		0.0120				

Client Information			**Sample Information**		
Project Name:	F50408		Report Basis:	Wet	
			Matrix:	Water	
Sample ID:	F50408-14		Weight / Volume:	870 mL	
			Solids / Lipids:	NA	%
			Original pH :	8	
Laboratory Information			Batch ID:	WG14343	
Project ID:	G383-579		Instrument:	HRMS1	
Sample ID:	G383-579-9B		Filename:	a10jul07b_2-12	
Collection Date/Time:	06/21/07	8:05	Retchk:	a10jul07b-8	
Receipt Date/Time:	07/03/07	10:10	Begin ConCal:	a10jul07b-8	
Extraction Date:	07/04/07		End ConCal:	a10jul07b_2-14	
Analysis Date/Time:	07/11/07	12:32	Initial Cal:	m8290-071007a	

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Method 8290
F50408-14
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.66	82.9	31:34	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.74	86.9	34:21	1.59	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.56	77.9	37:06	1.25	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.51	75.7	40:28	1.06	
13C12-OCDD	4.0	2.86	71.6	44:52	0.90	
13C12-2,3,7,8-TCDF	2.0	1.77	88.5	31:01	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.72	86.0	33:33	1.59	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.48	73.8	36:22	0.53	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.53	76.5	39:10	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.413	103	31:36	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.400	100	34:10	1.59	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.326	81.4	37:00	1.26	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.401	100	36:16	0.52	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.335	83.8	41:10	0.44	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:10	0.78	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:21	1.24	

Client Information			**Sample Information**	
Project Name:	F50408		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F50408-14		Weight / Volume:	870 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14343
Project ID:	G383-579		Instrument:	HRMS1
Sample ID:	G383-579-9B		Filename:	a10jul07b_2-12
Collection Date/Time:	06/21/07	8:05	Retchk:	a10jul07b-8
Receipt Date/Time:	07/03/07	10:10	Begin ConCal:	a10jul07b-8
Extraction Date:	07/04/07		End ConCal:	a10jul07b_2-14
Analysis Date/Time:	07/11/07	12:32	Initial Cal:	m8290-071007a

Form Version:[8290_DB_2.14]Report

Analyzed by: _____
Date: 7/11/07

Reviewed by: _____
Date: 7/11/07

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Method 8290
F50408-16
Accutest

Analytical Data Summary Sheet

Analyte	Amount (ng/L)	EDL (ng/L)	EMPC (ng/L)	RT (min.)	Ratio	Qualifier
2,3,7,8-TCDD	ND	0.00396				
1,2,3,7,8-PeCDD	ND	0.00846				
1,2,3,4,7,8-HxCDD	ND	0.00846				
1,2,3,6,7,8-HxCDD	ND	0.00846				
1,2,3,7,8,9-HxCDD	ND	0.00846				
1,2,3,4,6,7,8-HpCDD	0.0479 B			40:28	1.02	B A
OCDD	0.395 B			44:52	0.89	B
2,3,7,8-TCDF	ND	0.00296				
1,2,3,7,8-PeCDF	ND	0.00846				
2,3,4,7,8-PeCDF	ND	0.00846				
1,2,3,4,7,8-HxCDF	0.00802 B			36:16	1.32	A
1,2,3,6,7,8-HxCDF	0.00369 B			36:22	1.32	A
2,3,4,6,7,8-HxCDF	ND	0.00846				
1,2,3,7,8,9-HxCDF	ND	0.00846				
1,2,3,4,6,7,8-HpCDF	0.0308 B			39:12	0.97	B A
1,2,3,4,7,8,9-HpCDF	ND	0.00872				
OCDF	0.0926 B			45:10	0.90	B A
Total TCDDs	ND	0.00396				
Total PeCDDs	ND	0.00846				
Total HxCDDs	~~0.00528~~		0.0145 B			
Total HpCDDs	0.0847 B					B
Total TCDFs	ND	0.00296				
Total PeCDFs	0.00305 B					
Total HxCDFs	~~0.0117~~		0.0175 B			
Total HpCDFs	0.0376 B					B
WHO-2005 TEQ (ND=0)	0.00210		0.00210			
WHO-2005 TEQ (ND=½)	0.0120		0.0120			

Client Information			**Sample Information**	
Project Name:	F50408		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F50408-16		Weight / Volume:	591 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14330
Project ID:	G383-577		Instrument:	HRMS1
Sample ID:	G383-577-1B		Filename:	a08jul07a-11
Collection Date/Time:	06/20/07	9:40	Retchk:	a08jul07a-1
Receipt Date/Time:	06/23/07	10:30	Begin ConCal:	a08jul07a-1
Extraction Date:	06/26/07		End ConCal:	a08jul07a-15
Analysis Date/Time:	07/08/07	19:17	Initial Cal:	m8290cc-070807a

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Method 8290
F50408-16
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.44	72.0	31:34	0.80	
13C12-1,2,3,7,8-PeCDD	2.0	1.50	74.8	34:22	1.61	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.51	75.5	37:06	1.27	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.59	79.6	40:28	1.06	
13C12-OCDD	4.0	2.31	57.7	44:52	0.90	
13C12-2,3,7,8-TCDF	2.0	1.69	84.5	31:01	0.81	
13C12-1,2,3,7,8-PeCDF	2.0	1.53	76.5	33:33	1.62	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.57	78.4	36:22	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.59	79.7	39:12	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.343	85.8	31:34	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.323	80.7	34:10	1.63	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.348	87.0	37:00	1.31	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.353	88.3	36:16	0.51	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.326	81.5	41:10	0.43	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:09	0.80	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:21	1.26	

Client Information			**Sample Information**	
Project Name:	F50408		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F50408-16		Weight / Volume:	591 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14330
Project ID:	G383-577		Instrument:	HRMS1
Sample ID:	G383-577-1B		Filename:	a08jul07a-11
Collection Date/Time:	06/20/07	9:40	Retchk:	a08jul07a-1
Receipt Date/Time:	06/23/07	10:30	Begin ConCal:	a08jul07a-1
Extraction Date:	06/26/07		End ConCal:	a08jul07a-15
Analysis Date/Time:	07/08/07	19:17	Initial Cal:	m8290cc-070807a

Form Version:[8290_DB_2.14]Report

Analyzed by: _____
Date: 07/08/07

Reviewed by: _____
Date: 7/10/07

Form I Copy

Method 8290
F50408-17
Accutest

Analytical Data Summary Sheet

Analyte	Amount (ng/L)	EDL (ng/L)	EMPC (ng/L)	RT (min.)	Ratio		Qualifier
2,3,7,8-TCDD	0.00425 J			31:36	0.78		A
1,2,3,7,8-PeCDD	0.00471 B			34:22	1.70		A
1,2,3,4,7,8-HxCDD	ND	0.00577					
1,2,3,6,7,8-HxCDD	ND	0.00577					
1,2,3,7,8,9-HxCDD	ND UJ	0.00577					Q
1,2,3,4,6,7,8-HpCDD	EMPC	~~0.00577~~	0.00312 J	40:31	1.39	*	A
OCDD	0.0650 J			44:55	0.92		A
2,3,7,8-TCDF	0.0121 J			31:01	0.83		
1,2,3,7,8-PeCDF	0.0190 B			33:34	1.60		A
2,3,4,7,8-PeCDF	0.0158 B			34:10	1.66		A
1,2,3,4,7,8-HxCDF	0.00367 B			36:18	1.30		A
1,2,3,6,7,8-HxCDF	0.00240 B			36:25	1.41		A
2,3,4,6,7,8-HxCDF	EMPC	0.00577	0.00199 B	36:55	1.02	*	A
1,2,3,7,8,9-HxCDF	ND	0.00577					
1,2,3,4,6,7,8-HpCDF	0.00245 B			39:13	0.92		A
1,2,3,4,7,8,9-HpCDF	ND	0.00577					
OCDF	ND	0.0115					
Total TCDDs	0.00425 J						
Total PeCDDs	0.00471 B						
Total HxCDDs	ND	0.00577					
Total HpCDDs	~~0.00374~~		0.00686 J				
Total TCDFs	0.0121 B						
Total PeCDFs	0.0348 B						
Total HxCDFs	~~0.00607~~		0.00806 B				
Total HpCDFs	0.00245 B						
WHO-2005 TEQ (ND=0)	0.0161		0.0164				
WHO-2005 TEQ (ND=½)	0.0176		0.0175				

Client Information			**Sample Information**	
Project Name:	F50408		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F50408-17		Weight / Volume:	866 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14343
Project ID:	G383-579		Instrument:	HRMS1
Sample ID:	G383-579-10B		Filename:	a10jul07b_2-13
Collection Date/Time:	06/21/07	11:10	Retchk:	a10jul07b-8
Receipt Date/Time:	07/03/07	10:10	Begin ConCal:	a10jul07b-8
Extraction Date:	07/04/07		End ConCal:	a10jul07b_2-14
Analysis Date/Time:	07/11/07	13:20	Initial Cal:	m8290-071007a

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Method 8290
F50408-17
Accutest

Labeled Standard	Expected Amount (ng)	Measured Amount (ng)	Percent Recovery (%)	RT (min.)	Ratio	Qualifier
Extraction Standards						
13C12-2,3,7,8-TCDD	2.0	1.34	67.2	31:34	0.78	
13C12-1,2,3,7,8-PeCDD	2.0	1.46	72.8	34:22	1.59	
13C12-1,2,3,6,7,8-HxCDD	2.0	1.62	81.0	37:07	1.21	
13C12-1,2,3,4,6,7,8-HpCDD	2.0	1.81	90.7	40:30	1.06	
13C12-OCDD	4.0	3.48	86.9	44:52	0.90	
13C12-2,3,7,8-TCDF	2.0	1.48	74.0	31:01	0.79	
13C12-1,2,3,7,8-PeCDF	2.0	1.43	71.4	33:34	1.58	
13C12-1,2,3,6,7,8-HxCDF	2.0	1.62	80.9	36:24	0.52	
13C12-1,2,3,4,6,7,8-HpCDF	2.0	1.78	88.8	39:13	0.45	
Cleanup Standards						
37Cl4-2,3,7,8-TCDD	0.4	0.389	97.4	31:36	-	
13C12-2,3,4,7,8-PeCDF	0.4	0.383	95.8	34:10	1.61	
13C12-1,2,3,4,7,8-HxCDD	0.4	0.447	112	37:01	1.42	
13C12-1,2,3,4,7,8-HxCDF	0.4	0.359	89.7	36:18	0.51	
13C12-1,2,3,4,7,8,9-HpCDF	0.4	0.428	107	41:12	0.45	
Injection Standards						
13C12-1,2,3,4-TCDD	2.0	-	-	31:10	0.79	
13C12-1,2,3,7,8,9-HxCDD	2.0	-	-	37:22	1.25	Q

Client Information			**Sample Information**	
Project Name:	F50408		Report Basis:	Wet
			Matrix:	Water
Sample ID:	F50408-17		Weight / Volume:	866 mL
			Solids / Lipids:	NA %
			Original pH :	8
Laboratory Information			Batch ID:	WG14343
Project ID:	G383-579		Instrument:	HRMS1
Sample ID:	G383-579-10B		Filename:	a10jul07b_2-13
Collection Date/Time:	06/21/07	11:10	Retchk:	a10jul07b-8
Receipt Date/Time:	07/03/07	10:10	Begin ConCal:	a10jul07b-8
Extraction Date:	07/04/07		End ConCal:	a10jul07b_2-14
Analysis Date/Time:	07/11/07	13:20	Initial Cal:	m8290-071007a

Form Version:[8290_DB_2.14]Report

Analyzed by: _____
Date: 07-11-07

Reviewed by: _____
Date: 7/11/07

Shaw Environmental, Inc.
2113 Emmorton Park Road
Edgewood, Maryland
410-612-6350
FAX: 410-612-6351

Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Explosives, PETN, & Nitroglycerin
Accutest Laboratories, Inc., SDG F50408

DATE: August 21, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at New River Unit (NRU) Groundwater Investigation at RFAAP on June 18, 2007, June 19, 2007, June 20, 2007, and June 21, 2007. Samples were analyzed for explosives, nitroglycerin, and PETN using USEPA SW-846 3535A/8330A. A total of eleven aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
WBGMW02	F50408-2	BLAMW01	F50408-10
WBGMW03	F50408-3	IAAMW02	F50408-11
NBGMW01	F50408-4	IAAMW04	F50408-14
NBGMW02	F50408-5	WBGMW01	F50408-16
TMMW01	F50408-6	BLAMW02	F50408-17
IAAMW03	F50408-9		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Blank Analysis
	X	Initial Calibration
	X	Continuing Calibration
	X	System Monitoring Compounds
	X	Laboratory Control Sample
	X	Matrix Spike/Spike Duplicate
	X	Field Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable.

Eric Malarek, Chemist

8/21/07
Date

RFAAP VALIDATION REPORT
EXPLOSIVES REVIEW
SDG F50408

I-Holding Times and Preservation

The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For explosive compounds in cooled (@4°C ± 2°C) aqueous samples, the maximum holding time is 7 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 06/18/07, 06/19/07, 06/20/07, and 06/21/07, the coolers were received by the primary laboratory (Accutest) on 06/22/06 at 1.0°C, 1.2°C, 1.8°C, 2.0°C, 1.4°C, and 1.0°C. The herbicides were subcontracted to Accutest TX and were received the samples at 1.4°C, 3.0°C, 2.2°C, and 3.4°C. The TOX were subcontracted to Accutest NJ and were received at 3.6°C, 4.8°C, and 2.8°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the samples at 5.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 4.8°C, 4.5°C, 5.8°C, 3.2°C, and 1.4°C. Even though several of the temperatures were below criteria, there were no impacts regarding the sample analysis. No qualifiers were applied based upon these outliers.

- Holding Time Review: The aqueous samples were collected on 06/18/07, 06/19/07, 06/20/07, and 06/21/07. For samples collected 06/18/07 and 06/19/07, the explosives were extracted on 06/25/07 and analyzed on 06/28/07 and 07/04/07. For samples collected 06/20/07, the explosives were extracted on 06/27/07 and analyzed on 07/02/07 and 07/03/07. For samples collected 06/21/07, the explosives were extracted on 06/28/07 and analyzed on 07/02/07 and 07/03/07. All criteria were met. No qualifiers were applied.

II-Blank Analysis

The purpose of laboratory or field blank analyses is to determine the existence and magnitude of contamination problems resulting from laboratory or field activities. One method blank per analytical batch must be run on each instrument used to analyze samples. No contaminants should be present in the blanks. The DoD QSM criterion specifies all concentrations should be less than one-half MRL. Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤5 times (5X) the maximum amount for explosive target compounds. **Table 2** summarizes the blank contamination analysis. Rinse blank 062007R (F50408-8) (low-flow pump) applies to all samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
07/02/07	OP21203-MB	All target explosives <½MRL	NA	NA	None
07/04/07	OP21164-MB	All target explosives <½MRL	NA	NA	None
07/04/07	OP21164-MB	All target explosives <½MRL	NA	NA	None
07/05/07	OP21203-MB	All target explosives <½MRL	NA	NA	None
07/05/07	OP21164-MB	All target explosives <½MRL	NA	NA	None
07/03/07	OP21223-MB	All target explosives <½MRL	NA	NA	None
07/05/07	OP21223-MB	All target explosives <½MRL	NA	NA	None
07/06/07	OP21223-MB	All target explosives <½MRL	NA	NA	None
07/10/07	OP21223-MB	All target explosives <½MRL	NA	NA	None
06/28/07	OP21164-MB	PETN & NG <½MRL	NA	NA	None
07/02/07	OP21203-MB	PETN & NG <½MRL	NA	NA	None
07/03/07	OP21203-MB	PETN & NG <½MRL	NA	NA	None
07/02/07	OP21223-MB	PETN & NG <½MRL	NA	NA	None
07/02/07	062007R	All target explosives <½MRL	NA	NA	None
07/02/07	062007R	PETN & NG <½MRL	NA	NA	None

MRL = Method Reporting Limit NA = Not Applicable

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. The initial 5-point calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run. The DoD QSM specifies that the correlation coefficient (r^2) must be ≥0.990 and/or the percent relative standard deviation (%RSD) must be ≤20%. All detects were qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects were qualified as estimated "UJ" for where there were grossly exceeding recoveries. Grossly exceeding is defined as twice the established criteria limits.

- For the explosives initial calibration performed on 10/18/06 on instrument G1315B, all criteria were met for target explosives compounds. All compounds were determined using calibration factors with RSDs ≤20%. No qualifiers were applied. Samples WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), WBGMW01 (F50408-16), and BLAMW02 (F50408-17) apply to this initial calibration.

- For the explosives initial calibration performed on 01/19/07 on instrument G1315B, all criteria were met for target explosives compounds. All compounds were determined using calibration factors with RSDs ≤20%. No qualifiers were applied. No samples reported apply to this initial calibration.

- For the PETN and nitroglycerine initial calibration performed on 03/15/07 on instrument G1315B, all criteria were met for target compounds. All compounds were determined using calibration factors with RSDs ≤20%. No qualifiers were applied. Samples WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), WBGMW01 (F50408-16), and BLAMW02 (F50408-17) apply to this initial calibration.

IV-Continuing Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. Continuing calibration standards are analyzed after every 10 injections, and at the end of the analysis sequence. The DoD QSM specifies that the percent difference (%D) from initial calibration should be no greater than ±20%. All detects were qualified as estimated "J" for where there were exceeding %Ds, and all non-detects were qualified as estimated "UJ" for where there were grossly exceeding recoveries. Grossly exceeding is defined as twice the established criteria limits.

- For explosives initial calibration verification performed on 10/18/06 @17:39 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this initial verification calibration.

- For explosives initial calibration verification performed on 10/19/06 @13:44 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this initial verification calibration.

- For explosives continuing calibration performed on 07/02/07 @21:25 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples IAAMW03 (F50408-9), BLAMW01 (F50408-10), and IAAMW02 (F50408-11) apply to this continuing calibration.

- For explosives continuing calibration performed on 07/03/07 @02:56 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples IAAMW03 (F50408-9), BLAMW01 (F50408-10), and IAAMW02 (F50408-11) apply to this continuing calibration.

- For explosives continuing calibration performed on 07/03/07 @08:31 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For explosives continuing calibration performed on 07/03/07 @15:37 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples IAAMW04 (F50408-14), WBGMW01 (F50408-16), and BLAMW02 (F50408-17) apply to this continuing calibration.

- For explosives continuing calibration performed on 07/03/07 @20:12 on instrument G1315B, nitrobenzene (25.3%) was outside criteria for signal #2. Signal #1 was within criteria. All samples were non-detect for nitrobenzene; therefore, no qualifiers were applied based upon this outlier. Samples IAAMW04 (F50408-14), WBGMW01 (F50408-16), and BLAMW02 (F50408-17) apply to this continuing calibration.

- For explosives continuing calibration performed on 07/04/07 @01:42 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), and TMMW01 (F50408-6) apply to this continuing calibration.

- For explosives continuing calibration performed on 07/04/07 @06:46 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), and TMMW01 (F50408-6) apply to this continuing calibration.

- For explosives continuing calibration performed on 07/04/07 @10:26 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For explosives continuing calibration performed on 07/04/07 @16:56 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For explosives continuing calibration performed on 07/04/07 @22:26 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For explosives continuing calibration performed on 07/05/07 @12:49 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For explosives continuing calibration performed on 07/05/07 @17:28 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For explosives initial calibration verification performed on 01/19/07 @14:58 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For explosives continuing calibration performed on 07/05/07 @13:24 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For explosives continuing calibration performed on 07/05/07 @17:24 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples IAAMW04 (F50408-14) and BLAMW02 (F50408-17) confirmations apply to this continuing calibration.

- For explosives continuing calibration performed on 07/06/07 @13:05 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples IAAMW04 (F50408-14) and BLAMW02 (F50408-17) confirmations apply to this continuing calibration.

- For explosives continuing calibration performed on 07/06/07 @16:43 on instrument G1315B, RDX (21.8%) was outside criteria for signal #1. All criteria were met for signal #2. All samples were non-detect for RDX; therefore, no qualifiers were applied based upon these outliers. Samples IAAMW04 (F50408-14) and BLAMW02 (F50408-17) confirmations apply to this continuing calibration.

- For explosives continuing calibration performed on 07/06/07 @20:43 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples IAAMW04 (F50408-14) and BLAMW02 (F50408-17) confirmations apply to this continuing calibration.

- For explosives continuing calibration performed on 07/06/07 @23:43 on instrument G1315B, m-nitrotoluene (30.0%) was outside criteria for signal #1 and m-nitrotoluene (71.8%; grossly exceeding) was outside criteria for signal #2. m-Nitrotoluene would be qualified "UJ" for any associated samples based upon the very high %D; however, no samples reported apply to this continuing calibration.

- For explosives continuing calibration performed on 07/10/07 @10:26 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For explosives continuing calibration performed on 07/10/07 @14:38 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For PETN and nitroglycerine initial calibration verification performed on 03/15/07 @12:35 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For PETN and nitroglycerine continuing calibration performed on 06/28/07 @10:16 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples WBGMW02 (F50408-2), WBGMW03 (F50408-3), and NBGMW01 (F50408-4) apply to this continuing calibration.

- For PETN and nitroglycerine continuing calibration performed on 06/28/07 @11:50 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), and TMMW01 (F50408-6) apply to this continuing calibration.

- For PETN and nitroglycerine continuing calibration performed on 06/28/07 @13:33 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples NBGMW02 (F50408-5) and TMMW01 (F50408-6) apply to this continuing calibration.

- For PETN and nitroglycerine continuing calibration performed on 07/02/07 @17:01 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples IAAMW04 (F50408-14), WBGMW01 (F50408-16), and BLAMW02 (F50408-17) apply to this continuing calibration.

- For PETN and nitroglycerine continuing calibration performed on 07/02/07 @18:03 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), WBGMW01 (F50408-16), and BLAMW02 (F50408-17) apply to this continuing calibration.

- For PETN and nitroglycerine continuing calibration performed on 07/02/07 @19:28 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. Samples IAAMW03 (F50408-9), BLAMW01 (F50408-10), and IAAMW02 (F50408-11) apply to this continuing calibration.

- For PETN and nitroglycerine continuing calibration performed on 07/03/07 @10:41 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For PETN and nitroglycerine continuing calibration performed on 07/03/07 @11:15 on instrument G1315B, all criteria were met for target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

V-System Monitoring Compound (Surrogates)
Laboratory performance on individual samples is established by means of spiking activities. The percent recovery (%R) for all samples and blanks must be within the laboratory control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Criteria: 3,4-dinitrotoluene (70-136%)

- All criteria were met for explosives, PETN, and nitroglycerin. No qualifiers were applied.

VI-Laboratory Control Sample
Laboratory control samples (LCS) are used to monitor long-term accuracy of the analytical method. The analysis is performed at a frequency of 1 per analytical batch. The percent recoveries (%Rs) must be within the laboratory control limits. DoD QSM LCS recovery limits are specified in Table D-2 and Table D-12 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP21203-BS was used as LCS for explosives analyzed on 07/02/07. HMX (116%) was outside DoD QSM criteria. All samples were non-detect for all target explosive compounds; therefore, no qualifiers were applied based upon this outlier. Samples IAAMW03 (F50408-9), BLAMW01 (F50408-10), and IAAMW02 (F50408-11) apply to this LCS.

- Sample OP21223-BS was used as LCS for explosives analyzed on 07/03/07. All criteria were met. No qualifiers were applied. Samples IAAMW04 (F50408-14), WBGMW01 (F50408-16), and BLAMW02 (F50408-17) apply to this LCS.

- Sample OP21164-BS was used as LCS for explosives analyzed on 07/04/07. All criteria were met. No qualifiers were applied. Samples WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), and TMMW01 (F50408-6) apply to this LCS.

- Sample OP21203-BS was used as LCS for explosives analyzed on 07/05/07. HMX (140%), 2,4-Dinitrotoluene (132%), o-nitrotoluene (130%), p-nitrotoluene (130%), and 2,4,6-trinitrotoluene (136%) were outside lab or DoD QSM criteria. All samples were non-detect for all target explosive compounds; therefore, no qualifiers were applied based upon these outliers. Samples IAAMW03 (F50408-9), BLAMW01 (F50408-10), and IAAMW02 (F50408-11) apply to this LCS.

- Sample OP21223-BS was used as LCS for explosives analyzed on 07/06/07. HMX (130%) and RDX (128%) were outside lab or DoD QSM criteria. All samples were non-detect for all target explosive compounds; therefore, no qualifiers were applied based upon these outliers. Samples IAAMW04 (F50408-14), WBGMW01 (F50408-16), and BLAMW02 (F50408-17) apply to this LCS.

- Sample OP21164-BS2 was used as LCS for PETN and nitroglycerine analyzed on 06/28/07. All criteria were met. No qualifiers were applied. Samples WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), and TMMW01 (F50408-6) apply to this LCS.

- Sample OP21203-BS2 was used as LCS for PETN and nitroglycerine analyzed on 07/02/07. All criteria were met. No qualifiers were applied. Samples IAAMW03 (F50408-9), BLAMW01 (F50408-10), and IAAMW02 (F50408-11) apply to this LCS.

- Sample OP21223-BS2 was used as LCS for PETN and nitroglycerine analyzed on 07/02/07. All criteria were met. No qualifiers were applied. Samples IAAMW04 (F50408-14), WBGMW01 (F50408-16), and BLAMW02 (F50408-17) apply to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate

Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the laboratory control limits. DoD QSM MS/MSD recovery limits follow the LCS criteria and are specified in Table D-2 and Table D-12 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample F50409-5 was used as the MS/MSD for the explosive analysis on 07/04/07. Since this sample is not a RFAAP site sample, it was not evaluated. Samples WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), and TMMW01 (F50408-6) apply to this MS/MSD.

- Sample F50428-10 was used as the MS/MSD for the explosive analysis on 07/03/07. Since this sample is not a RFAAP site sample, it was not evaluated. Samples IAAMW03 (F50408-9), BLAMW01 (F50408-10), and IAAMW02 (F50408-11) apply to this MS/MSD.

- Sample F50557-1 was used as the MS/MSD for the explosive analysis on 07/03-06/07. Since this sample is not a RFAAP site sample, it was not evaluated. Samples IAAMW04 (F50408-14), WBGMW01 (F50408-16), and BLAMW02 (F50408-17) apply to this MS/MSD.

- Sample IAAMW02 (F50408-11) was used as the MS/MSD for the PETN and nitroglycerin analysis on 07/02-03/07. All criteria were met. No qualifiers were applied. Samples IAAMW03 (F50408-9), BLAMW01 (F50408-10), and IAAMW02 (F50408-11) apply to this MS/MSD.

- Sample BLAMW02 (F50408-17) was used as the MS/MSD for the PETN and nitroglycerin analysis on 07/02-03/07. PETN (123%, 121%) was above lab criteria. For nitroglycerin, all criteria were met. All samples were non-detect for target explosive compounds; therefore, no qualifiers were applied based upon these outliers. Samples IAAMW04 (F50408-14), WBGMW01 (F50408-16), and BLAMW02 (F50408-17) apply to this MS/MSD.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field groundwater sample duplicate pair NBGMW01 (F50408-4) and TMMW01 (F50408-6) was collected for explosives, PETN, and nitroglycerin. All target compounds were non-detect. All criteria were met. No qualifiers were applied.

IX-Quantitation Verification
The accuracy of analytical results was verified through the calculation of several parameters. The calculation was based calibration factors. The absolute percent difference (%D) between the calculated and the reported value must be within 10% difference. All values >MDL and <MRL or <3*MDL (whichever was greater) were qualified as estimated "J".

- The %D between the primary and secondary columns was within criteria for all explosives, PETN, and nitroglycerine. All samples were non-detect for all target explosive compounds.

Sample: OP21203-BS, 2,4,6-trinitrotoluene

Conc. µg/L = (Ax * Vt * DF) / (CF * Vs)

where: Conc. = Sample concentration in µg/L
Ax = Area of characteristic ion for compound being measured.
Vt = Volume of total extract (mL).
CF = Average relative calibration factor for compound being measured (from ICAL)
Vs = Volume of sample extracted (mL).
DF = Dilution factor

Conc. µg/L = (4155858 * 10 * 1) / (7456 * 1000) = 5.6 µg/L (Signal #1)

Reported Value = 5.7 µg/L
% Difference = 1.8%
Values were within 10% difference

Sample: OP21203-BS, nitroglycerine

Conc. µg/L = (Ax * Vt * DF) / (CF * Vs)

where: Conc. = Sample concentration in µg/L
Ax = Area of characteristic ion for compound being measured.
Vt = Volume of total extract (mL).
CF = Average relative calibration factor for compound being measured (from ICAL)
Vs = Volume of sample extracted (mL).
DF = Dilution factor

Conc. µg/L = (3181008 * 10 * 1) / (1228 * 1000) = 25.9 µg/L (Signal #1)

Reported Value = 25.9 µg/L
% Difference = 0.0%
Values were within 10% difference

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Raw Data: GG022623.D PP021129.D

Run I Copy

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	WBGMW02		
Lab Sample ID:	F50408-2	Date Sampled:	06/18/07
Matrix:	AQ - Ground Water	Date Received:	06/19/07
Method:	SW846 8330A SW846 3535A	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG022623.D	1	07/04/07	MRE	06/25/07	OP21164	GGG970
Run #2	PP021129.D	1	06/28/07	MRE	06/25/07	OP21164	GPP724

	Initial Volume	Final Volume
Run #1	980 ml	10.0 ml
Run #2	980 ml	10.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.20	0.061	ug/l	
121-82-4	RDX	ND	0.20	0.077	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.20	0.071	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.20	0.066	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.20	0.077	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.20	0.071	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.20	0.082	ug/l	
98-95-3	Nitrobenzene	ND	0.20	0.061	ug/l	
88-72-2	o-Nitrotoluene	ND	0.20	0.061	ug/l	
99-08-1	m-Nitrotoluene	ND	0.20	0.077	ug/l	
99-99-0	p-Nitrotoluene	ND	0.20	0.077	ug/l	
479-45-8	Tetryl	ND	0.20	0.077	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.20	0.097	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	0.20	0.082	ug/l	
55-63-0	Nitroglycerine	ND [a]	2.0	0.71	ug/l	
78-11-5	PETN	ND [a]	2.0	0.71	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	115%	120%	70-136%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Com

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	WBGMW03		
Lab Sample ID:	F50408-3	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8330A SW846 3535A	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG022624.D	1	07/04/07	MRE	06/25/07	OP21164	GGG970
Run #2	PP021130.D	1	06/28/07	MRE	06/25/07	OP21164	GPP724

	Initial Volume	Final Volume
Run #1	990 ml	10.0 ml
Run #2	990 ml	10.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.20	0.061	ug/l	
121-82-4	RDX	ND	0.20	0.076	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.20	0.071	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.20	0.066	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.20	0.076	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.20	0.071	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.20	0.081	ug/l	
98-95-3	Nitrobenzene	ND	0.20	0.061	ug/l	
88-72-2	o-Nitrotoluene	ND	0.20	0.061	ug/l	
99-08-1	m-Nitrotoluene	ND	0.20	0.076	ug/l	
99-99-0	p-Nitrotoluene	ND	0.20	0.076	ug/l	
479-45-8	Tetryl	ND	0.20	0.076	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.20	0.096	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	0.20	0.081	ug/l	
55-63-0	Nitroglycerine	ND [a]	2.0	0.71	ug/l	
78-11-5	PETN	ND [a]	2.0	0.71	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	99%	124%	70-136%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG022625.D PP021131.D

Form I Org

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	NBGMW01		
Lab Sample ID:	F50408-4	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8330A SW846 3535A	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG022625.D	1	07/04/07	MRE	06/25/07	OP21164	GGG970
Run #2	PP021131.D	1	06/28/07	MRE	06/25/07	OP21164	GPP724

	Initial Volume	Final Volume
Run #1	870 ml	10.0 ml
Run #2	870 ml	10.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.23	0.069	ug/l	
121-82-4	RDX	ND	0.23	0.086	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.23	0.080	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.23	0.075	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.23	0.086	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.23	0.080	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.23	0.092	ug/l	
98-95-3	Nitrobenzene	ND	0.23	0.069	ug/l	
88-72-2	o-Nitrotoluene	ND	0.23	0.069	ug/l	
99-08-1	m-Nitrotoluene	ND	0.23	0.086	ug/l	
99-99-0	p-Nitrotoluene	ND	0.23	0.086	ug/l	
479-45-8	Tetryl	ND	0.23	0.086	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.23	0.11	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	0.23	0.092	ug/l	
55-63-0	Nitroglycerine	ND [a]	2.3	0.80	ug/l	
78-11-5	PETN	ND [a]	2.3	0.80	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	99%	107%	70-136%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG022626.D PP021134.D

Form I Copy

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	NBGMW02		
Lab Sample ID:	F50408-5	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8330A SW846 3535A	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG022626.D	1	07/04/07	MRE	06/25/07	OP21164	GGG970
Run #2	PP021134.D	1	06/28/07	MRE	06/25/07	OP21164	GPP724

	Initial Volume	Final Volume
Run #1	890 ml	10.0 ml
Run #2	890 ml	10.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.22	0.067	ug/l	
121-82-4	RDX	ND	0.22	0.084	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.22	0.079	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.22	0.073	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.22	0.084	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.22	0.079	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.22	0.090	ug/l	
98-95-3	Nitrobenzene	ND	0.22	0.067	ug/l	
88-72-2	o-Nitrotoluene	ND	0.22	0.067	ug/l	
99-08-1	m-Nitrotoluene	ND	0.22	0.084	ug/l	
99-99-0	p-Nitrotoluene	ND	0.22	0.084	ug/l	
479-45-8	Tetryl	ND	0.22	0.084	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.22	0.11	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	0.22	0.090	ug/l	
55-63-0	Nitroglycerine	ND [a]	2.2	0.79	ug/l	
78-11-5	PETN	ND [a]	2.2	0.79	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	91%	94%	70-136%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG022627.D PP021135.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	TMMW01		
Lab Sample ID:	F50408-6	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8330A SW846 3535A	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG022627.D	1	07/04/07	MRE	06/25/07	OP21164	GGG970
Run #2	PP021135.D	1	06/28/07	MRE	06/25/07	OP21164	GPP724

	Initial Volume	Final Volume
Run #1	890 ml	10.0 ml
Run #2	890 ml	10.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.22	0.067	ug/l	
121-82-4	RDX	ND	0.22	0.084	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.22	0.079	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.22	0.073	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.22	0.084	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.22	0.079	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.22	0.090	ug/l	
98-95-3	Nitrobenzene	ND	0.22	0.067	ug/l	
88-72-2	o-Nitrotoluene	ND	0.22	0.067	ug/l	
99-08-1	m-Nitrotoluene	ND	0.22	0.084	ug/l	
99-99-0	p-Nitrotoluene	ND	0.22	0.084	ug/l	
479-45-8	Tetryl	ND	0.22	0.084	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.22	0.11	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	0.22	0.090	ug/l	
55-63-0	Nitroglycerine	ND [a]	2.2	0.79	ug/l	
78-11-5	PETN	ND [a]	2.2	0.79	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	101%	110%	70-136%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG022566.D PP021245.D

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Report of Analysis

Client Sample ID:	062007R		
Lab Sample ID:	F50408-8	Date Sampled:	06/20/07
Matrix:	AQ - Equipment Blank	Date Received:	06/21/07
Method:	SW846 8330A SW846 3535A	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG022566.D	1	07/02/07	MRE	06/27/07	OP21203	GGG969
Run #2	PP021245.D	1	07/02/07	MRE	06/27/07	OP21203	GPP727

	Initial Volume	Final Volume
Run #1	890 ml	10.0 ml
Run #2	890 ml	10.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.22	0.067	ug/l	
121-82-4	RDX	ND	0.22	0.084	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.22	0.079	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.22	0.073	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.22	0.084	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.22	0.079	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.22	0.090	ug/l	
98-95-3	Nitrobenzene	ND	0.22	0.067	ug/l	
88-72-2	o-Nitrotoluene	ND	0.22	0.067	ug/l	
99-08-1	m-Nitrotoluene	ND	0.22	0.084	ug/l	
99-99-0	p-Nitrotoluene	ND	0.22	0.084	ug/l	
479-45-8	Tetryl	ND	0.22	0.084	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.22	0.11	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	0.22	0.090	ug/l	
55-63-0	Nitroglycerine	ND [a]	2.2	0.79	ug/l	
78-11-5	PETN	ND [a]	2.2	0.79	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	106%	94%	70-136%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG022567.D PP021246.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	IAAMW03		
Lab Sample ID:	F50408-9	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8330A SW846 3535A	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG022567.D	1	07/02/07	MRE	06/27/07	OP21203	GGG969
Run #2	PP021246.D	1	07/02/07	MRE	06/27/07	OP21203	GPP727

	Initial Volume	Final Volume
Run #1	890 ml	10.0 ml
Run #2	890 ml	10.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.22	0.067	ug/l	
121-82-4	RDX	ND	0.22	0.084	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.22	0.079	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.22	0.073	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.22	0.084	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.22	0.079	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.22	0.090	ug/l	
98-95-3	Nitrobenzene	ND	0.22	0.067	ug/l	
88-72-2	o-Nitrotoluene	ND	0.22	0.067	ug/l	
99-08-1	m-Nitrotoluene	ND	0.22	0.084	ug/l	
99-99-0	p-Nitrotoluene	ND	0.22	0.084	ug/l	
479-45-8	Tetryl	ND	0.22	0.084	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.22	0.11	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	0.22	0.090	ug/l	
55-63-0	Nitroglycerine	ND [a]	2.2	0.79	ug/l	
78-11-5	PETN	ND [a]	2.2	0.79	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	106%	130%	70-136%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG022568.D PP021247.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	BLAMW01		
Lab Sample ID:	F50408-10	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8330A SW846 3535A	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG022568.D	1	07/03/07	MRE	06/27/07	OP21203	GGG969
Run #2	PP021247.D	1	07/02/07	MRE	06/27/07	OP21203	GPP727

	Initial Volume	Final Volume
Run #1	900 ml	10.0 ml
Run #2	900 ml	10.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.22	0.067	ug/l	
121-82-4	RDX	ND	0.22	0.083	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.22	0.078	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.22	0.072	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.22	0.083	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.22	0.078	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.22	0.089	ug/l	
98-95-3	Nitrobenzene	ND	0.22	0.067	ug/l	
88-72-2	o-Nitrotoluene	ND	0.22	0.067	ug/l	
99-08-1	m-Nitrotoluene	ND	0.22	0.083	ug/l	
99-99-0	p-Nitrotoluene	ND	0.22	0.083	ug/l	
479-45-8	Tetryl	ND	0.22	0.083	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.22	0.11	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	0.22	0.089	ug/l	
55-63-0	Nitroglycerine	ND [a]	2.2	0.78	ug/l	
78-11-5	PETN	ND [a]	2.2	0.78	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	117%	116%	70-136%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG022569.D PP021248.D

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Report of Analysis

Client Sample ID:	IAAMW02		
Lab Sample ID:	F50408-11	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8330A SW846 3535A	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG022569.D	1	07/03/07	MRE	06/27/07	OP21203	GGG969
Run #2	PP021248.D	1	07/02/07	MRE	06/27/07	OP21203	GPP727

	Initial Volume	Final Volume
Run #1	880 ml	10.0 ml
Run #2	880 ml	10.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.23	0.068	ug/l	
121-82-4	RDX	ND	0.23	0.085	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.23	0.080	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.23	0.074	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.23	0.085	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.23	0.080	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.23	0.091	ug/l	
98-95-3	Nitrobenzene	ND	0.23	0.068	ug/l	
88-72-2	o-Nitrotoluene	ND	0.23	0.068	ug/l	
99-08-1	m-Nitrotoluene	ND	0.23	0.085	ug/l	
99-99-0	p-Nitrotoluene	ND	0.23	0.085	ug/l	
479-45-8	Tetryl	ND	0.23	0.085	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.23	0.11	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	0.23	0.091	ug/l	
55-63-0	Nitroglycerine	ND [a]	2.3	0.80	ug/l	
78-11-5	PETN	ND [a]	2.3	0.80	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	114%	92%	70-136%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG022600.D PP021236.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	IAAMW04		
Lab Sample ID:	F50408-14	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
Method:	SW846 8330A SW846 3535A	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG022600.D	1	07/03/07	MRE	06/28/07	OP21223	GGG970
Run #2	PP021236.D	1	07/02/07	MRE	06/28/07	OP21223	GPP727

	Initial Volume	Final Volume
Run #1	880 ml	10.0 ml
Run #2	880 ml	10.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.23	0.068	ug/l	
121-82-4	RDX	ND	0.23	0.085	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.23	0.080	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.23	0.074	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.23	0.085	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.23	0.080	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.23	0.091	ug/l	
98-95-3	Nitrobenzene	ND	0.23	0.068	ug/l	
88-72-2	o-Nitrotoluene	ND	0.23	0.068	ug/l	
99-08-1	m-Nitrotoluene	ND	0.23	0.085	ug/l	
99-99-0	p-Nitrotoluene	ND	0.23	0.085	ug/l	
479-45-8	Tetryl	ND	0.23	0.085	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.23	0.11	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	0.23	0.091	ug/l	
55-63-0	Nitroglycerine	ND [a]	2.3	0.80	ug/l	
78-11-5	PETN	ND [a]	2.3	0.80	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	110%	92%	70-136%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG022601.D PP021237.D

Run I only

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	WBGMW01		
Lab Sample ID:	F50408-16	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
Method:	SW846 8330A SW846 3535A	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG022601.D	1	07/03/07	MRE	06/28/07	OP21223	GGG970
Run #2	PP021237.D	1	07/02/07	MRE	06/28/07	OP21223	GPP727

	Initial Volume	Final Volume
Run #1	520 ml	10.0 ml
Run #2	520 ml	10.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.38	0.12	ug/l	
121-82-4	RDX	ND	0.38	0.14	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.38	0.13	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.38	0.13	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.38	0.14	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.38	0.13	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.38	0.15	ug/l	
98-95-3	Nitrobenzene	ND	0.38	0.12	ug/l	
88-72-2	o-Nitrotoluene	ND	0.38	0.12	ug/l	
99-08-1	m-Nitrotoluene	ND	0.38	0.14	ug/l	
99-99-0	p-Nitrotoluene	ND	0.38	0.14	ug/l	
479-45-8	Tetryl	ND	0.38	0.14	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.38	0.18	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	0.38	0.15	ug/l	
55-63-0	Nitroglycerine	ND [a]	3.8	1.3	ug/l	
78-11-5	PETN	ND [a]	3.8	1.3	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	103%	114%	70-136%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GG022602.D PP021238.D

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Report of Analysis

Client Sample ID:	BLAMW02		
Lab Sample ID:	F50408-17	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
Method:	SW846 8330A SW846 3535A	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG022602.D	1	07/03/07	MRE	06/28/07	OP21223	GGG970
Run #2	PP021238.D	1	07/02/07	MRE	06/28/07	OP21223	GPP727

	Initial Volume	Final Volume
Run #1	820 ml	10.0 ml
Run #2	820 ml	10.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.24	0.073	ug/l	
121-82-4	RDX	ND	0.24	0.091	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.24	0.085	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.24	0.079	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.24	0.091	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.24	0.085	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.24	0.098	ug/l	
98-95-3	Nitrobenzene	ND	0.24	0.073	ug/l	
88-72-2	o-Nitrotoluene	ND	0.24	0.073	ug/l	
99-08-1	m-Nitrotoluene	ND	0.24	0.091	ug/l	
99-99-0	p-Nitrotoluene	ND	0.24	0.091	ug/l	
479-45-8	Tetryl	ND	0.24	0.091	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.24	0.12	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	0.24	0.098	ug/l	
55-63-0	Nitroglycerine	ND [a]	2.4	0.85	ug/l	
78-11-5	PETN	ND [a]	2.4	0.85	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	105%	112%	70-136%

(a) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Shaw Environmental, Inc.
2113 Emmorton Park Road
Edgewood, Maryland
410-612-6350
FAX: 410-612-6351

Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – Herbicides
Accutest Laboratories, Inc., SDG F50408

DATE: August 23, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at New River Unit (NRU) Groundwater Investigation at RFAAP on June 18, 2007, June 19, 2007, June 20, 2007, and June 21, 2007. Samples were analyzed for chlorinated herbicides using USEPA SW846 Method 8151A. A total of ten aqueous samples were validated. The sample IDs are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
WBGMW02	F50408-2	IAAMW03	F50408-9
WBGMW03	F50408-3	BLAMW01	F50408-10
NBGMW01	F50408-4	IAAMW02	F50408-11
NBGMW02	F50408-5	IAAMW04	F50408-14
TMMW01	F50408-6	BLAMW02	F50408-17

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	System Monitoring Compounds
	X	Laboratory Control Sample
X		Matrix Spike/Spike Duplicate
	X	Field Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

8/23/07
Date

RFAAP VALIDATION REPORT
CHLORINATED HERBICIDES REVIEW
SDG F50408

I-Holding Times

The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For chlorinated herbicides in cooled @4°C±2°C aqueous samples, the maximum holding time is 7 days from sample collection to extraction and 40 days from extraction to analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 06/18/07, 06/19/07, 06/20/07, and 06/21/07, the coolers were received by the primary laboratory (Accutest) on 06/22/06 at 1.0°C, 1.2°C, 1.8°C, 2.0°C, 1.4°C, and 1.0°C. The herbicides were subcontracted to Accutest TX and were received the samples at 1.4°C, 3.0°C, 2.2°C, and 3.4°C. The TOX were subcontracted to Accutest NJ and were received at 3.6°C, 4.8°C, and 2.8°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the samples at 5.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 4.8°C, 4.5°C, 5.8°C, 3.2°C, and 1.4°C. Even though several of the temperatures were below criteria, there were no impacts regarding the sample analysis. No qualifiers were applied based upon these outliers.

- Holding Time Review: The aqueous samples were collected on 06/18/07, 06/19/07, 06/20/07, and 06/21/07. For samples collected 06/18/07, the herbicides were extracted on 06/21/07 and analyzed on 06/22/07. For samples collected 06/19/07, 06/20/07, and 06/21/07, the herbicides were extracted on 06/26/07 and analyzed on 07/05/07. All criteria were met. No qualifiers were applied.

II-Initial Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. The DoD QSM specifies that the percent relative standard deviation (%RSD) for a 5-point standard calibration should be ≤20% for each target compound.

- For initial calibration performed on 06/22/07 on instrument GC-GG, all criteria were met for signal #1 and signal #2 for all target compounds. No qualifiers were applied. Sample WBGMW02 (F50408-2) applies to this initial calibration.

- For initial calibration performed on 07/05/07 on instrument GC-DD, all criteria were met for signal #1 and signal #2 for all the target compounds. No qualifiers were applied. Samples WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) apply to this initial calibration.

III-Continuing Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Continuing calibration establishes the response factors on which the quantitations are based and checks satisfactory performance of the instrument on a day-to-day basis. The DoD QSM specifies that the percent difference (%D) between the initial calibration CF and the continuing calibration CF must be ≤20%.

- For continuing calibration performed on 07/05/07 @23:59 on instrument GC-DD, all criteria were met for signal #1 and signal #2 for all target compounds. No qualifiers were applied. Samples WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) apply to this continuing calibration.

- For continuing calibration performed on 07/06/07 @02:28 on instrument GC-DD, all criteria were met for signal #1 and signal #2 for all target compounds. No qualifiers were applied. Samples WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) apply to this continuing calibration.

- Sample WBGMW02 (F50408-2) was analyzed just after the 06/22/07 initial calibration (See Section II). All criteria were met for signal #1 and signal #2 for all target compounds. No qualifiers were applied. Sample WBGMW02 (F50408-2) applies to this initial calibration.

- For continuing calibration performed on 06/23/07 @00:45 on instrument GC-DD, all criteria were met for signal #1 and signal #2 for all target compounds. No qualifiers were applied. Sample WBGMW02 (F50408-2) applies to this continuing calibration.

IV-Blank Analysis
The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field or laboratory activities. No contaminants should be detected in any of the associated blanks. The DoD QSM criterion specifies all concentrations should be less than one-half MRL. Positive sample results are qualified "B" if the concentration of the analyte is ≤ five times (5x) the absolute maximum blank concentration. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank 062007R (F50408-8) (low-flow pump) applies to all samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
06/22/07	OP7615-MB	All target compounds <½MRL	NA	NA	None
07/05/07	OP7626-MB	All target compounds <½MRL	NA	NA	None
07/05/07	062007R	All target compounds <½MRL	NA	NA	None

V-System Monitoring Compounds (Surrogates)
Laboratory performance on individual samples is established by means of spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. Spike recoveries must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Control Limit: 2,4-DCAA (18-157%)

- All criteria were met. No qualifiers were applied.

VI-Laboratory Control Samples and Laboratory Control Sample Duplicates
Data for laboratory control samples (LCS) and LCSD are generated to determine long-term precision and accuracy of the analytical method. Percent recoveries must be within the specified control limits. DoD QSM LCS recovery limits are specified in Table D-2 and Table D-8 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP7615-BS was used as the LCS and LCSD for the 06/22/07 run. All criteria were met. No qualifiers were applied. Sample WBGMW02 (F50408-2) applies to this LCS.

- Sample OP7626-BS was used as the LCS for the 07/05/07 run. All criteria were met. No qualifiers were applied. Samples WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) apply to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. DoD QSM MS/MSD recovery limits follow the LCS criteria and are specified in Table D-2 and Table D-8 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample IAAMW03 (F50408-9) was used for the MS/MSD analysis. Compound 2,4,5-TP (RPD=52%) was outside criteria limits. The LCS was within criteria for all target compounds (See Section VII). The spiked sample was qualified estimated non-detect "UJ" based upon the high RPD.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified because of blank contamination (B-qualified) or were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field groundwater sample duplicate pair NBGMW01 (F50408-4) and TMMW01 (F50408-6) was collected. All target compounds were non-detect. All criteria were met. No qualifiers were applied.

IX-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. Percent difference (%D) between the calculated value and the reported value must be within 10%. All positive values must have less than or equal to 40% %D between the primary and secondary columns. Any sample value >MDL and <MRL is qualified as estimated, "J." All criteria were met. No qualifiers were applied.

Sample: IAAMW03 (F50408-9), 2,4-D

Conc.μg/L = (Amt * DF * Vt) / (CF * Vo)

where: Amt is the response on column (ng/mL) of the sample
CF = Calibration Factor (from initial calibration)
Vt is the volume of final extract (mL)
DF is the dilution factor
Vo is the volume of the sample extracted (mL)

Conc. μg/L = (1629137 ng/mL * 1 * 10 mL) / (12610 * 425 mL)
= 3.0 ng/mL = 3.0 μg/L

Reported Conc. = 3.0 μg/L
%D = 0.0%
Values were within 10% difference

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

A (Dioxins) = MDL is based upon the signal-to-noise measurement.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics and Dioxins) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

D (Organics) = Indicates sample was analyzed at a dilution.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

E (Dioxins) = Reported value is estimated because of the presence of ether interferences.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/F ions is outside accepted ranges. The detected PCDD/F is reported as an estimated maximum possible concentration (EMPC).

I (Dioxins) = Reported value is estimated because of the incorrect isotope rations were obtained.

J (All) = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, (2) estimating a concentration <MRL and ≥ MDL, or estimating a concentration below the calibration range.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

U (All) = ND = BQL = Not detected. The associated number indicates the compound reporting limit for the sample.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Raw Data: GG35697.D

Form I GC

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	WBGMW02		
Lab Sample ID:	F50408-2	Date Sampled:	06/18/07
Matrix:	AQ - Ground Water	Date Received:	06/19/07
Method:	SW846 8151 SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG35697.D	1	06/22/07	ATX	06/21/07	T:OP7615	T:GGG1110
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	1.5	0.80	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.20	0.15	ug/l	
93-76-5	2,4,5-T	ND	0.20	0.12	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	83%		18-157%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: DD65575.D

Form I Copy

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	WBGMW03		
Lab Sample ID:	F50408-3	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8151 SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	DD65575.D	1	07/05/07	ATX	06/26/07	T:OP7626	T:GDD1276
Run #2							

	Initial Volume	Final Volume
Run #1	850 ml	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	1.8	0.94	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.24	0.18	ug/l	
93-76-5	2,4,5-T	ND	0.24	0.14	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	117%		18-157%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: DD65576.D

Form I Corg

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	NBGMW01		
Lab Sample ID:	F50408-4	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8151 SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	DD65576.D	1	07/05/07	ATX	06/26/07	T:OP7626	T:GDD1276
Run #2							

	Initial Volume	Final Volume
Run #1	950 ml	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	1.6	0.84	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.21	0.16	ug/l	
93-76-5	2,4,5-T	ND	0.21	0.13	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	123%		18-157%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: DD65577.D

For II copy

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	NBGMW02		
Lab Sample ID:	F50408-5	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8151 SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	DD65577.D	1	07/05/07	ATX	06/26/07	T:OP7626	T:GDD1276
Run #2							

	Initial Volume	Final Volume
Run #1	850 ml	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	1.8	0.94	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.24	0.18	ug/l	
93-76-5	2,4,5-T	ND	0.24	0.14	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	115%		18-157%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: DD65578.D

Form I Corr

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	TMMW01		
Lab Sample ID:	F50408-6	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8151 SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	DD65578.D	1	07/05/07	ATX	06/26/07	T:OP7626	T:GDD1276
Run #2							

	Initial Volume	Final Volume
Run #1	850 ml	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	1.8	0.94	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.24	0.18	ug/l	
93-76-5	2,4,5-T	ND	0.24	0.14	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	104%		18-157%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: DD65580.D

Form I Corr

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	IAAMW03		
Lab Sample ID:	F50408-9	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8151 SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	DD65580.D	1	07/05/07	ATX	06/26/07	T:OP7626	T:GDD1276
Run #2							

	Initial Volume	Final Volume
Run #1	850 ml	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	1.8	0.94	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND UJ	0.24	0.18	ug/l	
93-76-5	2,4,5-T	ND	0.24	0.14	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	107%		18-157%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: DD65583.D

for 1 Corr

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	BLAMW01		
Lab Sample ID:	F50408-10	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8151 SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	DD65583.D	1	07/06/07	ATX	06/26/07	T:OP7626	T:GDD1276
Run #2							

	Initial Volume	Final Volume
Run #1	900 ml	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	1.7	0.89	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.22	0.17	ug/l	
93-76-5	2,4,5-T	ND	0.22	0.13	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	118%		18-157%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: DD65584.D

Form I Corr

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	IAAMW02		
Lab Sample ID:	F50408-11	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8151 SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	DD65584.D	1	07/06/07	ATX	06/26/07	T:OP7626	T:GDD1276
Run #2							

	Initial Volume	Final Volume
Run #1	900 ml	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	1.7	0.89	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.22	0.17	ug/l	
93-76-5	2,4,5-T	ND	0.22	0.13	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	112%		18-157%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: DD65585.D

For I Corp

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	IAAMW04		
Lab Sample ID:	F50408-14	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
Method:	SW846 8151 SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	DD65585.D	1	07/06/07	ATX	06/26/07	T:OP7626	T:GDD1276
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	1.5	0.80	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.20	0.15	ug/l	
93-76-5	2,4,5-T	ND	0.20	0.12	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	123%		18-157%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: DD65586.D

Form I Org

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	BLAMW02		
Lab Sample ID:	F50408-17	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
Method:	SW846 8151 SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	DD65586.D	1	07/06/07	ATX	06/26/07	T:OP7626	T:GDD1276
Run #2							

	Initial Volume	Final Volume
Run #1	850 ml	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	1.8	0.94	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.24	0.18	ug/l	
93-76-5	2,4,5-T	ND	0.24	0.14	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	71%		18-157%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: DD65579.D

Form I OPs

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	062007R		
Lab Sample ID:	F50408-8	Date Sampled:	06/20/07
Matrix:	AQ - Equipment Blank	Date Received:	06/21/07
Method:	SW846 8151 SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	DD65579.D	1	07/05/07	ATX	06/26/07	T:OP7626	T:GDD1276
Run #2							

	Initial Volume	Final Volume
Run #1	950 ml	10.0 ml
Run #2		

Herbicide List

CAS No.	Compound	Result	RL	MDL	Units	Q
94-75-7	2,4-D	ND	1.6	0.84	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.21	0.16	ug/l	
93-76-5	2,4,5-T	ND	0.21	0.13	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	128%		18-157%

(a) Analysis performed at Accutest Laboratories, Houston, TX.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Shaw Environmental, Inc.
2113 Emmorton Park Road
Edgewood, Maryland
410-612-6350
FAX: 410-612-6351

Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – TAL Metals
Accutest Laboratories, Inc., SDG F50408

DATE: August 21, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at New River Unit (NRU) Groundwater Investigation at RFAAP on June 18, 2007, June 19, 2007, June 20, 2007, and June 21, 2007. Samples were analyzed for target analyte list (TAL) metals using USEPA SW-846 3010A/6010B for ICP metals and SW-846 7470A for mercury. A total of twelve aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
WBGMW01	F50408-1	IAAMW03	F50408-9
WBGMW02	F50408-2	BLAMW01	F50408-10
WBGMW03	F50408-3	IAAMW02	F50408-11
NBGMW01	F50408-4	IAAMW04	F50408-14
NBGMW02	F50408-5	IAAMW01	F50408-15
TMMW01	F50408-6	BLAMW02	F50408-17

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Inorganic Data Review* (April, 1993). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times
X		Initial and Continuing Calibration
X		Blank Analysis
	X	ICP Interference Check Sample (ICS)
	X	Laboratory Control Sample (LCS)
X		Laboratory Sample Duplicate
	X	Matrix Spike and Spike Duplicate
X		ICP Serial Dilution
	X	Field Sample Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

8/21/07
Date

RFAAP VALIDATION REPORT
METALS REVIEW
SDG F50408

I-Holding Times

The primary objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample analysis. Holding time criteria: Cool @4°C±2°C, preserved to pH<2 with HNO_3, the maximum holding time is 180 days for metals and 28 days for mercury.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 06/18/07, 06/19/07, 06/20/07, and 06/21/07, the coolers were received by the primary laboratory (Accutest) on 06/22/06 at 1.0°C, 1.2°C, 1.8°C, 2.0°C, 1.4°C, and 1.0°C. The herbicides were subcontracted to Accutest TX and were received the samples at 1.4°C, 3.0°C, 2.2°C, and 3.4°C. The TOX were subcontracted to Accutest NJ and were received at 3.6°C, 4.8°C, and 2.8°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the samples at 5.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 4.8°C, 4.5°C, 5.8°C, 3.2°C, and 1.4°C. Even though several of the temperatures were below criteria, there were no impacts regarding the sample analysis. No qualifiers were applied based upon these outliers.

- Holding Time Review: Samples were collected 06/18/07, 06/19/07, 06/20/07, and 06/21/07 for metals analysis. For samples collected 06/18/07, 06/19/07, and 06/20/07, they were digested on 06/23/07 and analyzed on 06/25/07 for ICP metals. For samples collected on 06/21/07, they were digested on 06/26/07 and analyzed on 06/26/07 for ICP metals. For samples collected 06/18/07, 06/19/07, 06/20/07, and 06/21/07, they were digested on 06/23/07 and analyzed on 06/23/07 for mercury. All criteria were met. No qualifiers were applied.

II-Initial and Continuing Calibration

Requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of the analysis run, and continuing calibration verification documents that the initial calibration is still valid.

ICP:	1- blank (DoD QSM <½ MRL)	Hg:	1 – blank (DoD QSM <½ MRL)
	3 – standards (r≥0.995)		5 – standards (r≥0.995)
	ICV/CCV (90-110%) (DoD QSM 90-110%)		ICV/CCV (80-120%)(DoD QSM ICV 90-110% & CCV 80-120%)
	MRL (70-130%) (DoD QSM 80-120%)		MRL (80-120%) (DoD QSM 80-120%)
	High Std. (95-105%)		High Std. (95-105%)

- The samples were analyzed for ICP metals on 06/25/07 and 06/26/07. Mercury was analyzed on 06/23/07 with a correlation coefficient of 0.9999. For 06/25/07 ICP run, aluminum (CCV3=87.5% and CCV4=86.5%), sodium (CCV3=84.5% and CCV4=83.5%), zinc (CCV18=113%, CCV20=114%, CCV21=111%, CCV22=112%, CCV23=113%, and CCV24=114%), beryllium (CCV18=111%, CCV20=112%, CCV22=111%, and CCV24=112%), cadmium (CCV18=112%, CCV20=112%, CCV22=111%, CCV23=111%, and CCV24=113%) were outside criteria; however, no samples were bracketed by these CCVs for these metals. No qualifiers were applied based upon these outliers. All other ICV/CCV/High Standard criteria were met. For the 06/26/07 ICP run and the 06/23/07 mercury run, all ICV/CCV/High Standard criteria were met. **Table 2** summarizes the MRL standard analysis. Samples with concentrations detected less than two times the MRL with out of criteria MRL recovery were qualified.

Table 2 MRL Analysis Summary

Analysis Date	Analysis	MRL (µg/L)	MRL %Recovery	Qualified samples @ <2xMRL	Validation Qualifiers
06/25/07	ICP-Sb	6.0	0.0%	BLAMW01, IAAMW02, IAAMW03, NBGMW01, NBGMW02, TMMW01, WBGMW01, WBGMW02, WBGMW03	L, UL
06/25/07	ICP-Pb	10	127%	BLAMW01, IAAMW02, IAAMW03, NBGMW01, NBGMW02, TMMW01, WBGMW02, WBGMW03	K
06/25/07	ICP-Cu	25	122%	BLAMW01, WBGMW01	K
06/25/07	ICP-Be	4.0	128%	IAAMW03, NBGMW02, WBGMW01	K
06/25/07	ICP-Zn	20	121%; 131%	BLAMW01, IAAMW02, IAAMW03, NBGMW01, NBGMW02, TMMW01, WBGMW02, WBGMW03	K
06/26/07	ICP-Sb	6.0	52.0%	BLAMW02, IAAMW01, IAAMW04	L, UL
06/26/07	ICP-As	10	126%	None	K
06/26/07	ICP-Pb	10	126%	BLAMW02, IAAMW04	K
06/23/07	Hg	1.0	All within criteria	None	None

III-Blanks

Blanks (preparation and calibration blanks) are assessed to determine the existence and magnitude of contamination problems. No contaminants should be detected (i.e. <MDL) in any of the associated blanks. DoD QSM limits are <½MRL for the method blank and <2*MDL for the calibration blanks. Samples are qualified "B" when they are less than 5x the absolute value of the maximum blank concentration. **Table 3** summarizes the blank contamination analysis. Rinse blank 062007R (F50408-8) (low-flow pump) applies to all samples in this SDG.

Table 3 Blank Contamination Analysis Summary

Analysis Date	Analysis	QC Blank ID	Max Conc. µg/L	Action Level µg/L	B qualified samples
06/25/07	Aluminum	ICB/CCBs	42.0J	210	WBGMW02
06/25/07	Arsenic	ICB/CCBs	5.8J	29.0	NBGMW01, WBGMW01
06/25/07	Lead	ICB/CCBs	3.7J	18.5	BLAMW01, IAAMW02, IAAMW03, NBGMW01, NBGMW02, WBGMW02, WBGMW03
06/25/07	Potassium	ICB/CCBs	1720J	8600	BLAMW01, IAAMW02, IAAMW03, NBGMW01, NBGMW02, TMMW01, WBGMW02, WBGMW03
06/25/07	Selenium	ICB/CCBs	5.3J	26.5	None
06/25/07	Sodium	ICB/CCBs	1880J	9400	BLAMW01, IAAMW02, IAAMW03, NBGMW01, NBGMW02, TMMW01, WBGMW02, WBGMW03
06/26/07	Lead	ICB/CCBs	3.7J	18.5	BLAMW02, IAAMW04
06/26/07	Potassium	ICB/CCBs	1710J	8550	IAAMW01, IAAMW04
06/26/07	Selenium	ICB/CCBs	5.2J	26.0	IAAMW01
06/26/07	Sodium	ICB/CCBs	1870J	9350	BLAMW02, IAAMW01, IAAMW04
06/23/07	Mercury	ICB/CCBs	<2*MDL	NA	None
06/25/07	Copper	MP12317-MB	1.9J	9.5	WBGMW01
06/25/07	Potassium	MP12317-MB	1720J	8600	NBGMW01, NBGMW02, TMMW01, WBGMW02, WBGMW03
06/25/07	Sodium	MP12317-MB	2040J	10200	NBGMW01, NBGMW02, TMMW01, WBGMW02, WBGMW03
06/25/07	Thallium	MP12317-MB	4.4J	22.0	None
06/25/07	Zinc	MP12317-MB	5.6J	28.0	NBGMW01, NBGMW02, TMMW01, WBGMW02, WBGMW03
06/25/07	Potassium	MP12317-MB	1710J	8550	NBGMW01, NBGMW02, TMMW01, WBGMW02, WBGMW03
06/25/07	Sodium	MP12317-MB	1960J	9800	NBGMW01, NBGMW02, TMMW01, WBGMW02, WBGMW03
06/25/07	Thallium	MP12317-MB	4.8J	24.0	None
06/25/07	Zinc	MP12317-MB	2.8J	14.0	NBGMW01, NBGMW02, TMMW01, WBGMW02, WBGMW03

Table 3 Blank Contamination Analysis Summary, Continued

Analysis Date	Analysis	QC Blank ID	Max Conc. µg/L	Action Level µg/L	B qualified samples
06/25/07	Potassium	MP12318-MB	1720J	8600	IAAMW03, BLAMW01
06/25/07	Sodium	MP12318-MB	2040J	10200	IAAMW03, BLAMW01
06/25/07	Thallium	MP12318-MB	5.3J	26.5	None
06/25/07	Zinc	MP12318-MB	6.9J	34.5	IAAMW03, BLAMW01
06/25/07	Copper	MP12319-MB	2.5J	12.5	None
06/25/07	Potassium	MP12319-MB	1710J	8550	IAAMW02
06/25/07	Sodium	MP12319-MB	2000J	10000	IAAMW02
06/25/07	Thallium	MP12319-MB	4.8J	24.0	None
06/25/07	Zinc	MP12319-MB	5.4J	27.0	IAAMW02
06/26/07	Copper	MP12332-MB	3.7J	18.5	IAAMW04, BLAMW02
06/26/07	Potassium	MP12332-MB	1710J	8550	IAAMW04, IAAMW01
06/26/07	Sodium	MP12332-MB	1990J	9950	IAAMW04, IAAMW01, BLAMW02
06/26/07	Zinc	MP12332-MB	4.8J	24.0	IAAMW04, BLAMW02
06/23/07	Mercury	MP12312-MB	<2*MDL	NA	None
06/25/07	Iron	062007R	16.2J	81.0	None
06/25/07	Lead	062007R	2.3J	11.5	BLAMW01, BLAMW02, IAAMW02, IAAMW03, IAAMW04, NBGMW01, NBGMW02, WBGMW02, WBGMW03
06/25/07	Magnesium	062007R	5.7J	28.5	None
06/25/07	Manganese	062007R	1.6J	8.0	WBGMW03
06/25/07	Potassium	062007R	1760J	8800	BLAMW01, IAAMW01, IAAMW02, IAAMW03, IAAMW04, NBGMW01, NBGMW02, TMMW01, WBGMW02, WBGMW03
06/25/07	Sodium	062007R	2100J	10500	BLAMW01, BLAMW02, IAAMW01, IAAMW02, IAAMW03, IAAMW04, NBGMW01, NBGMW02, TMMW01, WBGMW02, WBGMW03
06/25/07	Arsenic	062007R	3.3J	16.5	NBGMW01, WBGMW01
06/25/07	Zinc	062007R	8.0J	40.0	BLAMW01, BLAMW02, IAAMW02, IAAMW03, IAAMW04, NBGMW01, NBGMW02, TMMW01, WBGMW02, WBGMW03
06/25/07	Calcium	062007R	45.2J	226	None
06/23/07	Mercury	062007R	<2*MDL	NA	None

J = Estimated value <MRL and >MDL. Data point qualified was estimated "J".

IV-ICP Interference Check Sample (ICS)

The ICP interference check sample (ICS) verifies interelement and background correction factors. ICP Interference Check is performed at the beginning and end of each sample analysis run. Control limits are 80-120% (DoD QSM limits 80-120%).

- All criteria were met. No qualifiers were applied.

V-Laboratory Control Samples (LCS)
The laboratory control sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. All aqueous LCS results must fall within the control limits. The DoD QSM LCS recovery limits are specified in Table D-18 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample MP12317-BS was used as LCS for ICP metals analysis on 06/25/07. All criteria were met. No qualifiers were applied. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), and TMMW01 (F50408-6) apply to this LCS.

- Sample MP12318-BS was used as LCS for ICP metals analysis on 06/25/07. All criteria were met. No qualifiers were applied. Samples IAAMW03 (F50408-9) and BLAMW01 (F50408-10) apply to this LCS.

- Sample MP12319-BS was used as LCS for ICP metals analysis on 06/25/07. All criteria were met. No qualifiers were applied. Sample IAAMW02 (F50408-11) applies to this LCS.

- Sample MP12332-BS was used as LCS for ICP metals analysis on 06/26/07. All criteria were met. No qualifiers were applied. Samples IAAMW04 (F50408-14), IAAMW01 (F50408-15), and BLAMW02 (F50408-17) apply to this LCS.

- Sample MP12312-BS was used as LCS for mercury analysis performed on 06/23/07. All criteria were met. No qualifiers were applied. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), IAAMW01 (F50408-15), and BLAMW02 (F50408-17) apply to this LCS.

VI-Duplicate Sample Analysis
Duplicate sample determinations are used to demonstrate acceptable method precision by the laboratory at the time of analysis. Duplicate analyses are also performed to generate data in order to determine the long-term precision of the analytical method on various matrices. RPDs must be within established control limits. DoD QSM limits for metals are 20% RPD for ICP metals and mercury.

- Sample WBGMW01 (F50408-1) was used as laboratory duplicate for ICP metals analysis on 06/25/07. Arsenic (41.2%) was above criteria limits. Arsenic was outside due to low sample concentrations (i.e. <MRL); therefore, no qualifiers were applied based upon this outlier. For all other metals, all criteria were met. No qualifiers were applied. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), and TMMW01 (F50408-6) apply to this laboratory duplicate.

- Sample IAAMW03 (F50408-9) was used as laboratory duplicate for ICP metals analysis on 06/25/07. Chromium (68.7%) and lead (27.3%) were above criteria limits. Lead was outside due to low sample concentrations (i.e. <MRL); therefore, no qualifiers were applied based upon this outlier. Chromium was qualified estimated "J" for detects and no qualifier for non-detects based upon the high RPD. For all other metals, all criteria were met. No qualifiers were applied. Samples IAAMW03 (F50408-9) and BLAMW01 (F50408-10) apply to this laboratory duplicate.

- Sample IAAMW02 (F50408-11) was used as laboratory duplicate for ICP metals analysis on 06/25/07. Arsenic (200%), lead (200%), and vanadium (20.3%) were above criteria limits. Arsenic, lead, and vanadium were outside due to low sample concentrations (i.e. <MRL); therefore, no qualifiers were applied based upon these outliers. For all other metals, all criteria were met. No qualifiers were applied. Sample IAAMW02 (F50408-11) applies to this laboratory duplicate.

- Sample T17854-1 was used as laboratory duplicate for ICP metals analysis on 06/26/07. This sample is not a RFAAP site sample; therefore, it was not evaluated. Samples IAAMW04 (F50408-14), IAAMW01 (F50408-15), and BLAMW02 (F50408-17) apply to this laboratory duplicate.

- Sample F40032-8 was performed as laboratory duplicate for mercury on 06/23/07. This sample is not a RFAAP site sample; therefore, it was not evaluated. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), IAAMW01 (F50408-15), and BLAMW02 (F50408-17) apply to this laboratory duplicate.

VII-Matrix Spike/Spike Duplicate

MS/MSD are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. Specific criteria include the analyses of matrix spike and matrix spike duplicate samples at a frequency of one MS and MSD per 20 samples of similar matrix. MS and MSD recoveries and relative percent differences between MS and MSD recoveries should be within the specified limits. DoD QSM MS/MSD recovery limits follow the LCS criteria and are specified in Table D-18 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used. Post digestion spikes limits are 75-125% for ICP metals and mercury.

- Sample WBGMW01 (F50408-1) was used as laboratory MS/MSD for ICP metals analysis on 06/25/07. Calcium (56.0%) was outside criteria. The sample concentration was >4 times the spike added for calcium; therefore, no qualifiers were applied based upon this outlier. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), and TMMW01 (F50408-6) apply to this MS/MSD.

- Sample IAAMW03 (F50408-9) was used as laboratory MS/MSD for ICP metals analysis on 06/25/07. All criteria were met. No qualifiers were applied. Samples IAAMW03 (F50408-9) and BLAMW01 (F50408-10) apply to this MS/MSD.

- Sample IAAMW02 (F50408-11) was used as laboratory MS/MSD for ICP metals analysis on 06/25/07. All criteria were met. No qualifiers were applied. Sample IAAMW02 (F50408-11) applies to this MS/MSD.

- Sample T17854-1 was used as laboratory MS/MSD for ICP metals analysis on 06/26/07. This sample is not a RFAAP site sample; therefore, it was not evaluated. Samples IAAMW04 (F50408-14), IAAMW01 (F50408-15), and BLAMW02 (F50408-17) apply to this MS/MSD.

- Sample F50447-1A was performed as MS/MSD for mercury on 06/23/07. This sample is not a RFAAP site sample; therefore, it was not evaluated. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), IAAMW01 (F50408-15), and BLAMW02 (F50408-17) apply to this MS/MSD.

VIII-ICP Serial Dilution

An ICP serial dilution is performed to determine whether significant physical or chemical interferences exist due to sample matrix at high concentrations. An analysis of a 5-fold dilution should agree within 10% difference of the original result when the concentration in sample is a factor of 50 above MDL.

- The serial dilution for total ICP metals was analyzed on 06/25/07 using sample WBGMW01 (F50408-1). Arsenic (88.0%), beryllium (223%), calcium (10.9%), cobalt (10.6%), copper (27.0%), lead (10.9%), nickel (18.0%), potassium (42.5%), sodium (26.9%), and zinc (11.5%) were outside of criteria limits. Sample concentrations were <50 times MDL for arsenic, beryllium, cobalt, copper, lead, and nickel; therefore, no qualifiers were applied based upon these outliers. For calcium, potassium, sodium, and zinc, all detects were qualified estimated "J" and non-detects no qualifier based upon these outliers. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), and TMMW01 (F50408-6) apply to this serial dilution.

- The serial dilution for total ICP metals was analyzed on 06/25/07 using sample IAAMW03 (F50408-9). Beryllium (389%), chromium (11.2%), cobalt (100%), lead (492%), nickel (17.5%), potassium (194%), sodium (80.2%), and vanadium (100%) were outside of criteria limits. Sample concentrations were <50 times MDL for beryllium, cobalt, lead, nickel, sodium, and vanadium; therefore, no qualifiers were applied based upon these outliers. For chromium and potassium, all detects were qualified estimated "J" and non-detects no qualifier based upon these outliers. Samples IAAMW03 (F50408-9) and BLAMW01 (F50408-10) apply to this serial dilution.

- The serial dilution for total ICP metals was analyzed on 06/25/07 using sample IAAMW02 (F50408-11). Calcium (12.3%), chromium (46.4%), lead (100%), nickel (143%), potassium (197%), sodium (109%), vanadium (100%), and zinc (30.1%) were outside of criteria limits. Sample concentrations were <50 times MDL for chromium, lead, nickel, sodium, vanadium, and zinc; therefore, no qualifiers were applied based upon these outliers. For calcium and potassium, all detects were qualified estimated "J" and non-detects no qualifier based upon these outliers. Sample IAAMW02 (F50408-11) applies to this serial dilution.

- The serial dilution for total ICP metals was analyzed using sample T17854-1 on 06/26/07. This sample is not a RFAAP site sample; therefore, it was not evaluated. Samples IAAMW04 (F50408-14), IAAMW01 (F50408-15), and BLAMW02 (F50408-17) apply to this serial dilution.

- The serial dilution for mercury was analyzed using sample F50447-1A on 06/23/07. This sample is not a RFAAP site sample; therefore, it was not evaluated. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), IAAMW01 (F50408-15), and BLAMW02 (F50408-17) apply to this serial dilution.

IX-Field Duplicate Sample Analysis

Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field groundwater sample duplicate pair NBGMW01 (F50408-4) and TMMW01 (F50408-6) was collected for TAL metals. All detected metals found in the sample and its duplicate pair and associated %RPD are noted in **Table 4**. All other metals were non-detect. All detected metals were within criteria. No qualifiers were applied.

Table 4 Field Precision Hits Analysis Summary for Metals for Duplicate Pair NBGMW01 (F50408-4) and TMMW01 (F50408-6)

Compound	Original Sample (µg/L)	Duplicate Pair (µg/L)	%RPD
Aluminum	448	409	9.5
Iron	470	419	12.2
Lead	2.9J	1.7U	NA
Magnesium	11600	11500	0.9
Manganese	32.7	31.5	3.8
Nickel	11.8J	10.1J	16.8
Potassium	4350J	4350J	0.0
Sodium	2830J	2820J	0.4
Arsenic	6.3J	2.8U	NA
Barium	99.5J	95.3J	4.4
Chromium	17.1	15.4	11.0
Cobalt	5.6J	5.1J	9.8
Vanadium	1.5J	1.4J	7.1
Zinc	9.0J	7.5J	20.0
Calcium	78200	78400	0.3

U = Value non-detect as <MDL.
J = Estimated value <MRL and >MDL. Data point qualified was estimated "J".
NA = Not Applicable.

X-Quantitation Verification

The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J." The following calculations were performed for verification.

ICP Sample: WBGMW01 (F50408-1), Total Barium

Conc. (µg/L) = (conc. µg/L) *(Final Volume mL) * (DF) / (Volume Sample mL)

Conc. (µg/L) = (130.3 µg/L)*(50 mL)*(1) / (50 mL) = 130 µg/L

Reported concentration = 130 µg/L
%D = 0.0%
Values were within 10% difference.

CVAA Sample: WBGMW01 (F50408-1), Total Mercury

Conc. (µg/L) = (conc. µg/L) *(Final Volume mL) * (DF) / (Volume Sample mL)

Conc. (µg/L) = (0.540 µg/L)*(50 mL)*(1) / (50 mL) = 0.54 µg/L

Reported concentration = 0.54 µg/L
%D = 0.0%.
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

D = Indicates sample was analyzed at a dilution.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

N (Metals) = Laboratory spike sample recovery not within control limits.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	WBGMW01		
Lab Sample ID:	F50408-1	Date Sampled:	06/18/07
Matrix:	AQ - Ground Water	Date Received:	06/19/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	17800	200	18	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Antimony	3.4 U VL	6.0	3.4	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Arsenic	8.2 J B	10	2.8	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Barium	130 J J	200	5.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Beryllium	1.9 J K	4.0	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cadmium	1.0 U	5.0	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Calcium	345000 J	1000	42	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Chromium	48.0	10	0.60	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cobalt	9.3 J J	50	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Copper	17.2 J B	25	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Iron	19200	300	15	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Lead [a]	34.3	10	1.7	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Magnesium	104000	5000	4.3	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Manganese	256	15	1.5	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Mercury	0.54 J J	1.0	0.10	ug/l	1	06/23/07	06/23/07	MS	SW846 7470A [1]	SW846 7470A [3]
Nickel	22.0 J J	40	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Potassium	12000 J	10000	100	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Selenium [b]	2.8 U	50	2.8	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Silver	0.90 U	10	0.90	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Sodium	25600 J	10000	500	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Thallium [a]	2.9 U	20	2.9	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Vanadium	40.3 J J	50	1.1	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Zinc	112 J	20	1.6	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5803
(2) Instrument QC Batch: MA5807
(3) Prep QC Batch: MP12312
(4) Prep QC Batch: MP12317

(a) Elevated RL/MDL due to CRIA exceeding acceptance criteria.
(b) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

from I Cory

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	WBGMW02		
Lab Sample ID:	F50408-2	Date Sampled:	06/18/07
Matrix:	AQ - Ground Water	Date Received:	06/19/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	91.0 J B	200	18	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Antimony	3.4 U VL	6.0	3.4	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Arsenic	2.8 U	10	2.8	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Barium	81.9 J J	200	5.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Beryllium	1.0 U	4.0	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cadmium	1.0 U	5.0	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Calcium	95900 J	1000	42	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Chromium	7.0 J J	10	0.60	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cobalt	1.0 U	50	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Copper	1.0 U	25	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Iron	15 U	300	15	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Lead [a]	1.8 J B	10	1.7	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Magnesium	36800	5000	4.3	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Manganese	15.5	15	1.5	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Mercury	0.10 U	1.0	0.10	ug/l	1	06/23/07	06/23/07	MS	SW846 7470A [1]	SW846 7470A [3]
Nickel	5.0 J J	40	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Potassium	4440 J B	10000	100	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Selenium	2.8 U	10	2.8	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Silver	0.90 U	10	0.90	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Sodium	6940 J B	10000	500	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Thallium [a]	2.9 U	20	2.9	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Vanadium	1.1 J J	50	1.1	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Zinc	10.5 J B	20	1.6	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5803
(2) Instrument QC Batch: MA5807
(3) Prep QC Batch: MP12312
(4) Prep QC Batch: MP12317

(a) Elevated RL/MDL due to CRIA exceeding acceptance criteria.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	WBGMW03		
Lab Sample ID:	F50408-3	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	18 U	200	18	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Antimony	3.4 U UL	6.0	3.4	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Arsenic	2.8 U	10	2.8	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Barium	147 J J	200	5.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Beryllium	1.0 U	4.0	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cadmium	1.0 U	5.0	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Calcium	106000 J	1000	42	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Chromium	3.8 J J	10	0.60	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cobalt	2.4 J J	50	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Copper	1.0 U	25	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Iron	15 U	300	15	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Lead [a]	2.2 J B	10	1.7	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Magnesium	32700	5000	4.3	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Manganese	6.7 J B	15	1.5	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Mercury	0.10 U	1.0	0.10	ug/l	1	06/23/07	06/23/07	MS	SW846 7470A [1]	SW846 7470A [3]
Nickel	5.8 J J	40	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Potassium	4050 J B	10000	100	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Selenium [b]	2.8 U	20	2.8	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Silver	0.90 U	10	0.90	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Sodium	6230 J B	10000	500	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Thallium [a]	2.9 U	20	2.9	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Vanadium	1.1 U	50	1.1	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Zinc	17.1 J B	20	1.6	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5803
(2) Instrument QC Batch: MA5807
(3) Prep QC Batch: MP12312
(4) Prep QC Batch: MP12317

(a) Elevated RL/MDL due to CRIA exceeding acceptance criteria.
(b) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit
U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	NBGMW01		
Lab Sample ID:	F50408-4	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	448	200	18	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Antimony	3.4 U UL	6.0	3.4	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Arsenic	6.3 J B	10	2.8	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Barium	99.5 J J	200	5.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Beryllium	1.0 U	4.0	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cadmium	1.0 U	5.0	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Calcium	78200 J	1000	42	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Chromium	17.1	10	0.60	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cobalt	5.6 J J	50	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Copper	1.0 U	25	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Iron	470	300	15	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Lead [a]	2.9 J B	10	1.7	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Magnesium	11600	5000	4.3	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Manganese	32.7	15	1.5	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Mercury	0.10 U	1.0	0.10	ug/l	1	06/23/07	06/23/07	MS	SW846 7470A [1]	SW846 7470A [3]
Nickel	11.8 J J	40	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Potassium	4350 J B	10000	100	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Selenium	2.8 U	10	2.8	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Silver	0.90 U	10	0.90	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Sodium	2830 J B	10000	500	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Thallium [a]	2.9 U	20	2.9	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Vanadium	1.5 J J	50	1.1	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Zinc	9.0 J B	20	1.6	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5803
(2) Instrument QC Batch: MA5807
(3) Prep QC Batch: MP12312
(4) Prep QC Batch: MP12317

(a) Elevated RL/MDL due to CRIA exceeding acceptance criteria.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

From I copy

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	NBGMW02		
Lab Sample ID:	F50408-5	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	1790	200	18	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Antimony	3.4 U VL	6.0	3.4	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Arsenic	2.8 U	10	2.8	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Barium	93.9 J J	200	5.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Beryllium	1.1 J K	4.0	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cadmium	1.0 U	5.0	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Calcium	75600 J	1000	42	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Chromium	20.5	10	0.60	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cobalt	1.9 J J	50	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Copper	1.0 U	25	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Iron	2470	300	15	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Lead [a]	1.8 J B	10	1.7	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Magnesium	16400	5000	4.3	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Manganese	42.4	15	1.5	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Mercury	0.10 U	1.0	0.10	ug/l	1	06/23/07	06/23/07	MS	SW846 7470A [1]	SW846 7470A [3]
Nickel	14.2 J J	40	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Potassium	4460 J B	10000	100	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Selenium	2.8 U	10	2.8	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Silver	0.90 U	10	0.90	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Sodium	2870 J B	10000	500	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Thallium [a]	2.9 U	20	2.9	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Vanadium	5.6 J J	50	1.1	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Zinc	13.8 J B	20	1.6	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5803
(2) Instrument QC Batch: MA5807
(3) Prep QC Batch: MP12312
(4) Prep QC Batch: MP12317

(a) Elevated RL/MDL due to CRIA exceeding acceptance criteria.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Form I Copy

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	TMMW01		
Lab Sample ID:	F50408-6	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	409	200	18	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Antimony	3.4 U UL	6.0	3.4	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Arsenic	2.8 U	10	2.8	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Barium	95.3 J J	200	5.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Beryllium	1.0 U	4.0	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cadmium	1.0 U	5.0	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Calcium	78400 J	1000	42	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Chromium	15.4	10	0.60	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cobalt	5.1 J J	50	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Copper	1.0 U	25	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Iron	419	300	15	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Lead [a]	1.7 U	10	1.7	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Magnesium	11500	5000	4.3	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Manganese	31.5	15	1.5	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Mercury	0.10 U	1.0	0.10	ug/l	1	06/23/07	06/23/07	MS	SW846 7470A [1]	SW846 7470A [3]
Nickel	10.1 J J	40	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Potassium	4350 J B	10000	100	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Selenium [b]	2.8 U	20	2.8	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Silver	0.90 U	10	0.90	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Sodium	2820 J B	10000	500	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Thallium [a]	2.9 U	20	2.9	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Vanadium	1.4 J J	50	1.1	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Zinc	7.5 J B	20	1.6	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5803
(2) Instrument QC Batch: MA5807
(3) Prep QC Batch: MP12312
(4) Prep QC Batch: MP12317

(a) Elevated RL/MDL due to CRIA exceeding acceptance criteria.
(b) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit
U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Form I Org

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	IAAMW03		
Lab Sample ID:	F50408-9	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	875	200	18	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Antimony	3.4 U UL	6.0	3.4	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Arsenic	2.8 U	10	2.8	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Barium	49.7 J J	200	5.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Beryllium	1.2 J K	4.0	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cadmium	1.0 U	5.0	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Calcium	75900	1000	42	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Chromium	35.2 J	10	0.60	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cobalt	2.4 J J	50	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Copper	1.0 U	25	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Iron	1490	300	15	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Lead [a]	2.5 J B	10	1.7	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Magnesium	9670	5000	4.3	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Manganese	30.1	15	1.5	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Mercury	0.10 U	1.0	0.10	ug/l	1	06/23/07	06/23/07	MS	SW846 7470A [1]	SW846 7470A [3]
Nickel	11.8 J J	40	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Potassium	3450 J B	10000	100	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Selenium	2.8 U	10	2.8	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Silver	0.90 U	10	0.90	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Sodium	8850 J B	10000	500	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Thallium [a]	2.9 U	20	2.9	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Vanadium	3.1 J J	50	1.1	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Zinc	7.2 J B	20	1.6	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5803
(2) Instrument QC Batch: MA5807
(3) Prep QC Batch: MP12312
(4) Prep QC Batch: MP12318

(a) Elevated RL/MDL due to CRIA exceeding acceptance criteria.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Form 1 Copy

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	BLAMW01		
Lab Sample ID:	F50408-10	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	424	200	18	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Antimony	3.4 U VL	6.0	3.4	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Arsenic	2.8 U	10	2.8	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Barium	151 J J	200	5.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Beryllium	1.0 U	4.0	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cadmium	1.0 U	5.0	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Calcium	63000	1000	42	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Chromium	56.9 J	10	0.60	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cobalt	4.7 J J	50	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Copper	3.1 J K	25	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Iron	683	300	15	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Lead [a]	3.5 J B	10	1.7	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Magnesium	17200	5000	4.3	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Manganese	29.4	15	1.5	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Mercury	0.10 U	1.0	0.10	ug/l	1	06/23/07	06/23/07	MS	SW846 7470A [1]	SW846 7470A [3]
Nickel	35.8 J J	40	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Potassium	4000 J B	10000	100	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Selenium	2.8 U	10	2.8	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Silver	0.90 U	10	0.90	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Sodium	3130 J B	10000	500	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Thallium [a]	2.9 U	20	2.9	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Vanadium	1.8 J J	50	1.1	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Zinc	17.4 J B	20	1.6	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5803
(2) Instrument QC Batch: MA5807
(3) Prep QC Batch: MP12312
(4) Prep QC Batch: MP12318

(a) Elevated RL/MDL due to CRIA exceeding acceptance criteria.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Form I Copy

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	IAAMW02		
Lab Sample ID:	F50408-11	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	18 U	200	18	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Antimony	3.4 U UL	6.0	3.4	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Arsenic	2.8 U	10	2.8	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Barium	240	200	5.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Beryllium	1.0 U	4.0	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cadmium	1.0 U	5.0	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Calcium	79600 J	1000	42	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Chromium	4.0 J J	10	0.60	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cobalt	1.0 U	50	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Copper	1.0 U	25	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Iron	15 U	300	15	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Lead [a]	2.9 J B	10	1.7	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Magnesium	18700	5000	4.3	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Manganese	27.3	15	1.5	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Mercury	0.10 U	1.0	0.10	ug/l	1	06/23/07	06/23/07	MS	SW846 7470A [1]	SW846 7470A [3]
Nickel	3.6 J J	40	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Potassium	3370 J B	10000	100	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Selenium	2.8 U	10	2.8	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Silver	0.90 U	10	0.90	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Sodium	6910 J B	10000	500	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Thallium [a]	2.9 U	20	2.9	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Vanadium	1.1 U	50	1.1	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Zinc	5.1 J B	20	1.6	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5803
(2) Instrument QC Batch: MA5807
(3) Prep QC Batch: MP12312
(4) Prep QC Batch: MP12319

(a) Elevated RL/MDL due to CRIA exceeding acceptance criteria.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

For I Com

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	IAAMW04		
Lab Sample ID:	F50408-14	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	2850	200	18	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Antimony	3.4 U VL	6.0	3.4	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Arsenic	2.8 U	10	2.8	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Barium	41.3 J J	200	5.0	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Beryllium	1.0 U	4.0	1.0	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cadmium	1.0 U	5.0	1.0	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Calcium	63800	1000	42	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Chromium	17.1	10	0.60	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cobalt	1.5 J J	50	1.0	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Copper	1.3 J B	25	1.0	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Iron	4270	300	15	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Lead [a]	3.5 J B	10	1.7	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Magnesium	30100	5000	4.3	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Manganese	169	15	1.5	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Mercury	0.10 U	1.0	0.10	ug/l	1	06/23/07	06/23/07	MS	SW846 7470A [1]	SW846 7470A [3]
Nickel	11.8 J J	40	1.0	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Potassium	3820 J B	10000	100	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Selenium	2.8 U	10	2.8	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Silver	0.90 U	10	0.90	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Sodium	6860 J B	10000	500	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Thallium [a]	2.9 U	20	2.9	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Vanadium	8.6 J J	50	1.1	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Zinc	7.9 J B	20	1.6	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5803
(2) Instrument QC Batch: MA5810
(3) Prep QC Batch: MP12312
(4) Prep QC Batch: MP12332

(a) Elevated RL/MDL due to CRIA exceeding acceptance criteria.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Form I ORG

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

3.15.3

Client Sample ID:	IAAMW01		
Lab Sample ID:	F50408-15	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	34900	200	18	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Antimony	3.4 U UL	6.0	3.4	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Arsenic	20.9	10	2.8	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Barium	105 J J	200	5.0	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Beryllium	17.7	4.0	1.0	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cadmium	1.0 U	5.0	1.0	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Calcium	47900	1000	42	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Chromium	101	10	0.60	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cobalt	30.2 J J	50	1.0	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Copper	42.0	25	1.0	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Iron	83300	300	15	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Lead [a]	80.9	10	1.7	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Magnesium	13900	5000	4.3	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Manganese	1790	15	1.5	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Mercury	0.20 U	2.0	0.20	ug/l	1	06/23/07	06/23/07	MS	SW846 7470A [1]	SW846 7470A [3]
Nickel	92.8	40	1.0	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Potassium	7790 J B	10000	100	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Selenium	22.2 B	10	2.8	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Silver	0.90 U	10	0.90	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Sodium	2850 J B	10000	500	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Thallium [a]	2.9 U	20	2.9	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Vanadium	112	50	1.1	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Zinc	226	20	1.6	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5803
(2) Instrument QC Batch: MA5810
(3) Prep QC Batch: MP12312
(4) Prep QC Batch: MP12332

(a) Elevated RL/MDL due to CRIA exceeding acceptance criteria.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Form I Copy

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	BLAMW02		
Lab Sample ID:	F50408-17	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	4970	200	18	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Antimony	3.4 U VL	6.0	3.4	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Arsenic	2.8 U	10	2.8	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Barium	242	200	5.0	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Beryllium	1.0 U	4.0	1.0	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cadmium	1.0 U	5.0	1.0	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Calcium	260000	1000	42	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Chromium	170	10	0.60	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cobalt	10.5 J J	50	1.0	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Copper	19.3 J B	25	1.0	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Iron	7280	300	15	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Lead [a]	7.1 J B	10	1.7	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Magnesium	61100	5000	4.3	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Manganese	151	15	1.5	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Mercury	0.10 U	1.0	0.10	ug/l	1	06/23/07	06/23/07	MS	SW846 7470A [1]	SW846 7470A [3]
Nickel	115	40	1.0	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Potassium	9330 J J	10000	100	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Selenium [b]	2.8 U	40	2.8	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Silver	0.90 U	10	0.90	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Sodium	5730 J B	10000	500	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Thallium [a]	2.9 U	20	2.9	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Vanadium	15.3 J J	50	1.1	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]
Zinc	23.9 B	20	1.6	ug/l	1	06/26/07	06/26/07	RS	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5803
(2) Instrument QC Batch: MA5810
(3) Prep QC Batch: MP12312
(4) Prep QC Batch: MP12332

(a) Elevated RL/MDL due to CRIA exceeding acceptance criteria.
(b) Elevated reporting limit(s) due to matrix interference.

RL = Reporting Limit
MDL = Method Detection Limit
U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Form I Corr

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	062007R		
Lab Sample ID:	F50408-8	Date Sampled:	06/20/07
Matrix:	AQ - Equipment Blank	Date Received:	06/21/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	18 U	200	18	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Antimony	3.4 U	6.0	3.4	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Arsenic	3.3 J J	10	2.8	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Barium	5.0 U	200	5.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Beryllium	1.0 U	4.0	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cadmium	1.0 U	5.0	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Calcium	45.2 J J	1000	42	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Chromium	0.60 U	10	0.60	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Cobalt	1.0 U	50	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Copper	1.0 U	25	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Iron	16.2 J J	300	15	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Lead [a]	2.3 J J	10	1.7	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Magnesium	5.7 J J	5000	4.3	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Manganese	1.6 J J	15	1.5	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Mercury	0.10 U	1.0	0.10	ug/l	1	06/23/07	06/23/07	MS	SW846 7470A [1]	SW846 7470A [3]
Nickel	1.0 U	40	1.0	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Potassium	1760 J J	10000	100	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Selenium	2.8 U	10	2.8	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Silver	0.90 U	10	0.90	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Sodium	2100 J J	10000	500	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Thallium [a]	2.9 U	20	2.9	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Vanadium	1.1 U	50	1.1	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]
Zinc	8.0 J J	20	1.6	ug/l	1	06/23/07	06/25/07	RS	SW846 6010B [2]	SW846 3010A [4]

(1) Instrument QC Batch: MA5803
(2) Instrument QC Batch: MA5807
(3) Prep QC Batch: MP12312
(4) Prep QC Batch: MP12318

(a) Elevated RL/MDL due to CRIA exceeding acceptance criteria.

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result >= MDL but < RL

Shaw Environmental, Inc.
2113 Emmorton Park Road
Edgewood, Maryland
410-612-6350
FAX: 410-612-6351

Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Perchlorate
Datachem Laboratories, Inc. SDG 07E-0550-01
(Accutest Laboratories, Inc., SDG F50408)

DATE: August 29, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at New River Unit (NRU) Groundwater Investigation at RFAAP on June 18, 2007, June 19, 2007, June 20, 2007, and June 21, 2007. The aqueous samples were analyzed for perchlorate analysis using liquid chromatography mass spectroscopy (LC/MS) SW-846 method LC-MS-CLO4/6850 in selective ion monitoring (SIM) mode. A total of twelve aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
WBGMW01	F50408-1	IAAMW03	F50408-9
WBGMW02	F50408-2	BLAMW01	F50408-10
WBGMW03	F50408-3	IAAMW02	F50408-11
NBGMW01	F50408-4	IAAMW04	F50408-14
NBGMW02	F50408-5	IAAMW01	F50408-15
TMMW01	F50408-6	BLAMW02	F50408-17

Data were reviewed and validated using a combination of project QAPP, *DOD Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006), *DoD Perchlorate Handbook March, 2006* (DoD, 2006), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Inorganic Data Review* (April, 1993). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Check
X		Initial and Continuing Calibration
X		Blank Analysis
X		Internal Standards
	X	Laboratory Control Sample (LCS)
	X	Matrix Spike (MS) and Spike Duplicate (MSD)
	X	Field Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

8/29/07
Date

RFAAP VALIDATION REPORT
PERCHLORATE REVIEW
SDG 07E-0550-01 (F50408)

I-Holding Times and Preservation

The primary objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample analysis. For perchlorate analysis, aqueous samples are received and stored at cool @4°C±2°C with a maximum holding time of 28 days from collection (DoD Perchlorate Handbook criteria).

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 06/18/07, 06/19/07, 06/20/07, and 06/21/07, the coolers were received by the primary laboratory (Accutest) on 06/22/06 at 1.0°C, 1.2°C, 1.8°C, 2.0°C, 1.4°C, and 1.0°C. The herbicides were subcontracted to Accutest TX and were received the samples at 1.4°C, 3.0°C, 2.2°C, and 3.4°C. The TOX were subcontracted to Accutest NJ and were received at 3.6°C, 4.8°C, and 2.8°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the samples at 5.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 4.8°C, 4.5°C, 5.8°C, 3.2°C, and 1.4°C. Even though several of the temperatures were below criteria, there were no impacts regarding the sample analysis. No qualifiers were applied based upon these outliers.

- Holding Time Review: The aqueous samples were collected on 06/18/07, 06/19/07, 06/20/07, and 06/21/07. The aqueous perchlorate samples were prepped on 07/07/07 and analyzed on 07/07/07 and 07/08/07. All holding time criteria were met. No qualifiers were applied.

II-Instrument Performance Check

GC/MS instrument performance checks are performed to ensure mass resolution, identification and, to some degree, sensitivity. The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, $^{35}Cl^{16}O_3$, met the mass calibration criteria. No qualification was applied.

III-Initial and Continuing Calibration

Requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of the analysis run, and continuing calibration verification documents that the initial calibration is still valid.

Perchlorate:	1- blank (<1/2MRL DoD Perchlorate Handbook)
	5 – standards ($r \geq 0.995$ DoD Perchlorate Handbook)
	ICV (±10%D DoD Perchlorate Handbook)
	CCV/ICS (±30%D DoD Perchlorate Handbook)
	LODV (±30%D DoD Perchlorate Handbook)

- The perchlorate samples were analyzed on 07/07/07 and 07/08/07 for the aqueous samples. Perchlorate was calibrated second order for on 07/07/07 with a coefficient of 0.9999. Perchlorate for LODV1 (60.0%) and CCV3 (58.1%D) was above criteria, probably due to baseline noise. All other ICV/CCV/ICS/LODV standards were within criteria. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), and IAAMW03 (F50408-9) were bracketed by LODV1; therefore, were qualified as estimated "J" for detects and "UJ" for non-detects based upon the high %D. Samples BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), IAAMW01 (F50408-15), and BLAMW02 (F50408-17) were bracketed by CCV3; therefore, were qualified as estimated "J" for detects and "UJ" for non-detects based upon the high %D. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), IAAMW01 (F50408-15), and BLAMW02 (F50408-17) apply to this calibration.

IV-Blanks

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. One method blank per analytical batch must be run on each instrument used to analyze samples. No contaminants should be detected in any of the associated blanks >MDL. The DoD Perchlorate Handbook criterion specifies all concentrations should be less than ½ MRL for method blanks. Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤5 times (5X) the maximum amount for target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank 062007R (F50408-8) (low-flow pump) applies to all samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	Analysis	QC Blank ID	Max Conc. µg/L	Action Level µg/L	B qualified samples
07/07/07	Perchlorate	BL-258259-1	<½MRL	NA	None
07/07/07	Perchlorate	062007R	0.201	1.01	IAAMW02, IAAMW04, IAAMW01, WBGMW02, WBGMW03, NBGMW02, TMMW01

MRL = Method Reporting Limit.
NA = Not Applicable.

V-Internal Standards

Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Internal standard area counts for samples and blanks must not vary by more than a factor of two (-50% to +100%) from the associated calibration standard. The DoD Handbook specifies retention times (RT) 1.0 ± 2% of last calibration standard and the ratio of RT of sample to standard should be 3.06 and fall between 2.3 and 3.8. The laboratory 83:85 mass ratio limit range is 2.09 to 3.87. The internal standard peak area responses should fall between 50% to 150% recoveries.

- For sample WBGMW02 (F50408-2), the 83:85 mass ratio (2.03) was outside criteria probably due to low sample concentration (i.e. <MRL). Sample WBGMW02 (F50408-2) was qualified estimated "J" based upon this outlier.

- For sample NBGMW01 (F50408-4), the 83:85 mass ratio (1.31) was outside criteria. Sample NBGMW01 (F50408-4) was reported as non-detect; therefore no qualifiers were applied based upon this outlier.

- For sample IAAMW02 (F50408-11), the 83:85 mass ratio (1.92) was outside criteria probably due to low sample concentration (i.e. <MRL). Sample IAAMW02 (F50408-11) was qualified estimated "J" based upon this outlier.

- For all other samples, all criteria were met.

VI-Laboratory Control Samples (LCS)
The laboratory control sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. DoD Perchlorate Handbook and laboratory aqueous limits are 85-115%.

- Sample QC-258259-1 was used as aqueous LCS for perchlorate analysis dated 07/07/07 and 07/08/07. All criteria were met. No qualifiers were applied.

VII-Matrix Spike (MS) and Spike Duplicate (MSD)
MS and MSD are generated to determine long-term accuracy and precision of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. Specific criteria include the analyses of matrix spike samples at a frequency of one MS/MSD per 20 samples of similar matrix. MS/MSD recoveries and relative percent differences between MS recoveries should be within the specified limits. DoD Perchlorate Handbook aqueous limits are 75-125%; RPD≤20%. The laboratory limits are 80-120%; RPD≤15%.

- Sample IAAMW03 (F50408-9) was used for the MS/MSD analysis for the 07/07/07 and 07/08/07 perchlorate analysis. The perchlorate spike duplicate (126%) was above criteria. The associated LCS was within criteria (See Section VI). The spiked sample was non-detect; therefore, no qualifiers were applied. Samples apply to this MS/MSD sample.

VIII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field groundwater sample duplicate pair NBGMW01 (F50408-4) and TMMW01 (F50408-6) was collected for perchlorate. The original sample was non-detect and the field duplicate was detected at 0.160 µg/L. The field duplicate concentration was <MRL; therefore, all criteria were met. No qualifiers were applied.

IX-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value >MDL and <MRL or <3*MDL (whichever was greater) was qualified as estimated, "J." The following calculations were performed for verification.

Sample: WBGMW02 (F50408-2), Perchlorate

y (area ratio) = (Sample Area/Area EIC89) = (1895.6/83032.5) = 0.0228296 = ax^2 + bx + c

Setting y = 0,
x = [-b ± SQRT(b^2-4ac)] / (2a)

where: x is the amount ratio

a = 0.0279655 b = 1.29192 (set to zero = c-y) c = - 0.000721689 - 0.0228296 = -0.0235513

amount ratio ={-1.29192± [SQRT{(1.29192^2) – (4*0.0279655*-0.0235513)}] / (2*0.0279655)
= (-1.29192±1.292939) / (0.055931)
= 0.0182225

Conc. µg/L = (Amount ratio * Is * DF)

where: Conc. = Sample concentration in ug/L
I_s = Amount of internal standard (µg/L).
DF = Dilution factor

Conc. µg/L = (Amount ratio * Is * DF)
= (0.0182225 * 5 µg/L * 1) = 0.0911 µg/L

Reported concentration = 0.0911 µg/L
%D = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

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80758076

Date Printed.....: 09-JUL-07 14:12

Client Name.....: Accutest Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F50408
Release Number.....: Not Provided

Date Received.....: 23-JUN-07 00:00

Client Sample Name: F50408-01
DCL Sample Name...: 07M03318
DCL Report Group..: 07M-0550-01

Matrix.....: WATER
Date Sampled.....: Not Provided
Reporting Units...: ug/L
Report Basis.....: [X] As Received [ ] Dried

DCL Preparation Group: Not Applicable
Date Prepared.....: 07-JUL-07 00:00
Preparation Method...: CLO4-LC/MS
Aliquot Weight/Volume: Not Applicable
Net Weight/Volume....: Not Required

DCL Analysis Group: G076600H
Analysis Method...: 6850
Instrument Type...: LC/MS
Instrument ID.....: LCMS02
Column Type.....: KP-RPPX250
[X] Primary
[ ] Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Perchlorate	07-JUL-07 19:04	0.0612	ND	UJ	U	1	0.200

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Page 4

S0758077

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Client Name.....: Accutest Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F50408
Release Number.....: Not Provided

Date Received.....: 23-JUN-07 00:00

Client Sample Name: F50408-02
DCL Sample Name...: 07M03319
DCL Report Group..: 07M-0550-01

Matrix.....: WATER
Date Sampled.....: Not Provided
Reporting Units...: ug/L
Report Basis.....: [X] As Received [ ] Dried

DCL Preparation Group: Not Applicable
Date Prepared.....: 07-JUL-07 00:00
Preparation Method...: CLO4-LC/MS
Aliquot Weight/Volume: Not Applicable
Net Weight/Volume....: Not Required

DCL Analysis Group: G076600H
Analysis Method...: 6850
Instrument Type...: LC/MS
Instrument ID.....: LCMS02
Column Type.....: XP-RPPX250
[X] Primary
[ ] Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Perchlorate	07-JUL-07 19:24	0.0612	0.0911	B	J	1	0.200

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Date Printed.....: 09-JUL-07 14:12

Client Name.....: Accutest Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F50408
Release Number.....: Not Provided

Date Received.....: 23-JUN-07 00:00

Client Sample Name: F50408-03
DCL Sample Name...: 07H03320
DCL Report Group..: 07H-0550-01

Matrix.....: WATER
Date Sampled.....: Not Provided
Reporting Units...: ug/L
Report Basis.....: [X] As Received [ ] Dried

DCL Preparation Group: Not Applicable
Date Prepared.....: 07-JUL-07 00:00
Preparation Method...: CLO4-LC/MS
Aliquot Weight/Volume: Not Applicable
Net Weight/Volume....: Not Required

DCL Analysis Group: G076600H
Analysis Method...: 6850
Instrument Type...: LC/MS
Instrument ID.....: LCMS02
Column Type.....: KP-RPFX250
[X] Primary
[ ] Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Perchlorate	07-JUL-07 19:44	0.0612	0.190	B	J	1	0.200

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Client Name.....: Accutest Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F50408
Release Number.....: Not Provided

Date Received.....: 23-JUN-07 00:00

Client Sample Name: F50408-04
DCL Sample Name...: 07M03321
DCL Report Group..: 07M-0550-01

Matrix.....: WATER
Date Sampled.....: Not Provided
Reporting Units...: ug/L
Report Basis.....: [X] As Received [ ] Dried

DCL Preparation Group: Not Applicable
Date Prepared.....: 07-JUL-07 00:00
Preparation Method...: CLO4-LC/MS
Aliquot Weight/Volume: Not Applicable
Net Weight/Volume....: Not Required

DCL Analysis Group: G076600H
Analysis Method...: 6850
Instrument Type...: LC/MS
Instrument ID.....: LCMS02
Column Type.....: KP-RPPX250
[X] Primary
[ ] Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Perchlorate	07-JUL-07 20:03	0.0612	ND	UJ	U	1	0.200

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Client Name.....: Accutest Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F50408
Release Number.....: Not Provided

Date Received.....: 23-JUN-07 00:00

Client Sample Name: F50408-05
DCL Sample Name...: 07M03322
DCL Report Group..: 07M-0550-01

Matrix.....: WATER
Date Sampled.....: Not Provided
Reporting Units...: ug/L
Report Basis.....: [X] As Received [ ] Dried

DCL Preparation Group: Not Applicable
Date Prepared.....: 07-JUL-07 00:00
Preparation Method...: CLO4-LC/MS
Aliquot Weight/Volume: Not Applicable
Net Weight/Volume....: Not Required

DCL Analysis Group: G076600M
Analysis Method...: 6850
Instrument Type...: LC/MS
Instrument ID.....: LCMS02
Column Type.....: KP-RPPX250
[X] Primary
[ ] Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Perchlorate	07-JUL-07 20:23	0.0612	0.176	B	J	1	0.200

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Client Name.....: Accutest Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F50408
Release Number.....: Not Provided

Date Received.....: 23-JUN-07 00:00

Client Sample Name: F50408-06
DCL Sample Name...: 07M03323
DCL Report Group..: 07M-0550-01

Matrix.....: WATER
Date Sampled.....: Not Provided
Reporting Units...: ug/L
Report Basis.....: ☒ As Received ☐ Dried

DCL Preparation Group: Not Applicable
Date Prepared.....: 07-JUL-07 00:00
Preparation Method...: CLO4-LC/MS
Aliquot Weight/Volume: Not Applicable
Net Weight/Volume....: Not Required

DCL Analysis Group: G076600H
Analysis Method...: 6850
Instrument Type...: LC/MS
Instrument ID.....: LCMS02
Column Type.....: KP-RPPX250
☒ Primary
☐ Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Perchlorate	07-JUL-07 20:42	0.0612	0.150	B	J	1	0.200

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Date Printed.....: 09-JUL-07 14:12

Client Name.....: Accutest Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F50408
Release Number.....: Not Provided

Date Received.....: 23-JUN-07 00:00

Client Sample Name: F50408-09
DCL Sample Name...: 07M03325
DCL Report Group..: 07M-0550-01

Matrix.....: WATER
Date Sampled.....: Not Provided
Reporting Units...: ug/L
Report Basis.....: ☒ As Received ☐ Dried

DCL Preparation Group: Not Applicable
Date Prepared.....: 07-JUL-07 00:00
Preparation Method...: CLO4-LC/MS
Aliquot Weight/Volume: Not Applicable
Net Weight/Volume....: Not Required

DCL Analysis Group: G076600H
Analysis Method...: 6850
Instrument Type...: LC/MS
Instrument ID.....: LCMS02
Column Type.....: KP-RPPX250
☒ Primary
☐ Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Perchlorate	07-JUL-07 21:22	0.0612	ND	UJ	U	1	0.200

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Date Printed.....: 09-JUL-07 14:12

Client Name.....: Accutest Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F50408
Release Number.....: Not Provided

Date Received.....: 23-JUN-07 00:00

Client Sample Name: F50408-10
DCL Sample Name...: 07M03326
DCL Report Group..: 07M-0550-01

Matrix.....: WATER
Date Sampled.....: Not Provided
Reporting Units...: ug/L
Report Basis.....: [X] As Received [ ] Dried

DCL Preparation Group: Not Applicable
Date Prepared.....: 07-JUL-07 00:00
Preparation Method...: CLO4-LC/MS
Aliquot Weight/Volume: Not Applicable
Net Weight/Volume....: Not Required

DCL Analysis Group: G076600H
Analysis Method...: 6850
Instrument Type...: LC/MS
Instrument ID.....: LCMS02
Column Type.....: KP-RPPX250
[X] Primary
[ ] Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Perchlorate	07-JUL-07 23:00	0.0612	ND	UJ	U	1	0.200

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Client Name.....: Accutest Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F50408
Release Number.....: Not Provided

Date Received.....: 23-JUN-07 00:00

Client Sample Name: F50408-11
DCL Sample Name...: 07E03327
DCL Report Group..: 07E-0550-01

Matrix.....: WATER
Date Sampled.....: Not Provided
Reporting Units...: ug/L
Report Basis.....: [X] As Received [ ] Dried

DCL Preparation Group: Not Applicable
Date Prepared.....: 07-JUL-07 00:00
Preparation Method...: CLO4-LC/MS
Aliquot Weight/Volume: Not Applicable
Net Weight/Volume....: Not Required

DCL Analysis Group: G076600H
Analysis Method...: 6850
Instrument Type...: LC/MS
Instrument ID.....: LCMS02
Column Type.....: KP-RPFX250
[X] Primary
[ ] Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Perchlorate	07-JUL-07 23:19	0.0612	0.156	B	J	1	0.200

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S075807L

Date Printed.....: 09-JUL-07 14:12

Client Name.....: Accutest Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F50408
Release Number.....: Not Provided

Date Received.....: 23-JUN-07 00:00

Client Sample Name: F50408-14
DCL Sample Name...: 07M03328
DCL Report Group..: 07M-0550-01

Matrix.....: WATER
Date Sampled.....: Not Provided
Reporting Units...: ug/L
Report Basis.....: ☒ As Received ☐ Dried

DCL Preparation Group: Not Applicable
Date Prepared.....: 07-JUL-07 00:00
Preparation Method...: CLO4-LC/MS
Aliquot Weight/Volume: Not Applicable
Net Weight/Volume....: Not Required

DCL Analysis Group: G076600H
Analysis Method...: 6850
Instrument Type...: LC/MS
Instrument ID.....: LCMS02
Column Type.....: KP-RPPX250
☒ Primary
☐ Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Perchlorate	07-JUL-07 23:39	0.0612	0.195	B	J	1	0.200

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S075807M

Date Printed.....: 09-JUL-07 14:12

Client Name.....: Accutest Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F50408
Release Number.....: Not Provided

Date Received.....: 23-JUN-07 00:00

Client Sample Name: F50408-15
DCL Sample Name...: 07M03329
DCL Report Group..: 07M-0550-01

Matrix.....: WATER
Date Sampled.....: Not Provided
Reporting Units...: ug/L
Report Basis.....: [X] As Received [ ] Dried

DCL Preparation Group: Not Applicable
Date Prepared.....: 07-JUL-07 00:00
Preparation Method...: CLO4-LC/MS
Aliquot Weight/Volume: Not Applicable
Net Weight/Volume....: Not Required

DCL Analysis Group: G076600H
Analysis Method...: 6850
Instrument Type...: LC/MS
Instrument ID.....: LCMS02
Column Type.....: KP-RPPX250
[X] Primary
[ ] Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Perchlorate	07-JUL-07 23:58	0.0612	0.191	B	J	1	0.200

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SAMPLE ANALYSIS DATA SHEET

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9075S07N

Date Printed.....: 09-JUL-07 14:12

Client Name.....: Accutest Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F50408
Release Number.....: Not Provided

Date Received.....: 23-JUN-07 00:00

Client Sample Name: F50408-17
DCL Sample Name...: 07M03330
DCL Report Group..: 07M-0550-01

Matrix.....: WATER
Date Sampled.....: Not Provided
Reporting Units...: ug/L
Report Basis.....: ☒ As Received ☐ Dried

DCL Preparation Group: Not Applicable
Date Prepared.....: 07-JUL-07 00:00
Preparation Method...: CLO4-LC/MS
Aliquot Weight/Volume: Not Applicable
Net Weight/Volume....: Not Required

DCL Analysis Group: G076600H
Analysis Method...: 6850
Instrument Type...: LC/MS
Instrument ID.....: LCMS02
Column Type.....: XP-RPPX250
☒ Primary
☐ Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Perchlorate	08-JUL-07 00:18	0.0612	ND	UJ	U	1	0.200

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S075807D

Date Printed.....: 09-JUL-07 14:12

Client Name.....: Accutest Laboratories
Client Ref Number....: Not Provided
Sampling Site.....: F50408
Release Number.....: Not Provided

Date Received.....: 23-JUN-07 00:00

Client Sample Name: F50408-08
DCL Sample Name...: 07M03324
DCL Report Group..: 07M-0550-01

Matrix.....: WATER
Date Sampled.....: Not Provided
Reporting Units...: ug/L
Report Basis.....: [X] As Received [ ] Dried

DCL Preparation Group: Not Applicable
Date Prepared.....: 07-JUL-07 00:00
Preparation Method...: CLO4-LC/MS
Aliquot Weight/Volume: Not Applicable
Net Weight/Volume....: Not Required

DCL Analysis Group: G076600H
Analysis Method...: 6850
Instrument Type...: LC/MS
Instrument ID.....: LCMS02
Column Type.....: KP-RPPX250
[X] Primary
[ ] Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Perchlorate	07-JUL-07 21:02	0.0612	0.201			1	0.200

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MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Pesticides and PCBs
Accutest Laboratories, Inc., SDG F50408

DATE: August 20, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at New River Unit (NRU) Groundwater Investigation at RFAAP on June 18, 2007, June 19, 2007, June 20, 2007, and June 21, 2007. Samples were analyzed for pesticides and PCBs using USEPA Method 3510C/8081A and 3510C/8082, respectively. A total of ten aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
WBGMW02	F50408-2	IAAMW03	F50408-9
WBGMW03	F50408-3	BLAMW01	F50408-10
NBGMW01	F50408-4	IAAMW02	F50408-11
NBGMW02	F50408-5	IAAMW04	F50408-14
TMMW01	F50408-6	BLAMW02	F50408-17

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in Table 1. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Check
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
X		System Monitoring Compounds
X		Laboratory Control Samples
X		Matrix Spike/Spike Duplicate
	X	Field Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications.

Eric Malarek, Chemist

8/20/07
Date

RFAAP VALIDATION REPORT
PESTICIDE/PCB REVIEW
SDG F50408

I-Holding Times and Preservation
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For pesticides and PCB compounds in cooled (@4°C ± 2°C) aqueous samples, the maximum holding time is 7 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 06/18/07, 06/19/07, 06/20/07, and 06/21/07, the coolers were received by the primary laboratory (Accutest) on 06/22/06 at 1.0°C, 1.2°C, 1.8°C, 2.0°C, 1.4°C, and 1.0°C. The herbicides were subcontracted to Accutest TX and were received the samples at 1.4°C, 3.0°C, 2.2°C, and 3.4°C. The TOX were subcontracted to Accutest NJ and were received at 3.6°C, 4.8°C, and 2.8°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the samples at 5.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 4.8°C, 4.5°C, 5.8°C, 3.2°C, and 1.4°C. Even though several of the temperatures were below criteria, there were no impacts regarding the sample analysis. No qualifiers were applied based upon these outliers.

- Holding Time Review: The aqueous samples were collected on 06/18/07, 06/19/07, 06/20/07, and 06/21/07. The pesticides were extracted on 06/25/07 and analyzed on 07/02/07 and 07/03/07. The PCBs were extracted on 06/25/07 and analyzed on 06/27/07 and 06/28/07. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check (Degradation Standard)
Performance checks on the gas chromatograph with electron capture detector (GC/ECD) system are performed to ensure adequate resolution and instrument sensitivity. The performance evaluation mixture (PEM) must be analyzed at the beginning of the analytical sequence. The breakdown of Endrin and 4,4'-DDT must be ≤15% on both signals.

- For analysis performed on 06/29/07 @10:34, endrin and 4,4'-DDT percent breakdowns were 10.4% and 5.2% on signal #1 and 8.5% and 4.6% on signal #2, respectively. All criteria were met. No qualifiers were applied.

- For analysis performed on 07/02/07 @10:53, endrin and 4,4'-DDT percent breakdowns were 11.4% and 4.2% on signal #1 and 9.3% and 3.1% on signal #2, respectively. All criteria were met. No qualifiers were applied.

- For analysis performed on 07/03/07 @10:38, endrin and 4,4'-DDT percent breakdowns were 9.9% and 5.3% on signal #1 and 7.5% and 3.9% on signal #2, respectively. All criteria were met. No qualifiers were applied.

- For analysis performed on 07/05/07 @11:19, endrin and 4,4'-DDT percent breakdowns were 5.1% and 3.0% on signal #1 and 5.4% and 2.7% on signal #2, respectively. All criteria were met. No qualifiers were applied.

- For analysis performed on 07/07/07 @09:30, endrin and 4,4'-DDT percent breakdowns were 3.5% and 3.2% on signal #1 and 4.2% and 2.6% on signal #2, respectively. All criteria were met. No qualifiers were applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the target compounds. The initial 5 point calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run. Calibration factors are generated for each compound. The DoD QSM specifies that the percent relative standard deviation (%RSD) for all single peak target analytes, and aroclors 1016, 1242, 1254, and 1260 must be <20% or the mean %RSD for all analytes in the standard must be ≤20%. If linear regression is used, the correlation coefficient must be ≥0.990. All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits.

- For the pesticide initial calibration performed on 06/29/07 on instrument ECD5, all criteria were met. No qualifiers were applied. Samples WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) were analyzed using this initial calibration.

- For the pesticide initial calibration performed on 07/05/07 on instrument ECD6, all criteria were met. No qualifiers were applied. Sample TMMW01 (F50408-6) was re-analyzed using this initial calibration.

- For the PCB initial calibration performed on 06/29/07 on instrument ECD3, PCB1016-A (22.34%) was above criteria. PCB1016 was quantified using linear regression with correlations for PCB1016-A (r=0.9991), PCB1016-B (r=0.9994), PCB1016-C (r=0.9995), PCB1016-D (r=0.9989), PCB1016-E (r=0.9986), and PCB1016-F (r=0.9997) within criteria. The average recovery for PCB1016 was 16.6%. For all other target PCBS, all criteria were met. No qualifiers were applied based upon this outlier. Sample TMMW01 (F50408-6) was re-analyzed using this initial calibration.

- For the PCB initial calibration performed on 06/27/07 on instrument ECD7, all criteria were met. No qualifiers were applied. Samples WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) were analyzed using this initial calibration.

IV-Continuing Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for pesticide/PCB target compounds. Continuing calibration standards containing both target compounds and surrogates are analyzed at the beginning of each 12-hour analytical shift and after every 20 samples. The DoD QSM specifies that the percent difference (%D) or the average %Ds for all analytes in the standard from the initial calibration should be no greater than ±20%.

- For pesticide initial calibration verification performed on 06/29/07 @12:58 on instrument ECD5, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this initial calibration verification.

- For pesticide continuing calibration performed on 07/02/07 @11:14 on instrument ECD5, all criteria were met. No qualifiers were applied. Samples WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), and NBGMW02 (F50408-5) were analyzed using this continuing calibration.

- For toxaphene pesticide continuing calibration performed on 07/02/07 @11:30 on instrument ECD5, all criteria were met. No qualifiers were applied. Samples WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), and NBGMW02 (F50408-5) were analyzed using this continuing calibration.

- For chlordane pesticide continuing calibration performed on 07/02/07 @11:46 on instrument ECD5, all criteria were met. No qualifiers were applied. Samples WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), and NBGMW02 (F50408-5) were analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 07/02/07 @14:50 on instrument ECD5, all criteria were met. No qualifiers were applied. Samples WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) were analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 07/02/07 @16:43 on instrument ECD5, all criteria were met. No qualifiers were applied. Samples IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) were analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 07/03/07 @14:07 on instrument ECD5, 4,4'-DDT (23.6%) and methoxychlor (26.2%) were outside criteria for the signal #1. 4,4'-DDT (23.6%) and methoxychlor (22.5%) were outside criteria for the signal #2. 4,4'-DDT (20.6%) was outside criteria for column #2. 4,4'-DDT and methoxychlor were non-detect for all associated samples, therefore, no qualifiers were applied based upon these outliers. Sample TMMW01 (F50408-6) was analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 07/03/07 @14:55 on instrument ECD5, 4,4'-DDT (26.2%) and methoxychlor (25.9%) were outside criteria for the signal #1. 4,4'-DDT (27.8%) and methoxychlor (25.2%) were outside criteria for the signal #2. 4,4'-DDT and methoxychlor were non-detect for all associated samples, therefore, no qualifiers were applied based upon these outliers. Sample TMMW01 (F50408-6) was analyzed using this continuing calibration.

- For pesticide initial calibration verification performed on 07/05/07 @13:43 on instrument ECD6, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this initial calibration verification.

- For toxaphene pesticide continuing calibration performed on 07/07/07 @10:09 on instrument ECD6, all criteria were met. No qualifiers were applied. Sample TMMW01 (F50408-6) was re-analyzed using this continuing calibration.

- For chlordane pesticide continuing calibration performed on 07/07/07 @10:25 on instrument ECD6, all criteria were met. No qualifiers were applied. Sample TMMW01 (F50408-6) was re-analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 07/07/07 @13:57 on instrument ECD6, all criteria were met. No qualifiers were applied. Sample TMMW01 (F50408-6) was re-analyzed using this continuing calibration.

- For pesticide continuing calibration performed on 07/07/07 @16:19 on instrument ECD6, all criteria were met for signal #1. For signal #2, beta-BHC (20.9%), heptachlor (20.1%), aldrin (20.8%), heptachlor epoxide (20.1%), gamma-chlordane (21.9%), 4,4'-DDE (22.4%), dieldrin (20.5%), 4,4'-DDD (20.7%), and endosulfan II (20.8%) were outside criteria. All samples were non-detect for all target pesticides. No qualifiers were applied based upon these outliers. Sample TMMW01 (F50408-6) was re-analyzed using this continuing calibration.

- For PCB 1016/1260 initial calibration verification performed on 06/29/07 @16:13 on instrument ECD3, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 07/02/07 @16:32 on instrument ECD3, all criteria were met. No qualifiers were applied. Sample TMMW01 (F50408-6) was analyzed analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 07/02/07 @18:31 on instrument ECD3, all criteria were met. No qualifiers were applied. Sample TMMW01 (F50408-6) was analyzed using this continuing calibration.

- For PCB 1016/1260 initial calibration verification performed on 06/27/07 @13:55 on instrument ECD7, all criteria were met. No qualifiers were applied. No samples reported were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 06/27/07 @15:37 on instrument ECD7, all criteria were met. No qualifiers were applied. Samples WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), IAAMW03 (F50408-9), BLAMW01 (F50408-10), and IAAMW02 (F50408-11) were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 06/27/07 @18:44 on instrument ECD7, all criteria were met. No qualifiers were applied. Samples WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 06/27/07 @22:07 on instrument ECD7, all criteria were met. No qualifiers were applied. Samples IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) were analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 06/28/07 @11:57 on instrument ECD7, all criteria were met. No qualifiers were applied. Sample TMMW01 (F50408-6) was re-analyzed using this continuing calibration.

- For PCB 1248 continuing calibration performed on 06/28/07 @12:14 on instrument ECD7, all criteria were met. No qualifiers were applied. Sample TMMW01 (F50408-6) was re-analyzed using this continuing calibration.

- For PCB 1242 continuing calibration performed on 06/28/07 @12:31 on instrument ECD7, all criteria were met. No qualifiers were applied. Sample TMMW01 (F50408-6) was re-analyzed using this continuing calibration.

- For PCB 1232/1268 continuing calibration performed on 06/28/07 @12:48 on instrument ECD7, all criteria were met. No qualifiers were applied. Sample TMMW01 (F50408-6) was re-analyzed using this continuing calibration.

- For PCB 1221/1254 continuing calibration performed on 06/28/07 @13:05 on instrument ECD7, all criteria were met. No qualifiers were applied. Sample TMMW01 (F50408-6) was re-analyzed using this continuing calibration.

- For PCB 1016/1260 continuing calibration performed on 06/28/07 @16:12 on instrument ECD7, all criteria were met. No qualifiers were applied. Sample TMMW01 (F50408-6) was re-analyzed using this continuing calibration.

V-Blank Analysis

The purpose of laboratory or field blank analyses is to determine the existence and magnitude of contamination problems resulting from laboratory or field activities. One method blank per analytical batch must be run on each instrument used to analyze samples. The DoD QSM criterion specifies all concentrations should be less than one-half MRL. Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤5 times (5X) the maximum amount for pesticide and PCB target compounds. **Table 2** summarizes the blank contamination analysis. Rinse blank 062007R (F50408-8) (low-flow pump) applies to all samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Parameter	Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
Pesticides	07/02/07	OP21163-MB	All <MRL	NA	NA	None
Pesticides	07/02/07	062007R	All <MRL	NA	NA	None
PCBs	06/27/07	OP21162-MB	All <MRL	NA	NA	None
PCBs	06/27/07	062707R	All <MRL	NA	NA	None

NA = Not Applicable
MRL = Method Reporting Limit

VI-System Monitoring Compound (Surrogates)

Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Surrogate spikes are added to all samples and blanks to measure their recovery in sample and blank matrices. The percent recoveries (%Rs) must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Criteria: Tetrachloro-m-xylene: Pesticides: 42-127%
Decachlorobiphenyl: Pesticides: 27-127%

Criteria: Tetrachloro-m-xylene: PCBs: 38-127%
Decachlorobiphenyl: PCBs: 25-137%

- For PCBs sample NBGMW02 (F50408-5), decachlorobiphenyl (34%) was below DoD QSM criteria and within laboratory criteria. Tetrachloro-m-xylene was within criteria. Since only one surrogate was outside criteria, no qualifiers were applied based upon this outlier.

- For pesticides sample TMMW01 (F50408-6), tetrachloro-m-xylene (16%) and decachlorobiphenyl (12%) were outside criteria. All detects were qualified "L" and non-detects "UL" based upon the low recoveries.

- For PCBs sample TMMW01 (F50408-6), tetrachloro-m-xylene (15%) and decachlorobiphenyl (14%) were outside criteria. All detects were qualified "L" and non-detects "UL" based upon the low recoveries.

- For all other samples, all criteria were met for pesticides and PCBs analysis.

VII-Laboratory Control Samples
Laboratory control samples (LCS) are used to monitor laboratory accuracy by calculating the percent recoveries of the spiked compounds. All LCS percent recoveries must be within the specified control limits. DoD LCS recovery limits are specified in Table D-14 and Table D-16 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP21163-BS was used as the LCS for the pesticide analysis on 07/02/07. Compound endrin aldehyde (14%) was outside DoD QSM criteria, however within laboratory criteria. Compound endrin aldehyde was non-detect for all associated samples and was qualified estimated bias "UL" for non-detects based upon very low recovery. Samples WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) apply to this LCS.

- Sample OP21162-BS was used as the LCS for the PCB analysis on 06/27/07. All criteria were met. No qualifiers were applied. Samples WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) apply to this LCS.

VIII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. DoD MS/MSD recovery limits follow the LCS criteria and are specified in Table D-14 and Table D-16 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample TMMW01 (F50408-6) was used as the MS/MSD for the pesticide analysis on 07/02/07. Compound endrin aldehyde (19%, 15%) was outside DoD QSM criteria, however within laboratory criteria. The LCS was also low in recovery (See Section VII). Compound endrin aldehyde was non-setect for all samples and qualified estimated bias low "UL" for non-detects for the spiked sample based upon very low recoveries. Samples WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) apply to this MS/MSD.

- Sample TMMW01 (F50408-6) was used as the MS/MSD for the PCB analysis on 06/27/07. All criteria were met. No qualifiers were applied. Samples WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) apply to this MS/MSD.

IX-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field groundwater sample duplicate pair NBGMW01 (F50408-4) and TMMW01 (F50408-6) was collected for pesticides and PCBs. All target compounds were non-detect. All criteria were met. No qualifiers were applied.

X-Quantitation Verification
The accuracy of analytical results was verified through the calculation of several parameters. The difference between the calculated value and the reported value must be within 10% difference. All positive values must have less than or equal to 40% %D between the primary and secondary columns. Any sample value >MDL and <MRL is qualified as estimated, "J". All criteria were met.

- All samples were non-detect for target pesticides and PCBs for all samples. All criteria were met. No qualifiers were applied.

Sample: TMMW01MS (F50408-6MS), alpha-chlordane

Conc.μg/L = (Amt * DF * Vt) / (CF * Vo)

where: Amt is the response on column (ng/mL) of the sample
CF = Calibration Factor (from initial calibration)
Vt is the volume of final extract (mL)
DF is the dilution factor
Vo is the volume of the sample extracted (mL)

Conc. μg/L = (8811199 ng/mL * 1 * 10 mL) / (163900 * 480 mL)
= 1.1 ng/mL = 1.1 μg/L

Reported Conc. = 1.1 μg/L
%D = 0.0%
Values were within 10% difference

Sample: **TMMW01MS (F50408-6MS), Aroclor 1260**

Conc. μg/L = (Ax * Vt * DF) / (CF * Vi * Vs)

where: Conc. = Sample concentration in μg/L
Ax = Area/response for compound being measured.
Vt = Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10000 μL.
CF = Ave calibration response factor for compound being measured from ICAL (Area/pg)
Vi = Volume of extract injected (μL).
Vs = Volume of sample extracted (L).
DF = Dilution factor

Signal #1
Conc1 μg/L = (1237751 * 10000* 1) / (3363 *(1000000) * 1 * 0.48) = 7.67 μg/L
Conc2 μg/L = (1460043 * 10000* 1) / (3986 *(1000000) * 1 * 0.48) = 7.63 μg/L
Conc3 μg/L = (1336275 * 10000* 1) / (3602 *(1000000) * 1 * 0.48) = 7.73 μg/L
Conc4 μg/L = (1059405 * 10000* 1) / (2951 *(1000000) * 1 * 0.48) = 7.48 μg/L
Conc5 μg/L = (2374363 * 10000* 1) / (6461 *(1000000) * 1 * 0.48) = 7.66 μg/L
Conc6 μg/L = (915851 * 10000* 1) / (2611 *(1000000) * 1 * 0.48) = 7.31 μg/L
Average concentration = 7.6 μg/L

Signal #2
Conc1 μg/L = (659180 * 10000* 1) / (1897 *(1000000) * 1 * 0.48) = 7.24 μg/L
Conc2 μg/L = (817171 * 10000* 1) / (2301 *(1000000) * 1 * 0.48) = 7.40 μg/L
Conc3 μg/L = (816694 * 10000* 1) / (2220 *(1000000) * 1 * 0.48) = 7.66 μg/L
Conc4 μg/L = (541901 * 10000* 1) / (1630 *(1000000) * 1 * 0.48) = 6.93 μg/L
Conc5 μg/L = (1383918 * 10000* 1) / (3896 *(1000000) * 1 * 0.48) = 7.40 μg/L
Conc6 μg/L = (534144 * 10000* 1) / (1520 *(1000000) * 1 * 0.48) = 7.32 μg/L
Average concentration = 7.3 μg/L

Reported Value = 7.3 μg/L (from signal #2)
% Difference = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥ MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

N (Metals) = Laboratory spike sample recovery not within control limits.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Raw Data: KK19986.D

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	WBGMW02		
Lab Sample ID:	F50408-2	Date Sampled:	06/18/07
Matrix:	AQ - Ground Water	Date Received:	06/19/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK19986.D	1	07/02/07	FS	06/25/07	OP21163	GKK736
Run #2							

	Initial Volume	Final Volume
Run #1	1040 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.048	0.019	ug/l	
319-84-6	alpha-BHC	ND	0.048	0.014	ug/l	
319-85-7	beta-BHC	ND	0.048	0.019	ug/l	
319-86-8	delta-BHC	ND	0.048	0.019	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.048	0.014	ug/l	
5103-71-9	alpha-Chlordane	ND	0.048	0.014	ug/l	
5103-74-2	gamma-Chlordane	ND	0.048	0.014	ug/l	
60-57-1	Dieldrin	ND	0.048	0.014	ug/l	
72-54-8	4,4'-DDD	ND	0.096	0.019	ug/l	
72-55-9	4,4'-DDE	ND	0.096	0.019	ug/l	
50-29-3	4,4'-DDT	ND	0.096	0.019	ug/l	
72-20-8	Endrin	ND	0.096	0.038	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.096	0.019	ug/l	
7421-93-4	Endrin aldehyde	ND VL	0.096	0.038	ug/l	
53494-70-5	Endrin ketone	ND	0.096	0.019	ug/l	
959-98-8	Endosulfan-I	ND	0.048	0.014	ug/l	
33213-65-9	Endosulfan-II	ND	0.096	0.019	ug/l	
76-44-8	Heptachlor	ND	0.048	0.019	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.048	0.014	ug/l	
72-43-5	Methoxychlor	ND	0.096	0.038	ug/l	
8001-35-2	Toxaphene	ND	2.4	1.2	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	82%		42-127%
2051-24-3	Decachlorobiphenyl	84%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX021012.D

Form I only

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	WBGMW02		
Lab Sample ID:	F50408-2	Date Sampled:	06/18/07
Matrix:	AQ - Ground Water	Date Received:	06/19/07
Method:	SW846 8082 SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX021012.D	1	06/27/07	AC	06/25/07	OP21162	GXX163
Run #2							

	Initial Volume	Final Volume
Run #1	1040 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	0.48	0.24	ug/l	
11104-28-2	Aroclor 1221	ND	0.48	0.38	ug/l	
11141-16-5	Aroclor 1232	ND	0.48	0.38	ug/l	
53469-21-9	Aroclor 1242	ND	0.48	0.24	ug/l	
12672-29-6	Aroclor 1248	ND	0.48	0.24	ug/l	
11097-69-1	Aroclor 1254	ND	0.48	0.24	ug/l	
11096-82-5	Aroclor 1260	ND	0.48	0.24	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	82%		38-127%
2051-24-3	Decachlorobiphenyl	83%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK19987.D

Form I Cont

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	WBGMW03		
Lab Sample ID:	F50408-3	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK19987.D	1	07/02/07	FS	06/25/07	OP21163	GKK736
Run #2							

	Initial Volume	Final Volume
Run #1	980 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.051	0.020	ug/l	
319-84-6	alpha-BHC	ND	0.051	0.015	ug/l	
319-85-7	beta-BHC	ND	0.051	0.020	ug/l	
319-86-8	delta-BHC	ND	0.051	0.020	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.051	0.015	ug/l	
5103-71-9	alpha-Chlordane	ND	0.051	0.015	ug/l	
5103-74-2	gamma-Chlordane	ND	0.051	0.015	ug/l	
60-57-1	Dieldrin	ND	0.051	0.015	ug/l	
72-54-8	4,4'-DDD	ND	0.10	0.020	ug/l	
72-55-9	4,4'-DDE	ND	0.10	0.020	ug/l	
50-29-3	4,4'-DDT	ND	0.10	0.020	ug/l	
72-20-8	Endrin	ND	0.10	0.041	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.10	0.020	ug/l	
7421-93-4	Endrin aldehyde	ND VL	0.10	0.041	ug/l	
53494-70-5	Endrin ketone	ND	0.10	0.020	ug/l	
959-98-8	Endosulfan-I	ND	0.051	0.015	ug/l	
33213-65-9	Endosulfan-II	ND	0.10	0.020	ug/l	
76-44-8	Heptachlor	ND	0.051	0.020	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.051	0.015	ug/l	
72-43-5	Methoxychlor	ND	0.10	0.041	ug/l	
8001-35-2	Toxaphene	ND	2.6	1.3	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	82%		42-127%
2051-24-3	Decachlorobiphenyl	84%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX021013.D

Form I Copy

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	WBGMW03		
Lab Sample ID:	F50408-3	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8082 SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX021013.D	1	06/27/07	AC	06/25/07	OP21162	GXX163
Run #2							

	Initial Volume	Final Volume
Run #1	980 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	0.51	0.26	ug/l	
11104-28-2	Aroclor 1221	ND	0.51	0.41	ug/l	
11141-16-5	Aroclor 1232	ND	0.51	0.41	ug/l	
53469-21-9	Aroclor 1242	ND	0.51	0.26	ug/l	
12672-29-6	Aroclor 1248	ND	0.51	0.26	ug/l	
11097-69-1	Aroclor 1254	ND	0.51	0.26	ug/l	
11096-82-5	Aroclor 1260	ND	0.51	0.26	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	88%		38-127%
2051-24-3	Decachlorobiphenyl	83%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK19988.D

Form I copy

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	NBGMW01		
Lab Sample ID:	F50408-4	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK19988.D	1	07/02/07	FS	06/25/07	OP21163	GKK736
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.050	0.020	ug/l	
319-84-6	alpha-BHC	ND	0.050	0.015	ug/l	
319-85-7	beta-BHC	ND	0.050	0.020	ug/l	
319-86-8	delta-BHC	ND	0.050	0.020	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.050	0.015	ug/l	
5103-71-9	alpha-Chlordane	ND	0.050	0.015	ug/l	
5103-74-2	gamma-Chlordane	ND	0.050	0.015	ug/l	
60-57-1	Dieldrin	ND	0.050	0.015	ug/l	
72-54-8	4,4'-DDD	ND	0.10	0.020	ug/l	
72-55-9	4,4'-DDE	ND	0.10	0.020	ug/l	
50-29-3	4,4'-DDT	ND	0.10	0.020	ug/l	
72-20-8	Endrin	ND	0.10	0.040	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.10	0.020	ug/l	
7421-93-4	Endrin aldehyde	ND UL	0.10	0.040	ug/l	
53494-70-5	Endrin ketone	ND	0.10	0.020	ug/l	
959-98-8	Endosulfan-I	ND	0.050	0.015	ug/l	
33213-65-9	Endosulfan-II	ND	0.10	0.020	ug/l	
76-44-8	Heptachlor	ND	0.050	0.020	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.050	0.015	ug/l	
72-43-5	Methoxychlor	ND	0.10	0.040	ug/l	
8001-35-2	Toxaphene	ND	2.5	1.3	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	83%		42-127%
2051-24-3	Decachlorobiphenyl	64%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX021014.D

Form 1 Copy

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	NBGMW01		
Lab Sample ID:	F50408-4	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8082 SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX021014.D	1	06/27/07	AC	06/25/07	OP21162	GXX163
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	0.50	0.25	ug/l	
11104-28-2	Aroclor 1221	ND	0.50	0.40	ug/l	
11141-16-5	Aroclor 1232	ND	0.50	0.40	ug/l	
53469-21-9	Aroclor 1242	ND	0.50	0.25	ug/l	
12672-29-6	Aroclor 1248	ND	0.50	0.25	ug/l	
11097-69-1	Aroclor 1254	ND	0.50	0.25	ug/l	
11096-82-5	Aroclor 1260	ND	0.50	0.25	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	82%		38-127%
2051-24-3	Decachlorobiphenyl	62%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK19989.D

Form I Copy

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	NBGMW02		
Lab Sample ID:	F50408-5	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK19989.D	1	07/02/07	FS	06/25/07	OP21163	GKK736
Run #2							

	Initial Volume	Final Volume
Run #1	950 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.053	0.021	ug/l	
319-84-6	alpha-BHC	ND	0.053	0.016	ug/l	
319-85-7	beta-BHC	ND	0.053	0.021	ug/l	
319-86-8	delta-BHC	ND	0.053	0.021	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.053	0.016	ug/l	
5103-71-9	alpha-Chlordane	ND	0.053	0.016	ug/l	
5103-74-2	gamma-Chlordane	ND	0.053	0.016	ug/l	
60-57-1	Dieldrin	ND	0.053	0.016	ug/l	
72-54-8	4,4'-DDD	ND	0.11	0.021	ug/l	
72-55-9	4,4'-DDE	ND	0.11	0.021	ug/l	
50-29-3	4,4'-DDT	ND	0.11	0.021	ug/l	
72-20-8	Endrin	ND	0.11	0.042	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.11	0.021	ug/l	
7421-93-4	Endrin aldehyde	ND UL	0.11	0.042	ug/l	
53494-70-5	Endrin ketone	ND	0.11	0.021	ug/l	
959-98-8	Endosulfan-I	ND	0.053	0.016	ug/l	
33213-65-9	Endosulfan-II	ND	0.11	0.021	ug/l	
76-44-8	Heptachlor	ND	0.053	0.021	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.053	0.016	ug/l	
72-43-5	Methoxychlor	ND	0.11	0.042	ug/l	
8001-35-2	Toxaphene	ND	2.6	1.3	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	79%		42-127%
2051-24-3	Decachlorobiphenyl	36%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX021015.D

Form I Copy

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	NBGMW02		
Lab Sample ID:	F50408-5	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8082 SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX021015.D	1	06/27/07	AC	06/25/07	OP21162	GXX163
Run #2							

	Initial Volume	Final Volume
Run #1	950 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	0.53	0.26	ug/l	
11104-28-2	Aroclor 1221	ND	0.53	0.42	ug/l	
11141-16-5	Aroclor 1232	ND	0.53	0.42	ug/l	
53469-21-9	Aroclor 1242	ND	0.53	0.26	ug/l	
12672-29-6	Aroclor 1248	ND	0.53	0.26	ug/l	
11097-69-1	Aroclor 1254	ND	0.53	0.26	ug/l	
11096-82-5	Aroclor 1260	ND	0.53	0.26	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	77%		38-127%
2051-24-3	Decachlorobiphenyl	34%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK20036.D TT07634.D

For I Corn

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	TMMW01		
Lab Sample ID:	F50408-6	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8081A SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK20036.D	1	07/03/07	FS	06/25/07	OP21163	GKK737
Run #2 [a]	TT07634.D	1	07/07/07	FS	07/06/07	OP21350	GTT262

	Initial Volume	Final Volume
Run #1	950 ml	10.0 ml
Run #2	1000 ml	10.0 ml

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND VL	0.053	0.021	ug/l	
319-84-6	alpha-BHC	ND VL	0.053	0.016	ug/l	
319-85-7	beta-BHC	ND VL	0.053	0.021	ug/l	
319-86-8	delta-BHC	ND VL	0.053	0.021	ug/l	
58-89-9	gamma-BHC (Lindane)	ND VL	0.053	0.016	ug/l	
5103-71-9	alpha-Chlordane	ND VL	0.053	0.016	ug/l	
5103-74-2	gamma-Chlordane	ND VL	0.053	0.016	ug/l	
60-57-1	Dieldrin	ND VL	0.053	0.016	ug/l	
72-54-8	4,4'-DDD	ND VL	0.11	0.021	ug/l	
72-55-9	4,4'-DDE	ND VL	0.11	0.021	ug/l	
50-29-3	4,4'-DDT	ND VL	0.11	0.021	ug/l	
72-20-8	Endrin	ND VL	0.11	0.042	ug/l	
1031-07-8	Endosulfan sulfate	ND VL	0.11	0.021	ug/l	
7421-93-4	Endrin aldehyde	ND VL	0.11	0.042	ug/l	
53494-70-5	Endrin ketone	ND VL	0.11	0.021	ug/l	
959-98-8	Endosulfan-I	ND VL	0.053	0.016	ug/l	
33213-65-9	Endosulfan-II	ND VL	0.11	0.021	ug/l	
76-44-8	Heptachlor	ND VL	0.053	0.021	ug/l	
1024-57-3	Heptachlor epoxide	ND VL	0.053	0.016	ug/l	
72-43-5	Methoxychlor	ND VL	0.11	0.042	ug/l	
8001-35-2	Toxaphene	ND VL	2.6	1.3	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	16%	87%	42-127%
2051-24-3	Decachlorobiphenyl	12%	85%	27-127%

(a) Confirmed ND by re-extraction and reanalysis beyond holdtime.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX021046.D ST62814.D

Form I Copy

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	TMMW01		
Lab Sample ID:	F50408-6	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8082 SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	XX021046.D	1	06/28/07	AC	06/25/07	OP21162	GXX164
Run #2 [b]	ST62814.D	1	07/02/07	JB	06/30/07	OP21265	GST1677

	Initial Volume	Final Volume
Run #1	950 ml	10.0 ml
Run #2	1000 ml	10.0 ml

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND UL	0.53	0.26	ug/l	
11104-28-2	Aroclor 1221	ND UL	0.53	0.42	ug/l	
11141-16-5	Aroclor 1232	ND UL	0.53	0.42	ug/l	
53469-21-9	Aroclor 1242	ND UL	0.53	0.26	ug/l	
12672-29-6	Aroclor 1248	ND UL	0.53	0.26	ug/l	
11097-69-1	Aroclor 1254	ND UL	0.53	0.26	ug/l	
11096-82-5	Aroclor 1260	ND UL	0.53	0.26	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	15%	85%	38-127%
2051-24-3	Decachlorobiphenyl	14%	62%	25-137%

(a) Confirmed ND by re-extraction and reanalysis beyond holdtime.
(b) Confirmation run.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK19993.D

Form I Com

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	062007R		
Lab Sample ID:	F50408-8	Date Sampled:	06/20/07
Matrix:	AQ - Equipment Blank	Date Received:	06/21/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK19993.D	1	07/02/07	FS	06/25/07	OP21163	GKK736
Run #2							

	Initial Volume	Final Volume
Run #1	940 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.053	0.021	ug/l	
319-84-6	alpha-BHC	ND	0.053	0.016	ug/l	
319-85-7	beta-BHC	ND	0.053	0.021	ug/l	
319-86-8	delta-BHC	ND	0.053	0.021	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.053	0.016	ug/l	
5103-71-9	alpha-Chlordane	ND	0.053	0.016	ug/l	
5103-74-2	gamma-Chlordane	ND	0.053	0.016	ug/l	
60-57-1	Dieldrin	ND	0.053	0.016	ug/l	
72-54-8	4,4'-DDD	ND	0.11	0.021	ug/l	
72-55-9	4,4'-DDE	ND	0.11	0.021	ug/l	
50-29-3	4,4'-DDT	ND	0.11	0.021	ug/l	
72-20-8	Endrin	ND	0.11	0.043	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.11	0.021	ug/l	
7421-93-4	Endrin aldehyde	ND	0.11	0.043	ug/l	
53494-70-5	Endrin ketone	ND	0.11	0.021	ug/l	
959-98-8	Endosulfan-I	ND	0.053	0.016	ug/l	
33213-65-9	Endosulfan-II	ND	0.11	0.021	ug/l	
76-44-8	Heptachlor	ND	0.053	0.021	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.053	0.016	ug/l	
72-43-5	Methoxychlor	ND	0.11	0.043	ug/l	
8001-35-2	Toxaphene	ND	2.7	1.3	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	79%		42-127%
2051-24-3	Decachlorobiphenyl	61%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX021017.D

Form I COR

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	062007R		
Lab Sample ID:	F50408-8	Date Sampled:	06/20/07
Matrix:	AQ - Equipment Blank	Date Received:	06/21/07
Method:	SW846 8082 SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX021017.D	1	06/27/07	AC	06/25/07	OP21162	GXX163
Run #2							

	Initial Volume	Final Volume
Run #1	940 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	0.53	0.27	ug/l	
11104-28-2	Aroclor 1221	ND	0.53	0.43	ug/l	
11141-16-5	Aroclor 1232	ND	0.53	0.43	ug/l	
53469-21-9	Aroclor 1242	ND	0.53	0.27	ug/l	
12672-29-6	Aroclor 1248	ND	0.53	0.27	ug/l	
11097-69-1	Aroclor 1254	ND	0.53	0.27	ug/l	
11096-82-5	Aroclor 1260	ND	0.53	0.27	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	81%		38-127%
2051-24-3	Decachlorobiphenyl	60%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK19996.D

Form I Carry

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	IAAMW03		
Lab Sample ID:	F50408-9	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK19996.D	1	07/02/07	FS	06/25/07	OP21163	GKK736
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.050	0.020	ug/l	
319-84-6	alpha-BHC	ND	0.050	0.015	ug/l	
319-85-7	beta-BHC	ND	0.050	0.020	ug/l	
319-86-8	delta-BHC	ND	0.050	0.020	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.050	0.015	ug/l	
5103-71-9	alpha-Chlordane	ND	0.050	0.015	ug/l	
5103-74-2	gamma-Chlordane	ND	0.050	0.015	ug/l	
60-57-1	Dieldrin	ND	0.050	0.015	ug/l	
72-54-8	4,4'-DDD	ND	0.10	0.020	ug/l	
72-55-9	4,4'-DDE	ND	0.10	0.020	ug/l	
50-29-3	4,4'-DDT	ND	0.10	0.020	ug/l	
72-20-8	Endrin	ND	0.10	0.040	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.10	0.020	ug/l	
7421-93-4	Endrin aldehyde	ND UL	0.10	0.040	ug/l	
53494-70-5	Endrin ketone	ND	0.10	0.020	ug/l	
959-98-8	Endosulfan-I	ND	0.050	0.015	ug/l	
33213-65-9	Endosulfan-II	ND	0.10	0.020	ug/l	
76-44-8	Heptachlor	ND	0.050	0.020	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.050	0.015	ug/l	
72-43-5	Methoxychlor	ND	0.10	0.040	ug/l	
8001-35-2	Toxaphene	ND	2.5	1.3	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	89%		42-127%
2051-24-3	Decachlorobiphenyl	64%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX021018.D

Form I Com

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	IAAMW03		
Lab Sample ID:	F50408-9	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8082 SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX021018.D	1	06/27/07	AC	06/25/07	OP21162	GXX163
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	0.50	0.25	ug/l	
11104-28-2	Aroclor 1221	ND	0.50	0.40	ug/l	
11141-16-5	Aroclor 1232	ND	0.50	0.40	ug/l	
53469-21-9	Aroclor 1242	ND	0.50	0.25	ug/l	
12672-29-6	Aroclor 1248	ND	0.50	0.25	ug/l	
11097-69-1	Aroclor 1254	ND	0.50	0.25	ug/l	
11096-82-5	Aroclor 1260	ND	0.50	0.25	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	90%		38-127%
2051-24-3	Decachlorobiphenyl	61%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK19997.D

Form I Com

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	BLAMW01		
Lab Sample ID:	F50408-10	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK19997.D	1	07/02/07	FS	06/25/07	OP21163	GKK736
Run #2							

	Initial Volume	Final Volume
Run #1	950 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.053	0.021	ug/l	
319-84-6	alpha-BHC	ND	0.053	0.016	ug/l	
319-85-7	beta-BHC	ND	0.053	0.021	ug/l	
319-86-8	delta-BHC	ND	0.053	0.021	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.053	0.016	ug/l	
5103-71-9	alpha-Chlordane	ND	0.053	0.016	ug/l	
5103-74-2	gamma-Chlordane	ND	0.053	0.016	ug/l	
60-57-1	Dieldrin	ND	0.053	0.016	ug/l	
72-54-8	4,4'-DDD	ND	0.11	0.021	ug/l	
72-55-9	4,4'-DDE	ND	0.11	0.021	ug/l	
50-29-3	4,4'-DDT	ND	0.11	0.021	ug/l	
72-20-8	Endrin	ND	0.11	0.042	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.11	0.021	ug/l	
7421-93-4	Endrin aldehyde	ND VL	0.11	0.042	ug/l	
53494-70-5	Endrin ketone	ND	0.11	0.021	ug/l	
959-98-8	Endosulfan-I	ND	0.053	0.016	ug/l	
33213-65-9	Endosulfan-II	ND	0.11	0.021	ug/l	
76-44-8	Heptachlor	ND	0.053	0.021	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.053	0.016	ug/l	
72-43-5	Methoxychlor	ND	0.11	0.042	ug/l	
8001-35-2	Toxaphene	ND	2.6	1.3	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	91%		42-127%
2051-24-3	Decachlorobiphenyl	95%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX021019.D

Form I Copy

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	BLAMW01		
Lab Sample ID:	F50408-10	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8082 SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX021019.D	1	06/27/07	AC	06/25/07	OP21162	GXX163
Run #2							

	Initial Volume	Final Volume
Run #1	950 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	0.53	0.26	ug/l	
11104-28-2	Aroclor 1221	ND	0.53	0.42	ug/l	
11141-16-5	Aroclor 1232	ND	0.53	0.42	ug/l	
53469-21-9	Aroclor 1242	ND	0.53	0.26	ug/l	
12672-29-6	Aroclor 1248	ND	0.53	0.26	ug/l	
11097-69-1	Aroclor 1254	ND	0.53	0.26	ug/l	
11096-82-5	Aroclor 1260	ND	0.53	0.26	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	90%		38-127%
2051-24-3	Decachlorobiphenyl	90%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK19998.D

Form I copy

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	IAAMW02		
Lab Sample ID:	F50408-11	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK19998.D	1	07/02/07	FS	06/25/07	OP21163	GKK736
Run #2							

	Initial Volume	Final Volume
Run #1	980 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.051	0.020	ug/l	
319-84-6	alpha-BHC	ND	0.051	0.015	ug/l	
319-85-7	beta-BHC	ND	0.051	0.020	ug/l	
319-86-8	delta-BHC	ND	0.051	0.020	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.051	0.015	ug/l	
5103-71-9	alpha-Chlordane	ND	0.051	0.015	ug/l	
5103-74-2	gamma-Chlordane	ND	0.051	0.015	ug/l	
60-57-1	Dieldrin	ND	0.051	0.015	ug/l	
72-54-8	4,4'-DDD	ND	0.10	0.020	ug/l	
72-55-9	4,4'-DDE	ND	0.10	0.020	ug/l	
50-29-3	4,4'-DDT	ND	0.10	0.020	ug/l	
72-20-8	Endrin	ND	0.10	0.041	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.10	0.020	ug/l	
7421-93-4	Endrin aldehyde	ND VL	0.10	0.041	ug/l	
53494-70-5	Endrin ketone	ND	0.10	0.020	ug/l	
959-98-8	Endosulfan-I	ND	0.051	0.015	ug/l	
33213-65-9	Endosulfan-II	ND	0.10	0.020	ug/l	
76-44-8	Heptachlor	ND	0.051	0.020	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.051	0.015	ug/l	
72-43-5	Methoxychlor	ND	0.10	0.041	ug/l	
8001-35-2	Toxaphene	ND	2.6	1.3	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	90%		42-127%
2051-24-3	Decachlorobiphenyl	98%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX021022.D

Form I Copy

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	IAAMW02		
Lab Sample ID:	F50408-11	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8082 SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX021022.D	1	06/27/07	AC	06/25/07	OP21162	GXX163
Run #2							

	Initial Volume	Final Volume
Run #1	980 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	0.51	0.26	ug/l	
11104-28-2	Aroclor 1221	ND	0.51	0.41	ug/l	
11141-16-5	Aroclor 1232	ND	0.51	0.41	ug/l	
53469-21-9	Aroclor 1242	ND	0.51	0.26	ug/l	
12672-29-6	Aroclor 1248	ND	0.51	0.26	ug/l	
11097-69-1	Aroclor 1254	ND	0.51	0.26	ug/l	
11096-82-5	Aroclor 1260	ND	0.51	0.26	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	86%		38-127%
2051-24-3	Decachlorobiphenyl	95%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK19999.D

For I Corp

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	IAAMW04		
Lab Sample ID:	F50408-14	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK19999.D	1	07/02/07	FS	06/25/07	OP21163	GKK736
Run #2							

	Initial Volume	Final Volume
Run #1	940 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.053	0.021	ug/l	
319-84-6	alpha-BHC	ND	0.053	0.016	ug/l	
319-85-7	beta-BHC	ND	0.053	0.021	ug/l	
319-86-8	delta-BHC	ND	0.053	0.021	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.053	0.016	ug/l	
5103-71-9	alpha-Chlordane	ND	0.053	0.016	ug/l	
5103-74-2	gamma-Chlordane	ND	0.053	0.016	ug/l	
60-57-1	Dieldrin	ND	0.053	0.016	ug/l	
72-54-8	4,4'-DDD	ND	0.11	0.021	ug/l	
72-55-9	4,4'-DDE	ND	0.11	0.021	ug/l	
50-29-3	4,4'-DDT	ND	0.11	0.021	ug/l	
72-20-8	Endrin	ND	0.11	0.043	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.11	0.021	ug/l	
7421-93-4	Endrin aldehyde	ND VL	0.11	0.043	ug/l	
53494-70-5	Endrin ketone	ND	0.11	0.021	ug/l	
959-98-8	Endosulfan-I	ND	0.053	0.016	ug/l	
33213-65-9	Endosulfan-II	ND	0.11	0.021	ug/l	
76-44-8	Heptachlor	ND	0.053	0.021	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.053	0.016	ug/l	
72-43-5	Methoxychlor	ND	0.11	0.043	ug/l	
8001-35-2	Toxaphene	ND	2.7	1.3	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	88%		42-127%
2051-24-3	Decachlorobiphenyl	42%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX021025.D

Form I Org

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	IAAMW04		
Lab Sample ID:	F50408-14	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
Method:	SW846 8082 SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX021025.D	1	06/27/07	AC	06/25/07	OP21162	GXX163
Run #2							

	Initial Volume	Final Volume
Run #1	940 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	0.53	0.27	ug/l	
11104-28-2	Aroclor 1221	ND	0.53	0.43	ug/l	
11141-16-5	Aroclor 1232	ND	0.53	0.43	ug/l	
53469-21-9	Aroclor 1242	ND	0.53	0.27	ug/l	
12672-29-6	Aroclor 1248	ND	0.53	0.27	ug/l	
11097-69-1	Aroclor 1254	ND	0.53	0.27	ug/l	
11096-82-5	Aroclor 1260	ND	0.53	0.27	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	90%		38-127%
2051-24-3	Decachlorobiphenyl	40%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: KK20000.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	BLAMW02		
Lab Sample ID:	F50408-17	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
Method:	SW846 8081A SW846 3550B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	KK20000.D	1	07/02/07	FS	06/25/07	OP21163	GKK736
Run #2							

	Initial Volume	Final Volume
Run #1	940 ml	10.0 ml
Run #2		

Pesticide TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	0.053	0.021	ug/l	
319-84-6	alpha-BHC	ND	0.053	0.016	ug/l	
319-85-7	beta-BHC	ND	0.053	0.021	ug/l	
319-86-8	delta-BHC	ND	0.053	0.021	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.053	0.016	ug/l	
5103-71-9	alpha-Chlordane	ND	0.053	0.016	ug/l	
5103-74-2	gamma-Chlordane	ND	0.053	0.016	ug/l	
60-57-1	Dieldrin	ND	0.053	0.016	ug/l	
72-54-8	4,4'-DDD	ND	0.11	0.021	ug/l	
72-55-9	4,4'-DDE	ND	0.11	0.021	ug/l	
50-29-3	4,4'-DDT	ND	0.11	0.021	ug/l	
72-20-8	Endrin	ND	0.11	0.043	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.11	0.021	ug/l	
7421-93-4	Endrin aldehyde	ND VL	0.11	0.043	ug/l	
53494-70-5	Endrin ketone	ND	0.11	0.021	ug/l	
959-98-8	Endosulfan-I	ND	0.053	0.016	ug/l	
33213-65-9	Endosulfan-II	ND	0.11	0.021	ug/l	
76-44-8	Heptachlor	ND	0.053	0.021	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.053	0.016	ug/l	
72-43-5	Methoxychlor	ND	0.11	0.043	ug/l	
8001-35-2	Toxaphene	ND	2.7	1.3	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	76%		42-127%
2051-24-3	Decachlorobiphenyl	59%		27-127%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: XX021026.D

For I Corp

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	BLAMW02		
Lab Sample ID:	F50408-17	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
Method:	SW846 8082 SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX021026.D	1	06/27/07	AC	06/25/07	OP21162	GXX163
Run #2							

	Initial Volume	Final Volume
Run #1	940 ml	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	0.53	0.27	ug/l	
11104-28-2	Aroclor 1221	ND	0.53	0.43	ug/l	
11141-16-5	Aroclor 1232	ND	0.53	0.43	ug/l	
53469-21-9	Aroclor 1242	ND	0.53	0.27	ug/l	
12672-29-6	Aroclor 1248	ND	0.53	0.27	ug/l	
11097-69-1	Aroclor 1254	ND	0.53	0.27	ug/l	
11096-82-5	Aroclor 1260	ND	0.53	0.27	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	78%		38-127%
2051-24-3	Decachlorobiphenyl	56%		25-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Shaw Environmental, Inc.
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Edgewood, Maryland
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Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation – Semi-Volatiles & Polynuclear Aromatic Hydrocarbons Accutest Laboratories, Inc., SDG F50408

DATE: August 14, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at New River Unit (NRU) Groundwater Investigation at RFAAP on June 18, 2007, June 19, 2007, June 20, 2007, and June 21, 2007. Samples were analyzed for semivolatile organic compounds (SVOCs) using USEPA SW846 Methods 3510C/8270C. The polynuclear aromatic hydrocarbons (PAHs) were analyzed using selective ion monitoring (SIM) techniques. A total of eleven aqueous samples were validated. The sample Ids are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
WBGMW01	F50408-1	IAAMW03	F50408-9
WBGMW02	F50408-2	BLAMW01	F50408-10
WBGMW03	F50408-3	IAAMW02	F50408-11
NBGMW01	F50408-4	IAAMW04	F50408-14
NBGMW02	F50408-5	BLAMW02	F50408-17
TMMW01	F50408-6		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Instrument Performance Check
	X	Initial Calibration
	X	Continuing Calibration
	X	Blank Analysis
	X	Surrogate Spikes
	X	Internal Standards
	X	Laboratory Control Sample
	X	Matrix Spike/Spike Duplicate
	X	Field Duplicate
	X	Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable.

Eric Malarek, Chemist

8/14/07
Date

RFAAP VALIDATION REPORT
SEMIVOLATILES AND PAH REVIEW
SDG F50408

I-Holding Times and Preservation
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample extraction and analysis. Holding time criteria: For semivolatile (SVOC) and polynuclear aromatic hydrocarbons (PAH) compounds is cooled (@4°C ± 2°C) for aqueous samples, the maximum holding time is 7 days from sample collection to preparative extraction and 40 days from preparative extraction to determinative analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 06/18/07, 06/19/07, 06/20/07, and 06/21/07, the coolers were received by the primary laboratory (Accutest) on 06/22/06 at 1.0°C, 1.2°C, 1.8°C, 2.0°C, 1.4°C, and 1.0°C. The herbicides were subcontracted to Accutest TX and were received the samples at 1.4°C, 3.0°C, 2.2°C, and 3.4°C. The TOX were subcontracted to Accutest NJ and were received at 3.6°C, 4.8°C, and 2.8°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the samples at 5.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 4.8°C, 4.5°C, 5.8°C, 3.2°C, and 1.4°C. Even though several of the temperatures were below criteria, there were no impacts regarding the sample analysis. No qualifiers were applied based upon these outliers.

- Holding Time Review: The aqueous samples were collected on 06/18/07, 06/19/07, 06/20/07, and 06/21/07. For samples collected 06/18/07 and 06/19/07, the SVOCs were extracted on 06/21/07 and analyzed on 07/05/07. For samples collected 06/18/07 and 06/19/07, the PAHs by SIM were extracted on 06/21/07 and analyzed on 07/03/07. For samples collected 06/20/07 and 06/21/07, the SVOCs were extracted on 06/27/07 and analyzed on 07/06/07. For samples collected 06/20/07 and 06/21/07, the PAHs by SIM were extracted on 06/27/07 and analyzed on 07/03/07. Sample collection dates may be found on the attached form 1s. All criteria were met. No qualifiers were applied.

II-Instrument Performance Check
GC/MS instrument performance checks are performed to ensure mass resolution, identification and, to some degree, sensitivity. The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, decafluorotriphenylphosphine (DFTPP), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for compounds on the semivolatile target compound list (TCL). Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.995 and coefficients of determination >0.99. The minimum relative response factor (RRF) criteria must be ≥0.05. The DoD QSM specifies that the initial calibration percent relative standard deviation (%RSD) must be ≤15% on the average for all compounds (<30% for CCCs). All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- Initial calibration for the SVOCs was performed on 07/05/07 on instrument MSBNA02. Target compounds 2,4-dinitrophenol (19.7%) and 4,6-dinitro-2-methylphenol (25.9%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds 2,4-dinitrophenol (r=0.9950) and 4,6-dinitro-2-methylphenol (r=0.9975) were quantified using linear or second order regression with correlation coefficients >0.995, therefore, no qualifiers were applied based upon the high %RSDs. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6) were analyzed using this initial calibration.

- Initial calibration for the SVOCs was performed on 07/05/07 on instrument MSBNA03. Target compounds hexachlorocyclopentadiene (33.8%; grossly exceeding), 2,4-dinitrophenol (40.3%; grossly exceeding), 4,6-dinitro-2-methylphenol (20.8%), and pentachlorophenol (19.4%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds hexachlorocyclopentadiene (r=0.9992), 2,4-dinitrophenol (r=0.9985), 4,6-dinitro-2-methylphenol (r=0.9989), and pentachlorophenol (r=0.9961) were quantified using linear or second order regression with correlation coefficients >0.995, therefore, no qualifiers were applied based upon the high %RSDs. Samples IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) were analyzed using this initial calibration.

- Initial calibration for the PAHs by SIM was performed on 07/02/07 on instrument MSBNA01. Target compound indeno(1,2,3-cd)pyrene (18.3%) was outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compound indeno(1,2,3-cd)pyrene (r=0.9986) was quantified using linear regression with correlation coefficients >0.995, therefore, no qualifiers were applied based upon the high %RSD. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) were analyzed using this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used was capable of producing acceptable qualitative and quantitative data for semivolatile target compounds. Continuing calibration standards containing both target and surrogates compounds are analyzed at the beginning of each 12-hour analysis period following the analysis of the instrument performance check and prior to the analysis of blanks and samples. The minimum relative response factors (RRF) for semivolatile target compounds and surrogates must be ≥0.05. The DoD QSM specifies that the percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within ±20% for all target compounds. Grossly exceeding is defined where %D>40%. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For SVOC initial calibration verification performed on 07/05/07 @15:27 on instrument MSBNA02, 3-nitroaniline (26.0%) was outside criteria limits. For all other target compounds, all criteria were met. All samples were non-detect for 3-nitroaniline. No qualifiers were applied. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), and TMMW01 (F50408-6) apply to this initial calibration verification.

- For SVOC initial calibration verification performed on 07/05/07 @15:55 on instrument MSBNA02, all criteria were met for all target compounds. No qualifiers were applied. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), and TMMW01 (F50408-6) apply to this initial calibration verification.

- For SVOC continuing calibration performed on 07/06/07 @13:39 on instrument MSBNA02, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

- For SVOC initial calibration verification performed on 07/05/07 @14:46 on instrument MSBNA03, 4-chloroaniline (31.7%) and 3-nitroaniline (34.4%) were outside criteria limits. For all other target compounds, all criteria were met. All samples were non-detect for 4-chloroaniline and 3-nitroaniline. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For SVOC initial calibration verification performed on 07/05/07 @15:17 on instrument MSBNA03, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For SVOC continuing calibration performed on 07/06/07 @10:11 on instrument MSBNA03, all criteria were met for all target compounds. No qualifiers were applied. Samples IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) apply to this continuing calibration.

- For PAH by SIM initial calibration verification performed on 07/02/07 @19:59 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this initial calibration verification.

- For PAH by SIM continuing calibration performed on 07/03/07 @12:39 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) apply to this continuing calibration.

- For PAH by SIM continuing calibration performed on 07/05/07 @10:38 on instrument MSBNA01, all criteria were met for all target compounds. No qualifiers were applied. No samples reported apply to this continuing calibration.

V-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. A method blank analysis must be performed after the calibration standards and once every 12-hour time period beginning with the injection of DFTPP. No contaminants should be detected in any of the associated blanks > the MDL. DoD QSM criteria specifies all concentrations should be less than one-half MRL (<MRL for common laboratory contaminants phthalate esters). Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤10 times (10x) the maximum amount in any blank for the common laboratory contaminants phthalate esters, or 5 times (5X) the maximum amount for other semivolatile target compounds. **Table 2** summarizes the blank contamination analysis. Rinse blank 062007R (F50408-8) (low-flow pump) applies to all samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
07/05/07	OP21127-MB	All SVOC target <½MRL	NA	NA	None
07/06/07	OP21127-MB	All SVOC target <½MRL	NA	NA	None
07/06/07	OP21207-MB	All SVOC target <½MRL	NA	NA	None
07/03/07	OP21128-MB	All PAH SIM target <½MRL	NA	NA	None
07/03/07	OP21206-MB	All PAH SIM target <½MRL	NA	NA	None
07/05/07	OP21206-MB	All PAH SIM target <½MRL	NA	NA	None
07/03/07	062007R	All SVOC target <½MRL	NA	NA	None
07/06/07	062007R	All PAH SIM target <½MRL	NA	NA	None

NA = Not applicable.
MRL = Method reporting limit.

VI-Surrogate Spikes
Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Surrogate spikes are added to all samples and blanks to measure their recovery in sample and blank matrices. The percent recoveries (%Rs) must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Criteria:
2-Fluorophenol (14-62%) – S1
Phenol – d5 (10-40%) – S2
2,4,6-Tribromophenol (33-118%) – S3
Nitrobenzene-d5 (42-108%) – S4
2-Fluorobiphenyl (40-106%) – S5
p-Terphenyl – d14 (39-121%) – S6

- For all field samples, all surrogates were within criteria limits. No qualifiers were applied.

VII-Internal Standards
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Internal standard area counts for samples and blanks must not vary by more than a factor of two (-50% to +100%) from the associated calibration standard. The retention time of the internal standards in samples and blanks must not vary by more than ±30 seconds from the retention time of the associated calibration standard.

- All criteria were met. No qualifiers were applied.

VIII-Laboratory Control Sample
Laboratory control samples (LCS) are used to monitor laboratory accuracy by calculating the percent recoveries of the spiked compounds. All LCS percent recoveries must be within the specified control limits. DoD LCS recovery limits are specified in Table D-2 and Table D-6 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample OP21127-BS was used as the LCS for the SVOC analysis on 07/05/07. All criteria were met. No qualifiers were applied. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), and TMMW01 (F50408-6) apply to this LCS.

- Sample OP21207-BS was used as the LCS for the SVOC analysis on 07/06/07. All criteria were met. No qualifiers were applied. Samples IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) apply to this LCS.

- Sample OP21128-BS was used as the LCS for the PAH SIM analysis on 07/03/07. All criteria were met. No qualifiers were applied. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), and TMMW01 (F50408-6) apply to this LCS.

- Sample OP21206-BS was used as the LCS for the PAH SIM analysis on 07/03/07. All criteria were met. No qualifiers were applied. Samples IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) apply to this LCS.

IX-Matrix Spike/Matrix Spike Duplicate

Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. DoD MS/MSD recovery limits follow the LCS criteria and are specified in Table D-2 and Table D-6 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample WBGMW02 (F50408-2) was used for the MS/MSD for SVOC analysis on 07/05/07. 4-Nitrophenol (57%) and phenol (57%) were above laboratory accuracy criteria, however within DoD QSM criteria. All other target compounds were within criteria. The associated LCS was within criteria and all groundwater samples were non-detect for these compounds. No qualifiers were applied for 4-Nitrophenol and phenol based upon these outliers. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), and TMMW01 (F50408-6) apply to this MS/MSD.

- Sample IAAMW04 (F50408-14) was used for the MS/MSD for SVOC analysis on 07/06/07. All criteria were met. No qualifiers were applied. Samples IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) apply to this MS/MSD.

- Sample WBGMW02 (F50408-2) was used for the MS/MSD for PAH SIM analysis on 07/03/07. All criteria were met. No qualifiers were applied. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), and TMMW01 (F50408-6) apply to this MS/MSD.

- Sample F50499-3 was used for the MS/MSD for PAH SIM analysis on 07/05/07. The spiked sample was not a RFAAP site sample; therefore, it was not evaluated. Samples IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) apply to this MS/MSD.

X-Field Duplicate Sample Analysis

Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field groundwater sample duplicate pair NBGMW01 (F50408-4) and TMMW01 (F50408-6) was collected for SVOCs and PAH SIM. All target compounds were non-detect. All criteria were met. No qualifiers were applied.

XI-Quantitation Verification

The accuracy of analytical results was verified through the calculation of several parameters. Percent difference (%D) between the calculated and reported values must be ≤10%. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J."

Sample: WBGMW02MS (F50408-2MS), bis(2-ethylhexyl)phthalate

Conc. (µg/L) = {(Ax)*(Is)*(Vt)*(DF)}/{(Ais)*(RRF)*(V_o)*(V_i)}

where:	$Conc_{sample}$	=	Sample concentration in µg/L
	A_x	=	Area of characteristic ion for compound being measured.
	I_s	=	Amount of internal standard injected (ng).
	V_t	=	Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10,000 µL.
	A_{is}	=	Area of characteristic ion for the internal standard.
	RRF_A	=	Average relative response factor for compound being measured
	V_o	=	Volume of water extracted (mL).
	V_i	=	Volume of extract injected (µL).
	DF	=	Dilution Factor

Conc. µg/L = (265919 * 40ng * 1000µL * 1) / (240204 * 1.019 * 500mL * 1 µL) = 86.9 ng/mL
= 86.9 µg/L

Reported Value = 86.9 µg/L
% Difference = 0.0%
Values were within 10% difference.

Sample: WBGMW02MS (F50408-2MS), pyrene

Conc. (µg/L) = {(Ax)*(Is)*(Vt)*(DF)}/{(Ais)*(RRF)*(V_o)*(V_i)}

where:	$Conc_{sample}$	=	Sample concentration in µg/L
	A_x	=	Area of characteristic ion for compound being measured.
	I_s	=	Amount of internal standard injected (ng).
	V_t	=	Volume of total extract, taking into account dilutions (i.e., a 1-to-10 dilution of a 1-mL extract will mean V(t) = 10,000 µL.
	A_{is}	=	Area of characteristic ion for the internal standard.
	RRF_A	=	Average relative response factor for compound being measured
	V_o	=	Volume of water extracted (mL).
	V_i	=	Volume of extract injected (µL).
	DF	=	Dilution Factor

Conc. µg/L = (1261227 * 4ng * 1000µL * 1) / (112301 * 2.378 * 400mL * 1 µL) = 47.2 ng/mL
= 47.2 µg/L

Reported Value = 47.2 µg/L
% Difference = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Raw Data: L037300.D

Form I Copy

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	WBGMW01		
Lab Sample ID:	F50408-1	Date Sampled:	06/18/07
Matrix:	AQ - Ground Water	Date Received:	06/19/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L037300.D	1	07/05/07	RB	06/21/07	OP21127	SL1907
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	25	10	ug/l	
95-57-8	2-Chlorophenol	ND	5.0	2.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	2.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.0	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	10	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	5.0	ug/l	
95-48-7	2-Methylphenol	ND	5.0	2.0	ug/l	
	3&4-Methylphenol	ND	5.0	2.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	2.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	10	ug/l	
87-86-5	Pentachlorophenol	ND	25	10	ug/l	
108-95-2	Phenol	ND	5.0	2.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	2.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	2.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	1.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	2.0	ug/l	
100-51-6	Benzyl Alcohol	ND	5.0	1.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	1.0	ug/l	
106-47-8	4-Chloroaniline	ND	10	4.0	ug/l	
86-74-8	Carbazole	ND	5.0	1.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	1.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	2.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	1.0	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	1.0	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.0	1.0	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	5.0	1.0	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	5.0	1.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	2.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	2.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	1.0	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Copy

Report of Analysis

Client Sample ID:	WBGMW01		
Lab Sample ID:	F50408-1	Date Sampled:	06/18/07
Matrix:	AQ - Ground Water	Date Received:	06/19/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	5.0	2.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	2.5	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	2.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	2.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	2.5	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	1.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	2.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	2.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	2.0	ug/l	
78-59-1	Isophorone	ND	5.0	1.0	ug/l	
88-74-4	2-Nitroaniline	ND	10	4.0	ug/l	
99-09-2	3-Nitroaniline	ND	10	4.0	ug/l	
100-01-6	4-Nitroaniline	ND	10	4.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	1.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	2.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.0	1.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	41%		14-62%
4165-62-2	Phenol-d5	29%		10-40%
118-79-6	2,4,6-Tribromophenol	82%		33-118%
4165-60-0	Nitrobenzene-d5	69%		42-108%
321-60-8	2-Fluorobiphenyl	70%		40-106%
1718-51-0	Terphenyl-d14	73%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035325.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	WBGMW01		
Lab Sample ID:	F50408-1	Date Sampled:	06/18/07
Matrix:	AQ - Ground Water	Date Received:	06/19/07
Method:	SW846 8270C BY SIM SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035325.D	1	07/03/07	RB	06/21/07	OP21128	SW1835
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.0	0.50	ug/l	
208-96-8	Acenaphthylene	ND	1.0	0.50	ug/l	
120-12-7	Anthracene	ND	1.0	0.50	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.20	0.050	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.20	0.10	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.20	0.050	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.20	0.10	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.20	0.10	ug/l	
218-01-9	Chrysene	ND	0.20	0.10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.20	0.050	ug/l	
206-44-0	Fluoranthene	ND	1.0	0.25	ug/l	
86-73-7	Fluorene	ND	1.0	0.25	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.20	0.050	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.0	0.25	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.0	0.25	ug/l	
91-20-3	Naphthalene	ND	1.0	0.25	ug/l	
85-01-8	Phenanthrene	ND	1.0	0.50	ug/l	
129-00-0	Pyrene	ND	1.0	0.25	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: L037301.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	WBGMW02		
Lab Sample ID:	F50408-2	Date Sampled:	06/18/07
Matrix:	AQ - Ground Water	Date Received:	06/19/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L037301.D	1	07/05/07	RB	06/21/07	OP21127	SL1907
Run #2							

	Initial Volume	Final Volume
Run #1	850 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	29	12	ug/l	
95-57-8	2-Chlorophenol	ND	5.9	2.4	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.9	2.4	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.9	2.4	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.9	2.4	ug/l	
51-28-5	2,4-Dinitrophenol	ND	29	12	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	12	5.9	ug/l	
95-48-7	2-Methylphenol	ND	5.9	2.4	ug/l	
	3&4-Methylphenol	ND	5.9	2.4	ug/l	
88-75-5	2-Nitrophenol	ND	5.9	2.4	ug/l	
100-02-7	4-Nitrophenol	ND	29	12	ug/l	
87-86-5	Pentachlorophenol	ND	29	12	ug/l	
108-95-2	Phenol	ND	5.9	2.4	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.9	2.4	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.9	2.4	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.9	1.2	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.9	2.4	ug/l	
100-51-6	Benzyl Alcohol	ND	5.9	1.2	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.9	1.2	ug/l	
106-47-8	4-Chloroaniline	ND	12	4.7	ug/l	
86-74-8	Carbazole	ND	5.9	1.2	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.9	1.2	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.9	2.4	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.9	1.2	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.9	1.2	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.9	1.2	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	5.9	1.2	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	5.9	1.2	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.9	2.4	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.9	2.4	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	12	5.9	ug/l	
132-64-9	Dibenzofuran	ND	5.9	1.2	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	WBGMW02		
Lab Sample ID:	F50408-2	Date Sampled:	06/18/07
Matrix:	AQ - Ground Water	Date Received:	06/19/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	5.9	2.4	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.9	2.9	ug/l	
84-66-2	Diethyl phthalate	ND	5.9	2.4	ug/l	
131-11-3	Dimethyl phthalate	ND	5.9	2.4	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.9	2.9	ug/l	
118-74-1	Hexachlorobenzene	ND	5.9	1.2	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.9	2.4	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.9	2.4	ug/l	
67-72-1	Hexachloroethane	ND	5.9	2.4	ug/l	
78-59-1	Isophorone	ND	5.9	1.2	ug/l	
88-74-4	2-Nitroaniline	ND	12	4.7	ug/l	
99-09-2	3-Nitroaniline	ND	12	4.7	ug/l	
100-01-6	4-Nitroaniline	ND	12	4.7	ug/l	
98-95-3	Nitrobenzene	ND	5.9	1.2	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.9	2.4	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.9	2.4	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.9	1.2	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	40%		14-62%
4165-62-2	Phenol-d5	28%		10-40%
118-79-6	2,4,6-Tribromophenol	77%		33-118%
4165-60-0	Nitrobenzene-d5	64%		42-108%
321-60-8	2-Fluorobiphenyl	66%		40-106%
1718-51-0	Terphenyl-d14	74%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035326.D

Form I copy

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	WBGMW02		
Lab Sample ID:	F50408-2	Date Sampled:	06/18/07
Matrix:	AQ - Ground Water	Date Received:	06/19/07
Method:	SW846 8270C BY SIM SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035326.D	1	07/03/07	RB	06/21/07	OP21128	SW1835
Run #2							

	Initial Volume	Final Volume
Run #1	850 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.2	0.59	ug/l	
208-96-8	Acenaphthylene	ND	1.2	0.59	ug/l	
120-12-7	Anthracene	ND	1.2	0.59	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.24	0.059	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.24	0.12	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.24	0.059	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.24	0.12	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.24	0.12	ug/l	
218-01-9	Chrysene	ND	0.24	0.12	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.24	0.059	ug/l	
206-44-0	Fluoranthene	ND	1.2	0.29	ug/l	
86-73-7	Fluorene	ND	1.2	0.29	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.24	0.059	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.2	0.29	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.2	0.29	ug/l	
91-20-3	Naphthalene	ND	1.2	0.29	ug/l	
85-01-8	Phenanthrene	ND	1.2	0.59	ug/l	
129-00-0	Pyrene	ND	1.2	0.29	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: L037304.D

Form I Corr

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	WBGMW03		
Lab Sample ID:	F50408-3	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L037304.D	1	07/05/07	RB	06/21/07	OP21127	SL1907
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	25	10	ug/l	
95-57-8	2-Chlorophenol	ND	5.0	2.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	2.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.0	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	10	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	5.0	ug/l	
95-48-7	2-Methylphenol	ND	5.0	2.0	ug/l	
	3&4-Methylphenol	ND	5.0	2.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	2.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	10	ug/l	
87-86-5	Pentachlorophenol	ND	25	10	ug/l	
108-95-2	Phenol	ND	5.0	2.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	2.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	2.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	1.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	2.0	ug/l	
100-51-6	Benzyl Alcohol	ND	5.0	1.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	1.0	ug/l	
106-47-8	4-Chloroaniline	ND	10	4.0	ug/l	
86-74-8	Carbazole	ND	5.0	1.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	1.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	2.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	1.0	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	1.0	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.0	1.0	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	5.0	1.0	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	5.0	1.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	2.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	2.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	1.0	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	WBGMW03		
Lab Sample ID:	F50408-3	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	5.0	2.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	2.5	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	2.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	2.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	2.5	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	1.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	2.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	2.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	2.0	ug/l	
78-59-1	Isophorone	ND	5.0	1.0	ug/l	
88-74-4	2-Nitroaniline	ND	10	4.0	ug/l	
99-09-2	3-Nitroaniline	ND	10	4.0	ug/l	
100-01-6	4-Nitroaniline	ND	10	4.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	1.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	2.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.0	1.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	36%		14-62%
4165-62-2	Phenol-d5	24%		10-40%
118-79-6	2,4,6-Tribromophenol	80%		33-118%
4165-60-0	Nitrobenzene-d5	61%		42-108%
321-60-8	2-Fluorobiphenyl	65%		40-106%
1718-51-0	Terphenyl-d14	74%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035329.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	WBGMW03		
Lab Sample ID:	F50408-3	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8270C BY SIM SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035329.D	1	07/03/07	RB	06/21/07	OP21128	SW1835
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.0	0.50	ug/l	
208-96-8	Acenaphthylene	ND	1.0	0.50	ug/l	
120-12-7	Anthracene	ND	1.0	0.50	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.20	0.050	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.20	0.10	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.20	0.050	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.20	0.10	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.20	0.10	ug/l	
218-01-9	Chrysene	ND	0.20	0.10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.20	0.050	ug/l	
206-44-0	Fluoranthene	ND	1.0	0.25	ug/l	
86-73-7	Fluorene	ND	1.0	0.25	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.20	0.050	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.0	0.25	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.0	0.25	ug/l	
91-20-3	Naphthalene	ND	1.0	0.25	ug/l	
85-01-8	Phenanthrene	ND	1.0	0.50	ug/l	
129-00-0	Pyrene	ND	1.0	0.25	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: L037305.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	NBGMW01		
Lab Sample ID:	F50408-4	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L037305.D	1	07/05/07	RB	06/21/07	OP21127	SL1907
Run #2							

	Initial Volume	Final Volume
Run #1	840 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	30	12	ug/l	
95-57-8	2-Chlorophenol	ND	6.0	2.4	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	6.0	2.4	ug/l	
120-83-2	2,4-Dichlorophenol	ND	6.0	2.4	ug/l	
105-67-9	2,4-Dimethylphenol	ND	6.0	2.4	ug/l	
51-28-5	2,4-Dinitrophenol	ND	30	12	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	12	6.0	ug/l	
95-48-7	2-Methylphenol	ND	6.0	2.4	ug/l	
	3&4-Methylphenol	ND	6.0	2.4	ug/l	
88-75-5	2-Nitrophenol	ND	6.0	2.4	ug/l	
100-02-7	4-Nitrophenol	ND	30	12	ug/l	
87-86-5	Pentachlorophenol	ND	30	12	ug/l	
108-95-2	Phenol	ND	6.0	2.4	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	6.0	2.4	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	6.0	2.4	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	6.0	1.2	ug/l	
85-68-7	Butyl benzyl phthalate	ND	6.0	2.4	ug/l	
100-51-6	Benzyl Alcohol	ND	6.0	1.2	ug/l	
91-58-7	2-Chloronaphthalene	ND	6.0	1.2	ug/l	
106-47-8	4-Chloroaniline	ND	12	4.8	ug/l	
86-74-8	Carbazole	ND	6.0	1.2	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	6.0	1.2	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	6.0	2.4	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	6.0	1.2	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	6.0	1.2	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	6.0	1.2	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	6.0	1.2	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	6.0	1.2	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	6.0	2.4	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	6.0	2.4	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	12	6.0	ug/l	
132-64-9	Dibenzofuran	ND	6.0	1.2	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	NBGMW01		
Lab Sample ID:	F50408-4	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	6.0	2.4	ug/l	
117-84-0	Di-n-octyl phthalate	ND	6.0	3.0	ug/l	
84-66-2	Diethyl phthalate	ND	6.0	2.4	ug/l	
131-11-3	Dimethyl phthalate	ND	6.0	2.4	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	6.0	3.0	ug/l	
118-74-1	Hexachlorobenzene	ND	6.0	1.2	ug/l	
87-68-3	Hexachlorobutadiene	ND	6.0	2.4	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	6.0	2.4	ug/l	
67-72-1	Hexachloroethane	ND	6.0	2.4	ug/l	
78-59-1	Isophorone	ND	6.0	1.2	ug/l	
88-74-4	2-Nitroaniline	ND	12	4.8	ug/l	
99-09-2	3-Nitroaniline	ND	12	4.8	ug/l	
100-01-6	4-Nitroaniline	ND	12	4.8	ug/l	
98-95-3	Nitrobenzene	ND	6.0	1.2	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	6.0	2.4	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	6.0	2.4	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	6.0	1.2	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	44%		14-62%
4165-62-2	Phenol-d5	31%		10-40%
118-79-6	2,4,6-Tribromophenol	79%		33-118%
4165-60-0	Nitrobenzene-d5	69%		42-108%
321-60-8	2-Fluorobiphenyl	73%		40-106%
1718-51-0	Terphenyl-d14	73%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035330.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	NBGMW01		
Lab Sample ID:	F50408-4	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8270C BY SIM SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035330.D	1	07/03/07	RB	06/21/07	OP21128	SW1835
Run #2							

	Initial Volume	Final Volume
Run #1	840 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.2	0.60	ug/l	
208-96-8	Acenaphthylene	ND	1.2	0.60	ug/l	
120-12-7	Anthracene	ND	1.2	0.60	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.24	0.060	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.24	0.12	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.24	0.060	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.24	0.12	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.24	0.12	ug/l	
218-01-9	Chrysene	ND	0.24	0.12	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.24	0.060	ug/l	
206-44-0	Fluoranthene	ND	1.2	0.30	ug/l	
86-73-7	Fluorene	ND	1.2	0.30	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.24	0.060	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.2	0.30	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.2	0.30	ug/l	
91-20-3	Naphthalene	ND	1.2	0.30	ug/l	
85-01-8	Phenanthrene	ND	1.2	0.60	ug/l	
129-00-0	Pyrene	ND	1.2	0.30	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: L037306.D

Form 1 Copy

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	NBGMW02		
Lab Sample ID:	F50408-5	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L037306.D	1	07/05/07	RB	06/21/07	OP21127	SL1907
Run #2							

	Initial Volume	Final Volume
Run #1	800 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	31	13	ug/l	
95-57-8	2-Chlorophenol	ND	6.3	2.5	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	6.3	2.5	ug/l	
120-83-2	2,4-Dichlorophenol	ND	6.3	2.5	ug/l	
105-67-9	2,4-Dimethylphenol	ND	6.3	2.5	ug/l	
51-28-5	2,4-Dinitrophenol	ND	31	13	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	13	6.3	ug/l	
95-48-7	2-Methylphenol	ND	6.3	2.5	ug/l	
	3&4-Methylphenol	ND	6.3	2.5	ug/l	
88-75-5	2-Nitrophenol	ND	6.3	2.5	ug/l	
100-02-7	4-Nitrophenol	ND	31	13	ug/l	
87-86-5	Pentachlorophenol	ND	31	13	ug/l	
108-95-2	Phenol	ND	6.3	2.5	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	6.3	2.5	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	6.3	2.5	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	6.3	1.3	ug/l	
85-68-7	Butyl benzyl phthalate	ND	6.3	2.5	ug/l	
100-51-6	Benzyl Alcohol	ND	6.3	1.3	ug/l	
91-58-7	2-Chloronaphthalene	ND	6.3	1.3	ug/l	
106-47-8	4-Chloroaniline	ND	13	5.0	ug/l	
86-74-8	Carbazole	ND	6.3	1.3	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	6.3	1.3	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	6.3	2.5	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	6.3	1.3	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	6.3	1.3	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	6.3	1.3	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	6.3	1.3	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	6.3	1.3	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	6.3	2.5	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	6.3	2.5	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	13	6.3	ug/l	
132-64-9	Dibenzofuran	ND	6.3	1.3	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Copy

Report of Analysis

Client Sample ID:	NBGMW02		
Lab Sample ID:	F50408-5	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	6.3	2.5	ug/l	
117-84-0	Di-n-octyl phthalate	ND	6.3	3.1	ug/l	
84-66-2	Diethyl phthalate	ND	6.3	2.5	ug/l	
131-11-3	Dimethyl phthalate	ND	6.3	2.5	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	6.3	3.1	ug/l	
118-74-1	Hexachlorobenzene	ND	6.3	1.3	ug/l	
87-68-3	Hexachlorobutadiene	ND	6.3	2.5	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	6.3	2.5	ug/l	
67-72-1	Hexachloroethane	ND	6.3	2.5	ug/l	
78-59-1	Isophorone	ND	6.3	1.3	ug/l	
88-74-4	2-Nitroaniline	ND	13	5.0	ug/l	
99-09-2	3-Nitroaniline	ND	13	5.0	ug/l	
100-01-6	4-Nitroaniline	ND	13	5.0	ug/l	
98-95-3	Nitrobenzene	ND	6.3	1.3	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	6.3	2.5	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	6.3	2.5	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	6.3	1.3	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	40%		14-62%
4165-62-2	Phenol-d5	29%		10-40%
118-79-6	2,4,6-Tribromophenol	82%		33-118%
4165-60-0	Nitrobenzene-d5	63%		42-108%
321-60-8	2-Fluorobiphenyl	66%		40-106%
1718-51-0	Terphenyl-d14	69%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035331.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	NBGMW02		
Lab Sample ID:	F50408-5	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8270C BY SIM SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035331.D	1	07/03/07	RB	06/21/07	OP21128	SW1835
Run #2							

	Initial Volume	Final Volume
Run #1	800 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.3	0.63	ug/l	
208-96-8	Acenaphthylene	ND	1.3	0.63	ug/l	
120-12-7	Anthracene	ND	1.3	0.63	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.25	0.063	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.25	0.13	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.25	0.063	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.25	0.13	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.25	0.13	ug/l	
218-01-9	Chrysene	ND	0.25	0.13	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.25	0.063	ug/l	
206-44-0	Fluoranthene	ND	1.3	0.31	ug/l	
86-73-7	Fluorene	ND	1.3	0.31	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.25	0.063	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.3	0.31	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.3	0.31	ug/l	
91-20-3	Naphthalene	ND	1.3	0.31	ug/l	
85-01-8	Phenanthrene	ND	1.3	0.63	ug/l	
129-00-0	Pyrene	ND	1.3	0.31	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: L037307.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	TMMW01		
Lab Sample ID:	F50408-6	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L037307.D	1	07/05/07	RB	06/21/07	OP21127	SL1907
Run #2							

	Initial Volume	Final Volume
Run #1	820 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	30	12	ug/l	
95-57-8	2-Chlorophenol	ND	6.1	2.4	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	6.1	2.4	ug/l	
120-83-2	2,4-Dichlorophenol	ND	6.1	2.4	ug/l	
105-67-9	2,4-Dimethylphenol	ND	6.1	2.4	ug/l	
51-28-5	2,4-Dinitrophenol	ND	30	12	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	12	6.1	ug/l	
95-48-7	2-Methylphenol	ND	6.1	2.4	ug/l	
	3&4-Methylphenol	ND	6.1	2.4	ug/l	
88-75-5	2-Nitrophenol	ND	6.1	2.4	ug/l	
100-02-7	4-Nitrophenol	ND	30	12	ug/l	
87-86-5	Pentachlorophenol	ND	30	12	ug/l	
108-95-2	Phenol	ND	6.1	2.4	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	6.1	2.4	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	6.1	2.4	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	6.1	1.2	ug/l	
85-68-7	Butyl benzyl phthalate	ND	6.1	2.4	ug/l	
100-51-6	Benzyl Alcohol	ND	6.1	1.2	ug/l	
91-58-7	2-Chloronaphthalene	ND	6.1	1.2	ug/l	
106-47-8	4-Chloroaniline	ND	12	4.9	ug/l	
86-74-8	Carbazole	ND	6.1	1.2	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	6.1	1.2	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	6.1	2.4	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	6.1	1.2	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	6.1	1.2	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	6.1	1.2	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	6.1	1.2	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	6.1	1.2	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	6.1	2.4	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	6.1	2.4	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	12	6.1	ug/l	
132-64-9	Dibenzofuran	ND	6.1	1.2	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I GW7

Report of Analysis

Client Sample ID:	TMMW01		
Lab Sample ID:	F50408-6	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	6.1	2.4	ug/l	
117-84-0	Di-n-octyl phthalate	ND	6.1	3.0	ug/l	
84-66-2	Diethyl phthalate	ND	6.1	2.4	ug/l	
131-11-3	Dimethyl phthalate	ND	6.1	2.4	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	6.1	3.0	ug/l	
118-74-1	Hexachlorobenzene	ND	6.1	1.2	ug/l	
87-68-3	Hexachlorobutadiene	ND	6.1	2.4	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	6.1	2.4	ug/l	
67-72-1	Hexachloroethane	ND	6.1	2.4	ug/l	
78-59-1	Isophorone	ND	6.1	1.2	ug/l	
88-74-4	2-Nitroaniline	ND	12	4.9	ug/l	
99-09-2	3-Nitroaniline	ND	12	4.9	ug/l	
100-01-6	4-Nitroaniline	ND	12	4.9	ug/l	
98-95-3	Nitrobenzene	ND	6.1	1.2	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	6.1	2.4	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	6.1	2.4	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	6.1	1.2	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	44%		14-62%
4165-62-2	Phenol-d5	32%		10-40%
118-79-6	2,4,6-Tribromophenol	81%		33-118%
4165-60-0	Nitrobenzene-d5	69%		42-108%
321-60-8	2-Fluorobiphenyl	69%		40-106%
1718-51-0	Terphenyl-d14	77%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035332.D

Form I Copy

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	TMMW01		
Lab Sample ID:	F50408-6	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8270C BY SIM SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035332.D	1	07/03/07	RB	06/21/07	OP21128	SW1835
Run #2							

	Initial Volume	Final Volume
Run #1	820 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.2	0.61	ug/l	
208-96-8	Acenaphthylene	ND	1.2	0.61	ug/l	
120-12-7	Anthracene	ND	1.2	0.61	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.24	0.061	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.24	0.12	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.24	0.061	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.24	0.12	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.24	0.12	ug/l	
218-01-9	Chrysene	ND	0.24	0.12	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.24	0.061	ug/l	
206-44-0	Fluoranthene	ND	1.2	0.30	ug/l	
86-73-7	Fluorene	ND	1.2	0.30	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.24	0.061	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.2	0.30	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.2	0.30	ug/l	
91-20-3	Naphthalene	ND	1.2	0.30	ug/l	
85-01-8	Phenanthrene	ND	1.2	0.61	ug/l	
129-00-0	Pyrene	ND	1.2	0.30	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: R09105.D

Form I Com

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	IAAMW03		
Lab Sample ID:	F50408-9	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09105.D	1	07/06/07	NJ	06/27/07	OP21207	SR429
Run #2							

	Initial Volume	Final Volume
Run #1	970 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	26	10	ug/l	
95-57-8	2-Chlorophenol	ND	5.2	2.1	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.2	2.1	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.2	2.1	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.2	2.1	ug/l	
51-28-5	2,4-Dinitrophenol	ND	26	10	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	5.2	ug/l	
95-48-7	2-Methylphenol	ND	5.2	2.1	ug/l	
	3&4-Methylphenol	ND	5.2	2.1	ug/l	
88-75-5	2-Nitrophenol	ND	5.2	2.1	ug/l	
100-02-7	4-Nitrophenol	ND	26	10	ug/l	
87-86-5	Pentachlorophenol	ND	26	10	ug/l	
108-95-2	Phenol	ND	5.2	2.1	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.2	2.1	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.2	2.1	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.2	1.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.2	2.1	ug/l	
100-51-6	Benzyl Alcohol	ND	5.2	1.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.2	1.0	ug/l	
106-47-8	4-Chloroaniline	ND	10	4.1	ug/l	
86-74-8	Carbazole	ND	5.2	1.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.2	1.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.2	2.1	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.2	1.0	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.2	1.0	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.2	1.0	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	5.2	1.0	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	5.2	1.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.2	2.1	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.2	2.1	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	5.2	ug/l	
132-64-9	Dibenzofuran	ND	5.2	1.0	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	IAAMW03		
Lab Sample ID:	F50408-9	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	5.2	2.1	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.2	2.6	ug/l	
84-66-2	Diethyl phthalate	ND	5.2	2.1	ug/l	
131-11-3	Dimethyl phthalate	ND	5.2	2.1	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.2	2.6	ug/l	
118-74-1	Hexachlorobenzene	ND	5.2	1.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.2	2.1	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.2	2.1	ug/l	
67-72-1	Hexachloroethane	ND	5.2	2.1	ug/l	
78-59-1	Isophorone	ND	5.2	1.0	ug/l	
88-74-4	2-Nitroaniline	ND	10	4.1	ug/l	
99-09-2	3-Nitroaniline	ND	10	4.1	ug/l	
100-01-6	4-Nitroaniline	ND	10	4.1	ug/l	
98-95-3	Nitrobenzene	ND	5.2	1.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.2	2.1	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.2	2.1	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.2	1.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	42%		14-62%
4165-62-2	Phenol-d5	29%		10-40%
118-79-6	2,4,6-Tribromophenol	76%		33-118%
4165-60-0	Nitrobenzene-d5	73%		42-108%
321-60-8	2-Fluorobiphenyl	70%		40-106%
1718-51-0	Terphenyl-d14	74%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035339.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	IAAMW03		
Lab Sample ID:	F50408-9	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8270C BY SIM SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035339.D	1	07/03/07	RB	06/27/07	OP21206	SW1835
Run #2							

	Initial Volume	Final Volume
Run #1	970 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.0	0.52	ug/l	
208-96-8	Acenaphthylene	ND	1.0	0.52	ug/l	
120-12-7	Anthracene	ND	1.0	0.52	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.21	0.052	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.21	0.10	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.21	0.052	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.21	0.10	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.21	0.10	ug/l	
218-01-9	Chrysene	ND	0.21	0.10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.21	0.052	ug/l	
206-44-0	Fluoranthene	ND	1.0	0.26	ug/l	
86-73-7	Fluorene	ND	1.0	0.26	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.21	0.052	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.0	0.26	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.0	0.26	ug/l	
91-20-3	Naphthalene	ND	1.0	0.26	ug/l	
85-01-8	Phenanthrene	ND	1.0	0.52	ug/l	
129-00-0	Pyrene	ND	1.0	0.26	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: R09106.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	BLAMW01		
Lab Sample ID:	F50408-10	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09106.D	1	07/06/07	NJ	06/27/07	OP21207	SR429
Run #2							

	Initial Volume	Final Volume
Run #1	980 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	26	10	ug/l	
95-57-8	2-Chlorophenol	ND	5.1	2.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.1	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.1	2.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.1	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	26	10	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	5.1	ug/l	
95-48-7	2-Methylphenol	ND	5.1	2.0	ug/l	
	3&4-Methylphenol	ND	5.1	2.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.1	2.0	ug/l	
100-02-7	4-Nitrophenol	ND	26	10	ug/l	
87-86-5	Pentachlorophenol	ND	26	10	ug/l	
108-95-2	Phenol	ND	5.1	2.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.1	2.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.1	2.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.1	1.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.1	2.0	ug/l	
100-51-6	Benzyl Alcohol	ND	5.1	1.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.1	1.0	ug/l	
106-47-8	4-Chloroaniline	ND	10	4.1	ug/l	
86-74-8	Carbazole	ND	5.1	1.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.1	1.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.1	2.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.1	1.0	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.1	1.0	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.1	1.0	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	5.1	1.0	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	5.1	1.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.1	2.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.1	2.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	5.1	ug/l	
132-64-9	Dibenzofuran	ND	5.1	1.0	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	BLAMW01		
Lab Sample ID:	F50408-10	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	5.1	2.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.1	2.6	ug/l	
84-66-2	Diethyl phthalate	ND	5.1	2.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.1	2.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.1	2.6	ug/l	
118-74-1	Hexachlorobenzene	ND	5.1	1.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.1	2.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.1	2.0	ug/l	
67-72-1	Hexachloroethane	ND	5.1	2.0	ug/l	
78-59-1	Isophorone	ND	5.1	1.0	ug/l	
88-74-4	2-Nitroaniline	ND	10	4.1	ug/l	
99-09-2	3-Nitroaniline	ND	10	4.1	ug/l	
100-01-6	4-Nitroaniline	ND	10	4.1	ug/l	
98-95-3	Nitrobenzene	ND	5.1	1.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.1	2.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.1	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.1	1.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	38%		14-62%
4165-62-2	Phenol-d5	26%		10-40%
118-79-6	2,4,6-Tribromophenol	74%		33-118%
4165-60-0	Nitrobenzene-d5	69%		42-108%
321-60-8	2-Fluorobiphenyl	67%		40-106%
1718-51-0	Terphenyl-d14	73%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035340.D

For I Gray

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	BLAMW01		
Lab Sample ID:	F50408-10	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8270C BY SIM SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035340.D	1	07/03/07	RB	06/27/07	OP21206	SW1835
Run #2							

	Initial Volume	Final Volume
Run #1	980 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.0	0.51	ug/l	
208-96-8	Acenaphthylene	ND	1.0	0.51	ug/l	
120-12-7	Anthracene	ND	1.0	0.51	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.20	0.051	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.20	0.10	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.20	0.051	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.20	0.10	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.20	0.10	ug/l	
218-01-9	Chrysene	ND	0.20	0.10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.20	0.051	ug/l	
206-44-0	Fluoranthene	ND	1.0	0.26	ug/l	
86-73-7	Fluorene	ND	1.0	0.26	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.20	0.051	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.0	0.26	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.0	0.26	ug/l	
91-20-3	Naphthalene	ND	1.0	0.26	ug/l	
85-01-8	Phenanthrene	ND	1.0	0.51	ug/l	
129-00-0	Pyrene	ND	1.0	0.26	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: R09107.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	IAAMW02		
Lab Sample ID:	F50408-11	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09107.D	1	07/06/07	NJ	06/27/07	OP21207	SR429
Run #2							

	Initial Volume	Final Volume
Run #1	970 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	26	10	ug/l	
95-57-8	2-Chlorophenol	ND	5.2	2.1	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.2	2.1	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.2	2.1	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.2	2.1	ug/l	
51-28-5	2,4-Dinitrophenol	ND	26	10	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	5.2	ug/l	
95-48-7	2-Methylphenol	ND	5.2	2.1	ug/l	
	3&4-Methylphenol	ND	5.2	2.1	ug/l	
88-75-5	2-Nitrophenol	ND	5.2	2.1	ug/l	
100-02-7	4-Nitrophenol	ND	26	10	ug/l	
87-86-5	Pentachlorophenol	ND	26	10	ug/l	
108-95-2	Phenol	ND	5.2	2.1	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.2	2.1	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.2	2.1	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.2	1.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.2	2.1	ug/l	
100-51-6	Benzyl Alcohol	ND	5.2	1.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.2	1.0	ug/l	
106-47-8	4-Chloroaniline	ND	10	4.1	ug/l	
86-74-8	Carbazole	ND	5.2	1.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.2	1.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.2	2.1	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.2	1.0	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.2	1.0	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.2	1.0	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	5.2	1.0	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	5.2	1.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.2	2.1	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.2	2.1	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	5.2	ug/l	
132-64-9	Dibenzofuran	ND	5.2	1.0	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	IAAMW02		
Lab Sample ID:	F50408-11	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	5.2	2.1	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.2	2.6	ug/l	
84-66-2	Diethyl phthalate	ND	5.2	2.1	ug/l	
131-11-3	Dimethyl phthalate	ND	5.2	2.1	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.2	2.6	ug/l	
118-74-1	Hexachlorobenzene	ND	5.2	1.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.2	2.1	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.2	2.1	ug/l	
67-72-1	Hexachloroethane	ND	5.2	2.1	ug/l	
78-59-1	Isophorone	ND	5.2	1.0	ug/l	
88-74-4	2-Nitroaniline	ND	10	4.1	ug/l	
99-09-2	3-Nitroaniline	ND	10	4.1	ug/l	
100-01-6	4-Nitroaniline	ND	10	4.1	ug/l	
98-95-3	Nitrobenzene	ND	5.2	1.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.2	2.1	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.2	2.1	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.2	1.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	43%		14-62%
4165-62-2	Phenol-d5	30%		10-40%
118-79-6	2,4,6-Tribromophenol	76%		33-118%
4165-60-0	Nitrobenzene-d5	72%		42-108%
321-60-8	2-Fluorobiphenyl	72%		40-106%
1718-51-0	Terphenyl-d14	74%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035341.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	IAAMW02		
Lab Sample ID:	F50408-11	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8270C BY SIM SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035341.D	1	07/03/07	RB	06/27/07	OP21206	SW1835
Run #2							

	Initial Volume	Final Volume
Run #1	970 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.0	0.52	ug/l	
208-96-8	Acenaphthylene	ND	1.0	0.52	ug/l	
120-12-7	Anthracene	ND	1.0	0.52	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.21	0.052	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.21	0.10	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.21	0.052	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.21	0.10	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.21	0.10	ug/l	
218-01-9	Chrysene	ND	0.21	0.10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.21	0.052	ug/l	
206-44-0	Fluoranthene	ND	1.0	0.26	ug/l	
86-73-7	Fluorene	ND	1.0	0.26	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.21	0.052	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.0	0.26	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.0	0.26	ug/l	
91-20-3	Naphthalene	ND	1.0	0.26	ug/l	
85-01-8	Phenanthrene	ND	1.0	0.52	ug/l	
129-00-0	Pyrene	ND	1.0	0.26	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: R09110.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	IAAMW04		
Lab Sample ID:	F50408-14	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09110.D	1	07/06/07	NJ	06/27/07	OP21207	SR429
Run #2							

	Initial Volume	Final Volume
Run #1	980 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	26	10	ug/l	
95-57-8	2-Chlorophenol	ND	5.1	2.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.1	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.1	2.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.1	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	26	10	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	5.1	ug/l	
95-48-7	2-Methylphenol	ND	5.1	2.0	ug/l	
	3&4-Methylphenol	ND	5.1	2.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.1	2.0	ug/l	
100-02-7	4-Nitrophenol	ND	26	10	ug/l	
87-86-5	Pentachlorophenol	ND	26	10	ug/l	
108-95-2	Phenol	ND	5.1	2.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.1	2.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.1	2.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.1	1.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.1	2.0	ug/l	
100-51-6	Benzyl Alcohol	ND	5.1	1.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.1	1.0	ug/l	
106-47-8	4-Chloroaniline	ND	10	4.1	ug/l	
86-74-8	Carbazole	ND	5.1	1.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.1	1.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.1	2.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.1	1.0	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.1	1.0	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.1	1.0	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	5.1	1.0	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	5.1	1.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.1	2.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.1	2.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	5.1	ug/l	
132-64-9	Dibenzofuran	ND	5.1	1.0	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	IAAMW04		
Lab Sample ID:	F50408-14	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	5.1	2.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.1	2.6	ug/l	
84-66-2	Diethyl phthalate	ND	5.1	2.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.1	2.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.1	2.6	ug/l	
118-74-1	Hexachlorobenzene	ND	5.1	1.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.1	2.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.1	2.0	ug/l	
67-72-1	Hexachloroethane	ND	5.1	2.0	ug/l	
78-59-1	Isophorone	ND	5.1	1.0	ug/l	
88-74-4	2-Nitroaniline	ND	10	4.1	ug/l	
99-09-2	3-Nitroaniline	ND	10	4.1	ug/l	
100-01-6	4-Nitroaniline	ND	10	4.1	ug/l	
98-95-3	Nitrobenzene	ND	5.1	1.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.1	2.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.1	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.1	1.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	39%		14-62%
4165-62-2	Phenol-d5	26%		10-40%
118-79-6	2,4,6-Tribromophenol	68%		33-118%
4165-60-0	Nitrobenzene-d5	67%		42-108%
321-60-8	2-Fluorobiphenyl	66%		40-106%
1718-51-0	Terphenyl-d14	65%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035342.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	IAAMW04		
Lab Sample ID:	F50408-14	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
Method:	SW846 8270C BY SIM SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035342.D	1	07/03/07	RB	06/27/07	OP21206	SW1835
Run #2							

	Initial Volume	Final Volume
Run #1	980 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.0	0.51	ug/l	
208-96-8	Acenaphthylene	ND	1.0	0.51	ug/l	
120-12-7	Anthracene	ND	1.0	0.51	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.20	0.051	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.20	0.10	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.20	0.051	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.20	0.10	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.20	0.10	ug/l	
218-01-9	Chrysene	ND	0.20	0.10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.20	0.051	ug/l	
206-44-0	Fluoranthene	ND	1.0	0.26	ug/l	
86-73-7	Fluorene	ND	1.0	0.26	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.20	0.051	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.0	0.26	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.0	0.26	ug/l	
91-20-3	Naphthalene	ND	1.0	0.26	ug/l	
85-01-8	Phenanthrene	ND	1.0	0.51	ug/l	
129-00-0	Pyrene	ND	1.0	0.26	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: R09111.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	BLAMW02		
Lab Sample ID:	F50408-17	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09111.D	1	07/06/07	NJ	06/27/07	OP21207	SR429
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	25	10	ug/l	
95-57-8	2-Chlorophenol	ND	5.0	2.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	2.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.0	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	10	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	5.0	ug/l	
95-48-7	2-Methylphenol	ND	5.0	2.0	ug/l	
	3&4-Methylphenol	ND	5.0	2.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	2.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	10	ug/l	
87-86-5	Pentachlorophenol	ND	25	10	ug/l	
108-95-2	Phenol	ND	5.0	2.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	2.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	2.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	1.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	2.0	ug/l	
100-51-6	Benzyl Alcohol	ND	5.0	1.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	1.0	ug/l	
106-47-8	4-Chloroaniline	ND	10	4.0	ug/l	
86-74-8	Carbazole	ND	5.0	1.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	1.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	2.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	1.0	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	1.0	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.0	1.0	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	5.0	1.0	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	5.0	1.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	2.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	2.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	1.0	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	BLAMW02		
Lab Sample ID:	F50408-17	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	5.0	2.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	2.5	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	2.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	2.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	2.5	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	1.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	2.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	2.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	2.0	ug/l	
78-59-1	Isophorone	ND	5.0	1.0	ug/l	
88-74-4	2-Nitroaniline	ND	10	4.0	ug/l	
99-09-2	3-Nitroaniline	ND	10	4.0	ug/l	
100-01-6	4-Nitroaniline	ND	10	4.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	1.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	2.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.0	1.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	28%		14-62%
4165-62-2	Phenol-d5	18%		10-40%
118-79-6	2,4,6-Tribromophenol	65%		33-118%
4165-60-0	Nitrobenzene-d5	50%		42-108%
321-60-8	2-Fluorobiphenyl	51%		40-106%
1718-51-0	Terphenyl-d14	61%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035343.D

Form I copy

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	BLAMW02		
Lab Sample ID:	F50408-17	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
Method:	SW846 8270C BY SIM SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035343.D	1	07/03/07	RB	06/27/07	OP21206	SW1835
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.0	0.50	ug/l	
208-96-8	Acenaphthylene	ND	1.0	0.50	ug/l	
120-12-7	Anthracene	ND	1.0	0.50	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.20	0.050	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.20	0.10	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.20	0.050	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.20	0.10	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.20	0.10	ug/l	
218-01-9	Chrysene	ND	0.20	0.10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.20	0.050	ug/l	
206-44-0	Fluoranthene	ND	1.0	0.25	ug/l	
86-73-7	Fluorene	ND	1.0	0.25	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.20	0.050	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.0	0.25	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.0	0.25	ug/l	
91-20-3	Naphthalene	ND	1.0	0.25	ug/l	
85-01-8	Phenanthrene	ND	1.0	0.50	ug/l	
129-00-0	Pyrene	ND	1.0	0.25	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: R09104.D

Form I Corr

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	062007R		
Lab Sample ID:	F50408-8	Date Sampled:	06/20/07
Matrix:	AQ - Equipment Blank	Date Received:	06/21/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	R09104.D	1	07/06/07	NJ	06/27/07	OP21207	SR429
Run #2							

	Initial Volume	Final Volume
Run #1	980 ml	1.0 ml
Run #2		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	26	10	ug/l	
95-57-8	2-Chlorophenol	ND	5.1	2.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.1	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.1	2.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.1	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	26	10	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	5.1	ug/l	
95-48-7	2-Methylphenol	ND	5.1	2.0	ug/l	
	3&4-Methylphenol	ND	5.1	2.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.1	2.0	ug/l	
100-02-7	4-Nitrophenol	ND	26	10	ug/l	
87-86-5	Pentachlorophenol	ND	26	10	ug/l	
108-95-2	Phenol	ND	5.1	2.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.1	2.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.1	2.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.1	1.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.1	2.0	ug/l	
100-51-6	Benzyl Alcohol	ND	5.1	1.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.1	1.0	ug/l	
106-47-8	4-Chloroaniline	ND	10	4.1	ug/l	
86-74-8	Carbazole	ND	5.1	1.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.1	1.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.1	2.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.1	1.0	ug/l	
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.1	1.0	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	5.1	1.0	ug/l	
541-73-1	1,3-Dichlorobenzene	ND	5.1	1.0	ug/l	
106-46-7	1,4-Dichlorobenzene	ND	5.1	1.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.1	2.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.1	2.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	5.1	ug/l	
132-64-9	Dibenzofuran	ND	5.1	1.0	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Com

Report of Analysis

Client Sample ID:	062007R		
Lab Sample ID:	F50408-8	Date Sampled:	06/20/07
Matrix:	AQ - Equipment Blank	Date Received:	06/21/07
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

ABN TCL List w/o PAHs

CAS No.	Compound	Result	RL	MDL	Units	Q
84-74-2	Di-n-butyl phthalate	ND	5.1	2.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.1	2.6	ug/l	
84-66-2	Diethyl phthalate	ND	5.1	2.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.1	2.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.1	2.6	ug/l	
118-74-1	Hexachlorobenzene	ND	5.1	1.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.1	2.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.1	2.0	ug/l	
67-72-1	Hexachloroethane	ND	5.1	2.0	ug/l	
78-59-1	Isophorone	ND	5.1	1.0	ug/l	
88-74-4	2-Nitroaniline	ND	10	4.1	ug/l	
99-09-2	3-Nitroaniline	ND	10	4.1	ug/l	
100-01-6	4-Nitroaniline	ND	10	4.1	ug/l	
98-95-3	Nitrobenzene	ND	5.1	1.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.1	2.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.1	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	5.1	1.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	32%		14-62%
4165-62-2	Phenol-d5	22%		10-40%
118-79-6	2,4,6-Tribromophenol	58%		33-118%
4165-60-0	Nitrobenzene-d5	56%		42-108%
321-60-8	2-Fluorobiphenyl	54%		40-106%
1718-51-0	Terphenyl-d14	64%		39-121%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: W035338.D

Form I COM

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	062007R		
Lab Sample ID:	F50408-8	Date Sampled:	06/20/07
Matrix:	AQ - Equipment Blank	Date Received:	06/21/07
Method:	SW846 8270C BY SIM SW846 3510C	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W035338.D	1	07/03/07	RB	06/27/07	OP21206	SW1835
Run #2							

	Initial Volume	Final Volume
Run #1	980 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.0	0.51	ug/l	
208-96-8	Acenaphthylene	ND	1.0	0.51	ug/l	
120-12-7	Anthracene	ND	1.0	0.51	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.20	0.051	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.20	0.10	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.20	0.051	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.20	0.10	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.20	0.10	ug/l	
218-01-9	Chrysene	ND	0.20	0.10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.20	0.051	ug/l	
206-44-0	Fluoranthene	ND	1.0	0.26	ug/l	
86-73-7	Fluorene	ND	1.0	0.26	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.20	0.051	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.0	0.26	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.0	0.26	ug/l	
91-20-3	Naphthalene	ND	1.0	0.26	ug/l	
85-01-8	Phenanthrene	ND	1.0	0.51	ug/l	
129-00-0	Pyrene	ND	1.0	0.26	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant (RFAAP) Data Validation – Total Organic Carbon (TOC) Accutest Laboratories, Inc., SDG F50408

DATE: August 23, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at New River Unit (NRU) Groundwater Investigation at RFAAP on June 18, 2007, June 19, 2007, June 20, 2007, and June 21, 2007. Samples were analyzed for total organic carbon (TOC) using USEPA 415.1. A total of eleven aqueous samples were validated. The sample IDs are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
WBGMW01	F50408-1	IAAMW03	F50408-9
WBGMW02	F50408-2	BLAMW01	F50408-10
WBGMW03	F50408-3	IAAMW02	F50408-11
NBGMW01	F50408-4	IAAMW04	F50408-14
NBGMW02	F50408-5	BLAMW02	F50408-17
TMMW01	F50408-6		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *DoD Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), and method-specific criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Inorganic Data Review* (April, 1993). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times and Preservation
	X	Initial and Continuing Calibration
	X	Blank Analysis
	X	Laboratory Control Sample
	X	Matrix Spike
	X	Laboratory Duplicate
	X	Field Duplicate
	X	Calculation Verification

The quality of data collected in support of this sampling activity is considered acceptable.

Eric Malarek, Chemist

8/23/07
Date

RFAAP VALIDATION REPORT
TOC REVIEW
SDG F50408

I-Holding Times and Preservation
The primary objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample analysis. Holding time criteria: Cool 4°C±2°C, HCl pH<2, 28 days for TOC. The dates and times were compared between the sample collection and laboratory analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 06/18/07, 06/19/07, 06/20/07, and 06/21/07, the coolers were received by the primary laboratory (Accutest) on 06/22/06 at 1.0°C, 1.2°C, 1.8°C, 2.0°C, 1.4°C, and 1.0°C. The herbicides were subcontracted to Accutest TX and were received the samples at 1.4°C, 3.0°C, 2.2°C, and 3.4°C. The TOX were subcontracted to Accutest NJ and were received at 3.6°C, 4.8°C, and 2.8°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the samples at 5.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 4.8°C, 4.5°C, 5.8°C, 3.2°C, and 1.4°C. Even though several of the temperatures were below criteria, there were no impacts regarding the sample analysis. No qualifiers were applied based upon these outliers.

- Holding Time Review: Samples were collected 06/18/07, 06/19/07, 06/20/07, and 06/21/07. For samples collected 06/18/07, 06/19/07, and 06/20/07, the TOC samples were analyzed on 06/21/07 and 06/22/07. For samples collected 06/21/07, the TOC samples were analyzed on 07/04/07 and 07/05/07. All criteria were met. No qualifier was applied.

II-Initial and Continuing Calibration
Bench and run summary sheets were reviewed to determine whether calibration was performed at the beginning of sample analysis using the following criteria. Percent recoveries for initial and continuing calibration (90-110%) must be within limits.

TOC: 1 – blank (DoD QSM: <½MRL)
5 – standards (DoD QSM: r≥0.995)
ICV/CCV (DoD QSM: 90-110%)

- TOC analysis was run on 06/21/07, 06/22/07, 07/04/07, and 07/05/07. The initial calibration was analyzed 06/19/07 with a correlation coefficient of 0.9999. All ICV/CCVs were within criteria. All criteria were met. No qualifiers were applied. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), IAAMW03 (F50408-9), BLAMW01 (F50408-10), IAAMW02 (F50408-11), IAAMW04 (F50408-14), and BLAMW02 (F50408-17) apply to this calibration.

III-Blank Analysis
Blanks are assessed to determine the existence and magnitude of contamination problems. No contaminants should be detected (i.e. <MDL) in any of the associated blanks. The DoD QSM criteria specifies all concentrations should be <½MRL. Samples are qualified "U" when they are less than 5x the absolute value of the maximum blank concentration and treated as non-detect. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor = 1. Rinse blank 062007R (F50408-8) (low-flow pump) applies to all samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	Analysis	QC Blank ID	Target Compound	Max Conc. mg/L	Action Level mg/L	U qualified samples
06/21/07	TOC	ICB/CCBs	All <½ MRL	NA	NA	None
06/22/07	TOC	ICB/CCBs	All <½ MRL	NA	NA	None
07/04/07	TOC	ICB/CCBs	All <½ MRL	NA	NA	None
06/21/07	TOC	GN26103-MB	All <½ MRL	NA	NA	None
06/22/07	TOC	GN26386-MB	All <½ MRL	NA	NA	None
07/04/07	TOC	GN26348-MB	All <½ MRL	NA	NA	None
06/22/07	TOC	062007R	All <½ MRL	NA	NA	None

MRL = Method Reporting Limit
NA = Not Applicable

IV-Laboratory Control Samples

The laboratory control sample (LCS) serve as a monitor of the overall performance of each step during the analysis, including the sample preparation. LCS are generated to determine long-term accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. DoD QSM LCS recovery limits currently specify the use of in-house specified limits (DoD, 2006). All aqueous LCS results must fall within the control limits (91-109%).

- Sample GN26103-BS was used as TOC LCS for the 06/21/07 run. All criteria were met. No qualifier was applied. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), and TMMW01 (F50408-6) apply to this LCS.

- Sample GN26386-BS was used as TOC LCS for the 06/22/07 run. All criteria were met. No qualifier was applied. Samples IAAMW03 (F50408-9), BLAMW01 (F50408-10), and IAAMW02 (F50408-11) apply to this LCS.

- Sample GN26348-BS was used as TOC LCS for the 07/04/07 run. All criteria were met. No qualifier was applied. Samples IAAMW04 (F50408-14) and BLAMW02 (F50408-17) apply to this LCS.

V-Matrix Spike

Matrix spikes (MSs) are generated to determine long-term accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. Specific criteria include the analyses of matrix spike samples at a frequency of one MS per 20 samples of similar matrix. DoD QSM MS and MSD recovery limits use the LCS criteria, which currently is the use of in-house specified limits (DoD, 2006). The percent recoveries (%Rs) must be within the specified control limits (91-109%).

- Sample F50478-1 was used for the MS analysis for the 06/21/07 run. Since the spiked sample is not a site-related sample, it was not evaluated. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), and TMMW01 (F50408-6) apply to this MS/MSD.

- Sample 062007R (F50408-8) was used for the MS analysis for the 06/22/07 run. All criteria were met. No qualifiers were met. Samples IAAMW03 (F50408-9), BLAMW01 (F50408-10), and IAAMW02 (F50408-11) apply to this MS/MSD.

- Sample IAAMW04 (F50408-14) was used for the MS analysis for the 07/04/07 run. All criteria were met. No qualifiers were met. Samples IAAMW04 (F50408-14) and BLAMW02 (F50408-17) apply to this MS/MSD.

VI-Duplicate Sample Analysis
Duplicate sample determinations are used to demonstrate acceptable method precision by the laboratory at the time of analysis. Duplicate analysis is performed to generate data in order to determine the long-term precision of the analytical method on various matrices. DoD QSM MS and MSD recovery limits use the LCS criteria, which currently is the use of in-house specified limits (DoD, 2006). RPDs must be within established control limits (≤16% RPD).

- Sample F50478-1 was used for the laboratory duplicate analysis for the 06/21/07 run. Since the spiked sample is not a site-related sample, it was not evaluated. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), and TMMW01 (F50408-6) apply to this laboratory duplicate.

- Sample 062007R (F50408-8) was used for the laboratory duplicate analysis for the 06/22/07 run. All criteria were met. No qualifiers were met. Samples IAAMW03 (F50408-9), BLAMW01 (F50408-10), and IAAMW02 (F50408-11) apply to this laboratory duplicate.

- Sample IAAMW04 (F50408-14) was used for the laboratory duplicate analysis for the 07/04/07 run. All criteria were met. No qualifiers were met. Samples IAAMW04 (F50408-14) and BLAMW02 (F50408-17) apply to this laboratory duplicate.

VII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 35% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field groundwater sample duplicate pair NBGMW01 (F50408-4) and TMMW01 (F50408-6) was collected for TOC analysis. All target compounds were non-detect. All criteria were met. No qualifiers were applied.

VIII-Calculation Verification
The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J." The following calculations were performed for verification:

Sample: WBGMW01 (F50408-1), TOC

$y = mx + b$

where: y is the response area
m is the slope
x is the amount or concentration of analyte (µg/L)
b is a constant

First run: Y = 5492 m = 2.502 b = 0.4714 DF = 1

$5492 = 2.502 (X) + 0.4714$
$X = 2194.86$ µg/L

TOC (mg/L) = (X µg/L)*(DF) / (1000 µg/1 mL)

TOC (mg/L) = (2194.86 µg/L)*(1) / (1000 µg/1mL) = 2.195 mg/L

Second run: Y = 5520 m = 2.502 b = 0.4714 DF = 1

5520 = 2.502 (X) + 0.4714
X = 2206.05 µg/L

TOC (mg/L) = (X µg/L)*(DF) / (1000 µg/1 mL)

TOC (mg/L) = (2206.05 µg/L)*(1) / (1000 µg/1 mL) = 2.206 mg/L

Average TOC (mg/L) = 2.2 mg/L

Reported Value = 2.2 mg/L
%Difference of values = 0.0%

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >25% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

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MEMORANDUM

TO: Jeff Parks, Shaw E&I RFAAP Project Manager

FROM: Eric Malarek, Shaw E&I RFAAP Project Chemist

SUBJECT: Radford Army Ammunition Plant Data Validation – Total Organic Halides
Accutest Laboratories, Inc., SDG F50408

DATE: August 24, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at New River Unit (NRU) Groundwater Investigation at RFAAP on June 18, 2007, June 19, 2007, June 20, 2007, and June 21, 2007. Samples were analyzed for total organic halides (TOX) using USEPA 9020B. A total of eleven aqueous samples were validated. The sample IDs are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
WBGMW01	F50408-1	IAAMW03	F50408-9
WBGMW02	F50408-2	BLAMW01	F50408-10
WBGMW03	F50408-3	IAAMW02	F50408-11
NBGMW01	F50408-4	IAAMW04	F50408-14
NBGMW02	F50408-5	BLAMW02	F50408-17
TMMW01	F50408-6		

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *DoD Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), and method-specific criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Inorganic Data Review* (April, 1993). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times
	X	Initial and Continuing Calibration
	X	Blank Analysis
	X	Laboratory Control Sample
	X	Laboratory Duplicate
	X	Matrix Spike
	X	Field Duplicate
	X	Calculation Verification

The quality of data collected in support of this sampling activity is considered acceptable.

Eric Malarek, Chemist

8/24/07
Date

RFAAP VALIDATION REPORT
TOX REVIEW
SDG F50408

I-Holding Times and Preservation

The primary objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of sample analysis. Holding time criteria: Preserved, Cool 4°C±2°C, H_2SO_4 pH<2; 28 days for TOX. The dates and times were compared between the sample collection and laboratory analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 06/18/07, 06/19/07, 06/20/07, and 06/21/07, the coolers were received by the primary laboratory (Accutest) on 06/22/06 at 1.0°C, 1.2°C, 1.8°C, 2.0°C, 1.4°C, and 1.0°C. The herbicides were subcontracted to Accutest TX and were received the samples at 1.4°C, 3.0°C, 2.2°C, and 3.4°C. The TOX were subcontracted to Accutest NJ and were received at 3.6°C, 4.8°C, and 2.8°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the samples at 5.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 4.8°C, 4.5°C, 5.8°C, 3.2°C, and 1.4°C. Even though several of the temperatures were below criteria, there were no impacts regarding the sample analysis. No qualifiers were applied based upon these outliers.

- Holding Time Review: Samples were collected 06/18/07, 06/19/07, 06/20/07, and 06/21/07. For samples collected 06/18/07 and 06/20/07, the TOX samples were analyzed on 06/29/07. For samples collected 06/19/07, 06/20/07, and 06/21/07, the TOX samples were analyzed on 06/30/07. All criteria were met. No qualifier was applied.

II-Initial and Continuing Calibration

Bench and run summary sheets were reviewed to determine whether calibration was performed at the beginning of sample analysis using the following criteria. Percent recoveries must be within limits.

TOX: 1 – blank (DoD QSM: <½MRL)
1 - standard
ICV/CCV (DoD QSM: 90-110%)

- TOX analysis was run on 06/29/07 and 06/30/07. All ICV/CCV criteria were met. No qualifiers were applied.

III-Blank Analysis

Blanks are assessed to determine the existence and magnitude of contamination problems. No contaminants should be detected (i.e. <MDL) in any of the associated blanks. The DoD QSM criteria specifies all concentrations should be <½MRL. Samples are qualified "U" when they are less than 5x the absolute value of the maximum blank concentration and treated as non-detect. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor = 1. Rinse blank 062007R (F50408-8) (low-flow pump) applies to all samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	Analysis	QC Blank ID	Max Conc. ug/L	Action Level ug/L	B qualified samples
06/29/07	TOX	ICB/CCBs	All <½MRL	NA	None
06/30/07	TOX	ICB/CCBs	All <½MRL	NA	None
06/29/07	TOX	GN4881-MB	All <½MRL	NA	None
06/30/07	TOX	GN4902-MB	All <½MRL	NA	None
06/30/07	TOX	062007R	All <½MRL	NA	None

MRL = Method Reporting Limit
NA = Not Applicable

IV-Laboratory Control Sample
The laboratory control sample (LCS) serve as a monitor of the overall performance of each step during the analysis, including the sample preparation. LCS are generated to determine long-term accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. DoD QSM LCS recovery limits currently specify the use of in-house specified limits (DoD, 2006). All aqueous LCS results must fall within the control limits (90-110%).

- Sample GN4881-BS was used as TOX LCS for the 06/29/07 run. All criteria were met. No qualifier was applied. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), and IAAMW03 (F50408-9) apply to this LCS.

- Sample GN4902-BS was used as TOX LCS for the 06/30/07 run. All criteria were met. No qualifier was applied. Samples WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), BLAMW01 (F50408-10), and IAAMW02 (F50408-11) apply to this LCS.

V-Duplicate Sample Analysis
Duplicate sample determinations are used to demonstrate acceptable method precision by the laboratory at the time of analysis. Duplicate analysis is performed to generate data in order to determine the long-term precision of the analytical method on various matrices. DoD QSM MS and MSD recovery limits use the LCS criteria, which currently is the use of in-house specified limits (DoD, 2006). RPDs must be within established control limits (≤18% RPD).

- Sample IAAMW03 (F50408-9) was used for the laboratory duplicate analysis for the 06/29/07 run. TOX (23.4%) was outside criteria. TOX was outside due to low sample concentrations (i.e. <MRL); therefore, no qualifiers were applied based upon this outlier. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), and IAAMW03 (F50408-9) apply to this laboratory duplicate.

- No laboratory duplicate was performed for the 06/30/07 run; therefore not evaluated. Samples WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), BLAMW01 (F50408-10), and IAAMW02 (F50408-11) would of applied.

VI-Matrix Spike
Matrix spikes (MSs) are generated to determine long-term accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. Specific criteria include the analyses of matrix spike samples at a frequency of one MS per 20 samples of similar matrix. DoD QSM MS recovery limits use the LCS criteria, which currently is the use of in-house specified limits (DoD, 2006). The percent recoveries (%Rs) must be within the specified control limits (55-144%).

- Sample IAAMW03 (F50408-9) was used for the MS analysis for the 06/29/07 run. All criteria were met. No qualifiers were applied. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), and IAAMW03 (F50408-9) apply to this MS.

- No MS was performed for the 06/30/07 run; therefore not evaluated. Samples WBGMW03 (F50408-3), NBGMW01 (F50408-4), NBGMW02 (F50408-5), TMMW01 (F50408-6), BLAMW01 (F50408-10), and IAAMW02 (F50408-11) would of applied.

VII-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were qualified rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 35% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field groundwater sample duplicate pair NBGMW01 (F50408-4) and TMMW01 (F50408-6) was collected for TOX analysis. All target compounds were non-detect. All criteria were met. No qualifiers were applied.

VIII-Calculation Verification
The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J." The following calculations were performed for verification:

Sample: IAAMW03 (F50408-9), TOX

TOX (μg/L) = (C1 – C2) / (Vs)

Where: C1 = Cl of sample first and second column (μg)
C2 = Cl of blank (μg)
Vs = Volume of sample (L)

TOX (μg/L) = (9.5646+0.9284– 0.0) / (0.020) = 524.65 μg/L = 0.52 mg/L

Reported Value = 0.57 mg/L
% Difference = 8.8%

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >25% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

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Report of Analysis

Client Sample ID:	WBGMW01		
Lab Sample ID:	F50408-1	Date Sampled:	06/18/07
Matrix:	AQ - Ground Water	Date Received:	06/19/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Total Organic Carbon	2.2	1.0	mg/l	1	06/22/07 00:27	LE	EPA 415.1
Total Organic Halides [a]	< 0.050	0.050	mg/l	1	06/29/07	ANJ	SW846 9020B M

(a) Analysis performed at Accutest Laboratories, Dayton, NJ.

RL = Reporting Limit

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Report of Analysis

Client Sample ID:	WBGMW02		
Lab Sample ID:	F50408-2	Date Sampled:	06/18/07
Matrix:	AQ - Ground Water	Date Received:	06/19/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Total Organic Carbon	2.3	1.0	mg/l	1	06/21/07 19:10	LE	EPA 415.1
Total Organic Halides [a]	< 0.050	0.050	mg/l	1	06/29/07	ANJ	SW846 9020B M

(a) Analysis performed at Accutest Laboratories, Dayton, NJ.

RL = Reporting Limit

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Report of Analysis

Client Sample ID:	WBGMW03		
Lab Sample ID:	F50408-3	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Total Organic Carbon	1.4	1.0	mg/l	1	06/21/07 19:55	LE	EPA 415.1
Total Organic Halides [a]	< 0.050	0.050	mg/l	1	06/30/07	ANJ	SW846 9020B M

(a) Analysis performed at Accutest Laboratories, Dayton, NJ.

RL = Reporting Limit

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Report of Analysis

Client Sample ID:	NBGMW01		
Lab Sample ID:	F50408-4	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Total Organic Carbon	<1.0	1.0	mg/l	1	06/21/07 20:09	LE	EPA 415.1
Total Organic Halides [a]	<0.050	0.050	mg/l	1	06/30/07	ANJ	SW846 9020B M

(a) Analysis performed at Accutest Laboratories, Dayton, NJ.

RL = Reporting Limit

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Report of Analysis

Client Sample ID:	NBGMW02		
Lab Sample ID:	F50408-5	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Total Organic Carbon	< 1.0	1.0	mg/l	1	06/21/07 20:24	LE	EPA 415.1
Total Organic Halides [a]	< 0.050	0.050	mg/l	1	06/30/07	ANJ	SW846 9020B M

(a) Analysis performed at Accutest Laboratories, Dayton, NJ.

RL = Reporting Limit

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Report of Analysis

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Client Sample ID:	TMMW01		
Lab Sample ID:	F50408-6	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Total Organic Carbon	< 1.0	1.0	mg/l	1	06/21/07 20:38	LE	EPA 415.1
Total Organic Halides [a]	< 0.050	0.050	mg/l	1	06/30/07	ANJ	SW846 9020B M

(a) Analysis performed at Accutest Laboratories, Dayton, NJ.

RL = Reporting Limit

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Report of Analysis

Client Sample ID:	IAAMW03		
Lab Sample ID:	F50408-9	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Total Organic Carbon	< 1.0	1.0	mg/l	1	06/22/07 14:13	LE	EPA 415.1
Total Organic Halides [a]	< 0.050	0.050	mg/l	1	06/29/07	ANJ	SW846 9020B M

(a) Analysis performed at Accutest Laboratories, Dayton, NJ.

RL = Reporting Limit

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Report of Analysis

Client Sample ID:	BLAMW01		
Lab Sample ID:	F50408-10	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Total Organic Carbon	< 1.0	1.0	mg/l	1	06/22/07 14:27	LE	EPA 415.1
Total Organic Halides [a]	< 0.050	0.050	mg/l	1	06/30/07	ANJ	SW846 9020B M

(a) Analysis performed at Accutest Laboratories, Dayton, NJ.

RL = Reporting Limit

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Report of Analysis

Client Sample ID:	IAAMW02		
Lab Sample ID:	F50408-11	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Total Organic Carbon	1.1	1.0	mg/l	1	06/22/07 14:41	LE	EPA 415.1
Total Organic Halides [a]	<0.050	0.050	mg/l	1	06/30/07	ANJ	SW846 9020B M

(a) Analysis performed at Accutest Laboratories, Dayton, NJ.

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Report of Analysis

Client Sample ID:	IAAMW04		
Lab Sample ID:	F50408-14	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Total Organic Carbon	< 1.0	1.0	mg/l	1	07/04/07 13:27	LE	EPA 415.1
Total Organic Halides [a]	< 0.050	0.050	mg/l	1	06/30/07	ANJ	SW846 9020B M

(a) Analysis performed at Accutest Laboratories, Dayton, NJ.

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Report of Analysis

Client Sample ID:	BLAMW02		
Lab Sample ID:	F50408-17	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Total Organic Carbon	80.7	5.0	mg/l	5	07/05/07 08:54	LE	EPA 415.1
Total Organic Halides [a]	< 0.050	0.050	mg/l	1	06/30/07	ANJ	SW846 9020B M

(a) Analysis performed at Accutest Laboratories, Dayton, NJ.

RL = Reporting Limit

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	062007R		
Lab Sample ID:	F50408-8	Date Sampled:	06/20/07
Matrix:	AQ - Equipment Blank	Date Received:	06/21/07
		Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Total Organic Carbon	< 1.0	1.0	mg/l	1	06/22/07 13:58	LE	EPA 415.1
Total Organic Halides [a]	< 0.050	0.050	mg/l	1	06/30/07	ANJ	SW846 9020B M

(a) Analysis performed at Accutest Laboratories, Dayton, NJ.

RL = Reporting Limit

Shaw Environmental, Inc.
2113 Emmorton Park Road
Edgewood, Maryland
410-612-6350
FAX: 410-612-6351

Shaw® Shaw Environmental, Inc.

MEMORANDUM

TO: Jeff Parks, Shaw E&I Radford Army Ammunition Plant (RFAAP) Project Manager

FROM: Eric Malarek, Shaw E&I Project Chemist

SUBJECT: RFAAP Data Validation - Volatiles
Accutest Laboratories, Inc., SDG F50408

DATE: August 24, 2007

The purpose of this memorandum is to present the data validation report for the samples collected at New River Unit (NRU) Groundwater Investigation at RFAAP on June 18, 2007, June 19, 2007, June 20, 2007, and June 21, 2007. The samples were analyzed for target compound list (TCL) volatile organic compounds (VOCs) using USEPA SW846 Method 5030B/8260B. A total of twelve aqueous samples were validated. The sample IDs are:

Field Sample ID	Lab Sample ID	Field Sample ID	Lab Sample ID
WBGMW01	F50408-1	IAAMW03	F50408-9
WBGMW02	F50408-2	BLAMW01	F50408-10
WBGMW03	F50408-3	IAAMW02	F50408-11
NBGMW01	F50408-4	IAAMW04	F50408-14
NBGMW02	F50408-5	IAAMW01	F50408-15
TMMW01	F50408-6	BLAMW02	F50408-17

Data were reviewed by Eric Malarek and validated using a combination of project QAPP, *Quality Systems Manual for Environmental Laboratories, Final Version 3, January, 2006* (DoD, 2006) (DoD QSM), method-specific criteria, and laboratory SOP criteria. The data qualifier scheme was consistent with the *Region III Modifications to the National Functional Guidelines for Organic Data Review* (September 1994). Parameters evaluated are presented in **Table 1**. Data associated with parameters in compliance with quality control specifications have not been qualified. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA Region III specifications.

Table 1 Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
X		Holding Times and Preservation
	X	Instrument Performance Results
	X	Initial Calibration
X		Continuing Calibration
X		Blank Analysis
	X	Laboratory Control Sample
X		Matrix Spike / Spike Duplicate Sample
	X	System Monitoring Compounds
	X	Internal Standards
	X	Field Sample Duplicate
X		Quantitation Verification

The quality of data collected in support of this sampling activity is considered acceptable with noted qualifications, except for the following. Chloroethane, bromomethane, chloromethane, and vinyl chloride were qualified rejected "R" for the spiked sample WBGMW01 (F50408-1) based upon the zero or <10% recoveries (See Section VII). The associated LCS was within criteria limits for these compounds.

Eric Malarek, Chemist

8/24/07
Date

RFAAP VALIDATION REPORT
VOLATILES REVIEW
SDG F50408

I-Holding Times and Preservation
The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of analysis. Holding time criteria: For aqueous samples cooled @ 4°C±2°C; pH<2 HCl, the maximum holding time is 14 days (7 days if no HCl added) from sample collection to analysis.

- Temperature Review: The temperature blank was sent with each cooler and recorded by the laboratory upon receipt. For samples collected on 06/18/07, 06/19/07, 06/20/07, and 06/21/07, the coolers were received by the primary laboratory (Accutest) on 06/22/06 at 1.0°C, 1.2°C, 1.8°C, 2.0°C, 1.4°C, and 1.0°C. The herbicides were subcontracted to Accutest TX and were received the samples at 1.4°C, 3.0°C, 2.2°C, and 3.4°C. The TOX were subcontracted to Accutest NJ and were received at 3.6°C, 4.8°C, and 2.8°C. The perchlorate subcontract laboratory (Datachem Laboratories, Inc.) received the samples at 5.0°C. The dioxin subcontract laboratory (SGS Paradigm Analytical Laboratories, Inc.) received the samples at 4.8°C, 4.5°C, 5.8°C, 3.2°C, and 1.4°C. Even though several of the temperatures were below criteria, there were no impacts regarding the sample analysis. No qualifiers were applied based upon these outliers.

- Holding Time Review: The aqueous samples were collected for TCL VOCs on 06/18/07, 06/19/07, 06/20/07, and 06/21/07. For samples collected 06/18/07, the VOCs were prepped and analyzed on 06/29/07. For samples collected 06/19/07, the VOCs were prepped and analyzed on 07/02/07. For samples collected 06/19/07 and 06/20/07, the VOCs were prepped and analyzed on 07/03/07. For samples collected 06/21/07, the VOCs were prepped and analyzed on 07/05/07. Sample BLAMW02 (F50408-17) was collected 06/21/07, received pH>2, and analyzed on 07/05/07 at 7 days out of hold. Sample BLAMW02 (F50408-17) was qualified "L" for detects and "UL" for non-detects based upon this outlier for all aromatic VOCs (benzene, chlorobenzene, ethylbenzene, toluene, styrene, o-xylene, and m,p-xylenes).

II-Instrument Performance Check
The analysis of the instrument performance check solution must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check, bromofluorobenzene (BFB), met the ion abundance criteria. No qualification was applied.

III-Initial Calibration
Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for volatile target compounds. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear calibration curve. The RRF must be greater than 0.1 for chloromethane, 1,1-dichloroethane, and bromoform and greater than 0.3 for 1,1,2,2-tetrachloroethane and chlorobenzene. The minimum relative response factor (RRF) must be ≥0.05 for all other compounds. The DoD QSM specifies that the percent relative standard deviation (%RSD) must be ≤15% for each target compound and must be ≤30% for each calibration check compound. For compounds analyzed using linear regression or second order, correlation coefficients must be >0.995 and coefficients of determination >0.99. All detects are qualified as estimated "J" for where there were exceeding %RSDs, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For initial calibration performed on 06/29/07 on instrument MSVOA4, target compounds acetone (19.1%), methylene chloride (21.0%), 4-methyl-2-pentanone (27.6%), trans-1,3-dichloropropene (15.3%), 2-hexanone (29.8%), styrene (16.9%), and bromoform (15.2%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds acetone (r=0.9969), methylene chloride (r=0.9989), 4-methyl-2-pentanone (r=0.9994), trans-1,3-dichloropropene (r=0.9998), 2-hexanone (r=0.9992), and styrene (r=0.9997) were quantified using linear or second order regression with correlation coefficients >0.995, therefore, no qualifiers were applied based upon these outliers. Bromoform was non-detect for all samples; therefore, no qualifiers were applied based upon the high %RSD. Samples IAAMW04 (F50408-14), IAAMW01 (F50408-15), and BLAMW02 (F50408-17) were analyzed using this initial calibration.

- For initial calibration performed on 06/20/07 on instrument MSVOA5, target compounds 1,1-dichloroethene (17.7%), carbon disulfide (15.3%), methylene chloride (52.5%; grossly exceeding), trans-1,2-dichloroethene (15.5%), 1,1,1-trichloroethane (16.7%), carbon tetrachloride (20.2%), benzene (15.6%), trichloroethene (15.2%), 1,2-dichloropropane (15.6%), bromodichloromethane (16.4%), cis-1,3-dichloropropene (16.5%), 4-methyl-2-pentanone (18.0%), trans-1,3-dichloropropene (15.0%), 2-hexanone (17.2%), tetrachloroethene (15.1%), dibromochloromethane (18.7%), ethylbenzene (17.1%), m,p-xylenes (19.1%), o-xylenes (19.9%), styrene (24.4%), and bromoform (23.9%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds 1,1-dichloroethene (r=0.9994), carbon disulfide (r=0.9993), methylene chloride (r=0.9996), trans-1,2-dichloroethene (r=0.9994), 1,1,1-trichloroethane (r=0.9997), carbon tetrachloride (r=1.0000), benzene (r=0.9999), trichloroethene (r=1.0000), 1,2-dichloropropane (r=0.9999), bromodichloromethane (r=0.9999), cis-1,3-dichloropropene (r=0.9999), 4-methyl-2-pentanone (r=0.9999), trans-1,3-dichloropropene (r=0.9992), 2-hexanone (r=0.9999), tetrachloroethene (r=0.9999), dibromochloromethane (r=0.9999), ethylbenzene (r=1.0000), m,p-xylenes (r=0.9999), o-xylenes (r=0.9997), and styrene (r=0.9998) were quantified using linear or second order regression with correlation coefficients >0.995, therefore, no qualifiers were applied based upon these outliers. Bromoform was non-detect for all samples; therefore, no qualifiers were applied based upon the high %RSD. Samples WBGMW01 (F50408-1), WBGMW02 (F50408-2), WBGMW03 (F50408-3), and NBGMW01 (F50408-4) were analyzed using this initial calibration.

- For initial calibration performed on 06/20/07 on instrument MSVOA6, target compounds bromomethane (31.8%; grossly exceeding), chloroethane (32.2%; grossly exceeding), carbon disulfide (25.8%), methylene chloride (75.9%; grossly exceeding), acetone (54.8%; grossly exceeding), o-xylene (21.8%), styrene (23.3%), and bromoform (20.7%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds bromomethane (r=0.9983), chloroethane (r=0.9991), carbon disulfide (r=0.9957), methylene chloride (r=0.9994), acetone (r=0.9973), o-xylene (r=0.9992), and styrene (r=0.9998) were quantified using linear or second order regression with correlation coefficients >0.995, therefore, no qualifiers were applied based upon these outliers. Bromoform was non-detect for all samples; therefore, no qualifiers were applied based upon the high %RSD. Samples NBGMW02 (F50408-5) and TMMW01 (F50408-6) were analyzed using this initial calibration.

- For initial calibration performed on 07/03/07 on instrument MSVOA6, target compounds chloroethane (16.7%), methylene chloride (22.7%), 2-hexanone (17.1%), styrene (16.5%), and bromoform (17.6%) were outside criteria. All other target compounds were within criteria (%RSD≤15% or ≤30%; RRF≥0.05). Compounds chloroethane (r=0.9998), methylene chloride (r=0.9999), 2-hexanone (r=0.9996), and styrene (r=1.0000) were quantified using linear or second order regression with correlation coefficients >0.995, therefore, no qualifiers were applied based upon these outliers. Bromoform was non-detect for all samples; therefore, no qualifiers were applied based upon the high %RSD. Samples IAAMW03 (F50408-9), BLAMW01 (F50408-10), and IAAMW02 (F50408-11) were analyzed using this initial calibration.

IV-Continuing Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument used is capable of producing acceptable qualitative and quantitative data for volatile target compounds. Continuing calibration establishes the 12-hour relative response factors on which the quantitations are based and checks satisfactory performance of the instrument on a day-to-day basis. The RRF must be greater than 0.1 for chloromethane, 1,1-dichloroethane, and bromoform and greater than 0.3 for 1,1,2,2-tetrachloroethane and chlorobenzene. The minimum relative response factor (RRF) must be ≥0.05 for all other compounds. The DoD QSM specifies that the percent difference (%D) between the initial calibration RRF and the continuing calibration RRF must be within 20% for all target compounds. All detects are qualified as estimated "J" for where there were exceeding %Ds, and all non-detects are qualified as estimated "UJ" for where there were grossly exceeding recoveries, unless determined to be unusable "R". Grossly exceeding is defined as twice the established criteria limits. For where there were low RRFs, all detects are qualified as estimated "J" and non-detects are rejected "R".

- For initial calibration verification performed on 06/29/07 @13:13 on instrument MSVOA4, all target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). No samples reported apply to this initial calibration verification.

- For continuing calibration performed on 07/05/07 @09:10 on instrument MSVOA4, target compounds acetone (28.5%) and methylene chloride (30.1%) were outside criteria. All other target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). Acetone and methylene chloride were qualified estimated "J" for detects and no qualifier for non-detects based upon the high %Drifts. Samples IAAMW04 (F50408-14), IAAMW01 (F50408-15), and BLAMW02 (F50408-17) apply to this continuing calibration.

- For initial calibration verification performed on 06/20/07 @13:29 on instrument MSVOA5, bromomethane (21.1%) was outside criteria. All other target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). Bromomethane was non-detect for all samples; therefore, no qualifiers were applied based upon the high %D. No samples reported apply to this initial calibration verification.

- For continuing calibration performed on 06/29/07 @10:34 on instrument MSVOA5, chloromethane (21.1%) was outside criteria. All other target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). Chloromethane was non-detect for all samples; therefore, no qualifiers were applied based upon the high %D. Samples WBGMW01 (F50408-1) and WBGMW02 (F50408-2) apply to this continuing calibration.

- For continuing calibration performed on 07/03/07 @10:03 on instrument MSVOA5, all target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). No qualifiers were applied. Samples WBGMW03 (F50408-3) and NBGMW01 (F50408-4) apply to this continuing calibration.

- For initial calibration verification performed on 06/20/07 @15:47 on instrument MSVOA6, bromomethane (26.6%) was outside criteria. All other target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). Bromomethane was non-detect for all samples; therefore, no qualifiers were applied based upon the high %D. No samples reported apply to this initial calibration verification.

- For continuing calibration performed on 07/02/07 @09:57 on instrument MSVOA6, all target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). No qualifiers were applied. Samples NBGMW02 (F50408-5) and TMMW01 (F50408-6) apply to this continuing calibration.

- For initial calibration verification performed on 07/03/07 @14:04 on instrument MSVOA6, target compounds 1,1-dichloroethene (22.9%), carbon disulfide (23.1%), and acetone (27.1%) were outside criteria. All other target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). 1,1-Dichloroethene, carbon disulfide, and acetone were qualified estimated "J" for detects and no qualifier for non-detects based upon the high %Ds or %Drifts. No samples reported apply to this initial calibration verification.

- For continuing calibration performed on 07/03/07 @14:50 on instrument MSVOA6, all target compounds were within criteria (%D≤20%; %Drift≤20%; RRF≥0.05). No qualifiers were applied. Samples IAAMW03 (F50408-9), BLAMW01 (F50408-10), and IAAMW02 (F50408-11) apply to this continuing calibration.

V-Blank Analysis

The purpose of blank analyses is to determine the presence and magnitude of contamination problems resulting from field and laboratory activities. A method blank analysis must be performed after the calibration standards and once every 12-hour time period beginning with the injection of BFB. No contaminants should be detected in any of the associated blanks > the MDL. The DoD QSM criteria specifies all concentrations should be less than one-half MRL (<MRL for common laboratory contaminants methylene chloride, acetone, and 2-butanone). Positive sample results are reported and qualified "B", if the concentration of the compound in the sample is ≤10 times (10x) the maximum amount in any blank for the common laboratory contaminants methylene chloride, acetone, and 2-butanone (MEK), or 5 times (5X) the maximum amount for other volatile target compounds. **Table 2** summarizes the blank contamination analysis. Action levels are based upon dilution factor of one. Rinse blank 062007R (F50408-8) (low-flow pump) applies to all samples in this SDG.

Table 2 Blank Contamination Analysis Summary

Analysis Date	QC Blank ID	Compound	Max Conc. µg/L	Action Level µg/L	B qualified samples
06/29/07	VC1995-MB	All target <½MRL	NA	NA	None
07/02/07	VJ2166-MB	All target <½MRL	NA	NA	None
07/03/07	VC1998-MB	All target <½MRL	NA	NA	None
07/03/07	VJ2167-MB	All target <½MRL	NA	NA	None
07/05/07	VB1985-MB	All target <½MRL	NA	NA	None
07/03/07	062007R	Acetone	7.5J	75	BLAMW02, WBGMW02
07/03/07	062007R	Methylene chloride	1.6J	16	None
07/03/07	062007R	Toluene	1.9	9.5	BLAMW01
06/29/07	061807T	Methylene Chloride	1.4J	14	None
07/02/07	061907T	Methylene Chloride	1.4J	14	None
07/03/07	062007T	Methylene Chloride	1.6J	16	None
07/05/07	062107T	All target <½MRL	NA	NA	None

J = Estimated value <MRL and >MDL. Data point qualified was estimated "J".
NA = Not Applicable
MRL = Method Reporting Limit

VI-Laboratory Control Sample
Data for laboratory control samples (LCS) are evaluated to determine long-term accuracy of the analytical method on various matrices. Percent recoveries (%Rs) should be within the specified control limits. The DoD LCS recovery limits are specified in Table D-4 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample VC1995-BS was used as the LCS for the VOC analysis on 06/29/07. All criteria were met. No qualifiers were applied. Samples WBGMW01 (F50408-1) and WBGMW02 (F50408-2) apply to this LCS.

- Sample VJ2166-BS was used as the LCS for the VOC analysis on 07/02/07. Bromomethane (148%) was above DoD QSM criteria and within lab limits. Bromomethane was non-detect for all associated samples; therefore, no qualifiers were applied based upon this outlier. Samples NBGMW02 (F50408-5) and TMMW01 (F50408-6) apply to this LCS.

- Sample VC1998-BS was used as the LCS for the VOC analysis on 07/02/07. Chloromethane (149%) was above DoD QSM criteria and within lab limits. Chloromethane was non-detect for all associated samples; therefore, no qualifiers were applied based upon this outlier. Samples WBGMW03 (F50408-3) and NBGMW01 (F50408-4) apply to this LCS.

- Sample VJ2167-BS was used as the LCS for the VOC analysis on 07/03/07. All criteria were met. No qualifiers were applied. Samples IAAMW03 (F50408-9), BLAMW01 (F50408-10), and IAAMW02 (F50408-11) apply to this LCS.

- Sample VB1985-BS was used as the LCS for the VOC analysis on 07/05/07. Bromomethane (146%) was above DoD QSM criteria and within lab limits. Bromomethane was non-detect for all associated samples; therefore, no qualifiers were applied based upon this outlier. Samples IAAMW04 (F50408-14), IAAMW01 (F50408-15), and BLAMW02 (F50408-17) apply to this LCS.

VII-Matrix Spike/Matrix Spike Duplicate
Data for matrix spike/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. The percent recoveries (%Rs) and the relative percent difference (RPD) must be within the specified control limits. The DoD MS/MSD recovery limits follow the LCS criteria and are specified in Table D-4 of the DoD QSM (DoD, 2006). If the compound is not listed, then the laboratory criteria shall be used.

- Sample WBGMW01 (F50408-1) was used for the MS/MSD analysis on 06/29/07. Chloroethane (0%, 0%), bromomethane (0%, 0%), chloromethane (4%, 5%), and vinyl chloride (3%, 3%) did not recover or recovery <10% for the MS/MSD sample. The associated LCS was within criteria for these compounds (See Section VI). The spiked sample was non-detect for these compounds. Chloroethane, bromomethane, chloromethane, and vinyl chloride were qualified rejected "R" for the spiked sample based upon the zero or <10% recoveries. All other percent recoveries were within criteria for all target compounds. Samples WBGMW01 (F50408-1) and WBGMW02 (F50408-2) apply to this MS/MSD.

- Sample F50481-3 was used for the MS/MSD analysis for analysis on 07/02/07. Since this sample is not a RFAAP site sample, it was not evaluated. No qualifiers were applied. Samples NBGMW02 (F50408-5) and TMMW01 (F50408-6) apply to this MS/MSD.

- Sample WBGMW03 (F50408-3) was used for the MS/MSD analysis on 07/03/07. Chloromethane (134%, 133%) and methyl ethyl ketone (135%, 129%) were outside criteria for the MS/MSD sample. The associated LCS was within criteria for these compounds (See Section VI). The associated samples were non-detect for these compounds; therefore, no qualifiers were applied based upon these outliers. All other percent recoveries were within criteria for all target compounds. Samples WBGMW03 (F50408-3) and NBGMW01 (F50408-4) apply to this MS/MSD.

- Sample IAAMW03 (F50408-9) was used for the MS/MSD analysis on 07/03/07. All percent recoveries were within criteria for all target compounds. No qualifiers were applied. Samples IAAMW03 (F50408-9), BLAMW01 (F50408-10), and IAAMW02 (F50408-11) apply to this MS/MSD.

- Sample F50557-12 was used for the MS/MSD analysis for analysis on 07/05/07. Since this sample is not a RFAAP site sample, it was not evaluated. No qualifiers were applied. Samples IAAMW04 (F50408-14), IAAMW01 (F50408-15), and BLAMW02 (F50408-17) apply to this MS/MSD.

VIII-System Monitoring Compounds (Surrogates)
Laboratory performance on individual samples is evaluated through the review of surrogate spike samples. Recoveries for system monitoring compounds in volatile samples and blanks must be within the specified control limits. DoD surrogate recovery limits are specified in Table D-3 of the DoD QSM (DoD, 2006). If the surrogate is not listed, then the laboratory criteria shall be used.

Criteria: Dibromofluoromethane (87-116%)
1,2-Dichloroethane-d4 (76-127%)
Toluene-d8 (86-112%)
4-Bromofluorobenzene (84-120%)

- All criteria were met. No qualifiers were applied.

IX-Internal Standards (IS)
Internal standards performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run. Specific criteria include: area counts (-50% to +100%) of the associated calibration standard, and retention time (± 30 seconds) from that of the associated calibration standard.

- All criteria were met. No qualifiers were applied.

X-Field Duplicate Sample Analysis
Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The RPD was calculated only for those analytes which were detected at levels exceeding the method reporting limits in both samples of the duplicate pair. Analytes that were rejected (R-qualified) in either sample of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous samples. Analytical results were qualified as estimated (J) for any RPDs exceeding criteria.

- Field groundwater sample duplicate pair NBGMW01 (F50408-4) and TMMW01 (F50408-6) was collected for TCL VOCs. All target compounds were non-detect. All criteria were met. No qualifiers were applied.

XI-Quantitation Verification
The accuracy of analytical results is verified through the calculation of several parameters. The percent difference (%D) between the calculated and the reported values should be within 10%. Any sample value >MDL and <MRL or <3*MDL (whichever is greater) was qualified as estimated, "J."

Sample: WBGMW01 (F50408-1), Chloroform

Conc. (µg/L) = (Ax)*(Is) *(DF)/(Ais)*(RRF)

where: Ax is the compound area
Ais is the corresponding internal standard area
Is is the corresponding internal standard concentration (µg/L)
DF is the dilution factor
RRF is the relative response factor.

Conc. µg/L = (15461 * 50 µg/L * 1) / (1185277 * 0.525) = 1.2 µg/L

Reported Conc. = 1.2 µg/L
%D = 0.0%
Values were within 10% difference.

USEPA Region III Validation Qualifiers

(No Code) = Confirmed identification.

B = The analyte has been detected in the sample and the associated laboratory or field blank.

J = Indicates an estimated value for (1) estimated value due to QC non-conformance. Reported value may not be accurate or precise, (2) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (3) estimating a concentration ≥MDL and <MRL or <3*MDL, whichever is greater.

K = Analyte present. Reported value may be biased high (estimated) due to QC non-conformance.

L = Analyte present. Reported value may be biased low (estimated) due to QC non-conformance.

R = Unreliable result. Analyte may or may not be present in the sample due to QC non-conformance.

UL = Value is estimated bias low and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise. Quantitation limit is probably higher.

UJ = Value is estimated and not detected due to QC non-conformance. Reporting limit may be inaccurate or imprecise.

Laboratory Qualifiers

(No Code) = Confirmed identification.

U = Not detected. The associated number indicates the compound reporting limit for the sample.

A (Dioxins) = B (Metals) = The reported value was obtained from a reading <MRL and ≥MDL and is considered estimated.

B (Organics) = The analyte or compound has been detected in the sample and laboratory method blank. It indicates probable blank contamination.

E (Metals) = Reported value is estimated because of the presence of interferences.

E (Organics) = Identifies compounds whose concentrations exceed the upper level of the calibration range.

EMPC (Dioxins) = The ion-abundance ratio between the two characteristic PCDD/PCDF ions was outside accepted ranges. The detected PCDD/PCDF was reported as an estimated maximum possible concentration (EMPC).

D = Indicates sample was analyzed at a dilution.

J = Indicates an estimated value for (1) estimating a concentration as a tentatively identified compound as indicated by the mass spectral and retention time data, or (2) estimating a concentration <MRL and ≥ MDL.

N (Organics) = Indicates presumptive evidence of a compound for tentatively identified compounds using a library search.

N (Metals) = Laboratory spike sample recovery not within control limits.

P (Organics) = Target analyte confirmation >40% difference for detected compound between the primary and secondary columns. The lower of the two values was reported.

* (Metals) = Duplicate analysis not within control limits.

* (Organics) = Surrogate outside of QC limits on both original and re-analysis.

Raw Data: C0049427.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	WBGMW01		
Lab Sample ID:	F50408-1	Date Sampled:	06/18/07
Matrix:	AQ - Ground Water	Date Received:	06/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	C0049427.D	1	06/29/07	KW	n/a	n/a	VC1995
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result		RL	MDL	Units	Q
67-64-1	Acetone	ND		25	5.0	ug/l	
71-43-2	Benzene	ND		1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND		1.0	0.50	ug/l	
75-25-2	Bromoform	ND		1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND		1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	R	2.0	1.0	ug/l	
67-66-3	Chloroform	1.2	J	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND		2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND		1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND		1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND		1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND		1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND		1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND		1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND		1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND		1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND		1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND		1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND		1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND		5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND		5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	R	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	R	2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND		5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND		5.0	2.5	ug/l	
100-42-5	Styrene	ND		1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND		1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND		1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND		1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND		1.0	0.50	ug/l	
108-88-3	Toluene	ND		1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND		1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	WBGMW01		
Lab Sample ID:	F50408-1	Date Sampled:	06/18/07
Matrix:	AQ - Ground Water	Date Received:	06/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND R	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		87-116%
17060-07-0	1,2-Dichloroethane-D4	104%		76-127%
2037-26-5	Toluene-D8	98%		86-112%
460-00-4	4-Bromofluorobenzene	101%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: C0049428.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

3.2.3

Client Sample ID:	WBGMW02		
Lab Sample ID:	F50408-2	Date Sampled:	06/18/07
Matrix:	AQ - Ground Water	Date Received:	06/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	C0049428.D	1	06/29/07	KW	n/a	n/a	VC1995
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result		RL	MDL	Units	Q
67-64-1	Acetone	5.6	B	25	5.0	ug/l	J
71-43-2	Benzene	ND		1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND		1.0	0.50	ug/l	
75-25-2	Bromoform	ND		1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND		1.0	0.50	ug/l	
75-00-3	Chloroethane	ND		2.0	1.0	ug/l	
67-66-3	Chloroform	ND		1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND		2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND		1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND		1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND		1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND		1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND		1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND		1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND		1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND		1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND		1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND		1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND		1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND		5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND		5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND		2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND		2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND		5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND		5.0	2.5	ug/l	
100-42-5	Styrene	ND		1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND		1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND		1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND		1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND		1.0	0.50	ug/l	
108-88-3	Toluene	ND		1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND		1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	WBGMW02		
Lab Sample ID:	F50408-2	Date Sampled:	06/18/07
Matrix:	AQ - Ground Water	Date Received:	06/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	99%		87-116%
17060-07-0	1,2-Dichloroethane-D4	102%		76-127%
2037-26-5	Toluene-D8	97%		86-112%
460-00-4	4-Bromofluorobenzene	97%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: C0049497.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	WBGMW03		
Lab Sample ID:	F50408-3	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	C0049497.D	1	07/03/07	KW	n/a	n/a	VC1998
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	5.0	ug/l	
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	WBGMW03		
Lab Sample ID:	F50408-3	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	99%		87-116%
17060-07-0	1,2-Dichloroethane-D4	99%		76-127%
2037-26-5	Toluene-D8	94%		86-112%
460-00-4	4-Bromofluorobenzene	102%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: C0049498.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	NBGMW01		
Lab Sample ID:	F50408-4	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	C0049498.D	1	07/03/07	KW	n/a	n/a	VC1998
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	5.0	ug/l	
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	NBGMW01		
Lab Sample ID:	F50408-4	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		87-116%
17060-07-0	1,2-Dichloroethane-D4	102%		76-127%
2037-26-5	Toluene-D8	95%		86-112%
460-00-4	4-Bromofluorobenzene	103%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: J030899.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	NBGMW02		
Lab Sample ID:	F50408-5	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J030899.D	1	07/02/07	JG	n/a	n/a	VJ2166
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	5.0	ug/l	
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	NBGMW02		
Lab Sample ID:	F50408-5	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	106%		87-116%
17060-07-0	1,2-Dichloroethane-D4	96%		76-127%
2037-26-5	Toluene-D8	99%		86-112%
460-00-4	4-Bromofluorobenzene	101%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: J030900.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	TMMW01		
Lab Sample ID:	F50408-6	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J030900.D	1	07/02/07	JG	n/a	n/a	VJ2166
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	5.0	ug/l	
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	TMMW01		
Lab Sample ID:	F50408-6	Date Sampled:	06/19/07
Matrix:	AQ - Ground Water	Date Received:	06/20/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	105%		87-116%
17060-07-0	1,2-Dichloroethane-D4	94%		76-127%
2037-26-5	Toluene-D8	100%		86-112%
460-00-4	4-Bromofluorobenzene	104%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: J030934.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	IAAMW03		
Lab Sample ID:	F50408-9	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J030934.D	1	07/03/07	JG	n/a	n/a	VJ2167
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	5.0	ug/l	
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Com

Report of Analysis

Client Sample ID:	IAAMW03		
Lab Sample ID:	F50408-9	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	96%		87-116%
17060-07-0	1,2-Dichloroethane-D4	95%		76-127%
2037-26-5	Toluene-D8	102%		86-112%
460-00-4	4-Bromofluorobenzene	108%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: J030935.D

Form I Com

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	BLAMW01		
Lab Sample ID:	F50408-10	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J030935.D	1	07/03/07	JG	n/a	n/a	VJ2167
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	5.0	ug/l	
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	0.74 B	1.0	0.50	ug/l	J
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Copy

Report of Analysis

Client Sample ID:	BLAMW01		
Lab Sample ID:	F50408-10	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	97%		87-116%
17060-07-0	1,2-Dichloroethane-D4	95%		76-127%
2037-26-5	Toluene-D8	102%		86-112%
460-00-4	4-Bromofluorobenzene	108%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: J030936.D

Form I Copy

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	IAAMW02		
Lab Sample ID:	F50408-11	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J030936.D	1	07/03/07	JG	n/a	n/a	VJ2167
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	5.0	ug/l	
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Copy

Report of Analysis

Client Sample ID:	IAAMW02		
Lab Sample ID:	F50408-11	Date Sampled:	06/20/07
Matrix:	AQ - Ground Water	Date Received:	06/21/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	97%		87-116%
17060-07-0	1,2-Dichloroethane-D4	95%		76-127%
2037-26-5	Toluene-D8	102%		86-112%
460-00-4	4-Bromofluorobenzene	106%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: B047070.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	IAAMW04		
Lab Sample ID:	F50408-14	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	B047070.D	1	07/05/07	JG	n/a	n/a	VB1985
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	5.0	ug/l	
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I Corp

Report of Analysis

Client Sample ID:	IAAMW04		
Lab Sample ID:	F50408-14	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	107%		87-116%
17060-07-0	1,2-Dichloroethane-D4	116%		76-127%
2037-26-5	Toluene-D8	104%		86-112%
460-00-4	4-Bromofluorobenzene	107%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: B047071.D

Form I Corr

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	IAAMW01		
Lab Sample ID:	F50408-15	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	B047071.D	1	07/05/07	JG	n/a	n/a	VB1985
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	5.0	ug/l	
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Am I Corr

Report of Analysis

Client Sample ID:	IAAMW01		
Lab Sample ID:	F50408-15	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	108%		87-116%
17060-07-0	1,2-Dichloroethane-D4	117%		76-127%
2037-26-5	Toluene-D8	103%		86-112%
460-00-4	4-Bromofluorobenzene	108%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: B047072.D

Form I Corg

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	BLAMW02		
Lab Sample ID:	F50408-17	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	B047072.D	1	07/05/07	JG	n/a	n/a	VB1985
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone [b]	5.4 B	25	5.0	ug/l	J
71-43-2	Benzene	ND VL	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND VL	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND VL	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND VL	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND VL	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	BLAMW02		
Lab Sample ID:	F50408-17	Date Sampled:	06/21/07
Matrix:	AQ - Ground Water	Date Received:	06/22/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND VL	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND VL	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	107%		87-116%
17060-07-0	1,2-Dichloroethane-D4	119%		76-127%
2037-26-5	Toluene-D8	104%		86-112%
460-00-4	4-Bromofluorobenzene	109%		84-120%

(a) Sample was not preserved to a pH < 2; reported results are considered minimum values.
(b) CCV outside of control limits; results may be biased low.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: J030933.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	062007R		
Lab Sample ID:	F50408-8	Date Sampled:	06/20/07
Matrix:	AQ - Equipment Blank	Date Received:	06/21/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J030933.D	1	07/03/07	JG	n/a	n/a	VJ2167
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	7.5 J	25	5.0	ug/l	J
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	1.6 J	5.0	1.0	ug/l	J
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	1.9	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	062007R		
Lab Sample ID:	F50408-8	Date Sampled:	06/20/07
Matrix:	AQ - Equipment Blank	Date Received:	06/21/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	98%		87-116%
17060-07-0	1,2-Dichloroethane-D4	96%		76-127%
2037-26-5	Toluene-D8	102%		86-112%
460-00-4	4-Bromofluorobenzene	108%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: J030879.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	061907T		
Lab Sample ID:	F50408-7	Date Sampled:	06/19/07
Matrix:	AQ - Trip Blank Water	Date Received:	06/20/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J030879.D	1	07/02/07	JG	n/a	n/a	VJ2166
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	5.0	ug/l	
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	1.4 J	5.0	1.0	ug/l	J
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	061907T		
Lab Sample ID:	F50408-7	Date Sampled:	06/19/07
Matrix:	AQ - Trip Blank Water	Date Received:	06/20/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	107%		87-116%
17060-07-0	1,2-Dichloroethane-D4	103%		76-127%
2037-26-5	Toluene-D8	98%		86-112%
460-00-4	4-Bromofluorobenzene	101%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: J030928.D

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Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

3.12.3

Client Sample ID:	062007T		
Lab Sample ID:	F50408-12	Date Sampled:	06/20/07
Matrix:	AQ - Trip Blank Water	Date Received:	06/21/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	J030928.D	1	07/03/07	JG	n/a	n/a	VJ2167
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	5.0	ug/l	
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	1.6 J	5.0	1.0	ug/l	J
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	062007T		
Lab Sample ID:	F50408-12	Date Sampled:	06/20/07
Matrix:	AQ - Trip Blank Water	Date Received:	06/21/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		87-116%
17060-07-0	1,2-Dichloroethane-D4	103%		76-127%
2037-26-5	Toluene-D8	102%		86-112%
460-00-4	4-Bromofluorobenzene	105%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: C0049429.D

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Report of Analysis

Client Sample ID:	061807T		
Lab Sample ID:	F50408-13	Date Sampled:	06/18/07
Matrix:	AQ - Trip Blank Water	Date Received:	06/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	C0049429.D	1	06/29/07	KW	n/a	n/a	VC1995
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	5.0	ug/l	
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	1.4 J	5.0	1.0	ug/l	J
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	061807T		
Lab Sample ID:	F50408-13	Date Sampled:	06/18/07
Matrix:	AQ - Trip Blank Water	Date Received:	06/19/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	99%		87-116%
17060-07-0	1,2-Dichloroethane-D4	103%		76-127%
2037-26-5	Toluene-D8	97%		86-112%
460-00-4	4-Bromofluorobenzene	103%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: B047059.D

From I Cal

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

3.2.0 3

Client Sample ID:	062107T		
Lab Sample ID:	F50408-20	Date Sampled:	06/21/07
Matrix:	AQ - Trip Blank Water	Date Received:	06/22/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	B047059.D	1	07/05/07	JG	n/a	n/a	VB1985
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	5.0	ug/l	
71-43-2	Benzene	ND	1.0	0.50	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.50	ug/l	
75-25-2	Bromoform	ND	1.0	0.50	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.50	ug/l	
75-00-3	Chloroethane	ND	2.0	1.0	ug/l	
67-66-3	Chloroform	ND	1.0	0.50	ug/l	
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.50	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.50	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.50	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.50	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.50	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.40	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.50	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.50	ug/l	
591-78-6	2-Hexanone	ND	5.0	2.5	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.5	ug/l	
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l	
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	2.5	ug/l	
100-42-5	Styrene	ND	1.0	0.50	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.50	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.40	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.50	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.50	ug/l	
108-88-3	Toluene	ND	1.0	0.50	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.50	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Form I COM

Accutest LabLink@66339 09:18 23-Jul-2007

Report of Analysis

Client Sample ID:	062107T		
Lab Sample ID:	F50408-20	Date Sampled:	06/21/07
Matrix:	AQ - Trip Blank Water	Date Received:	06/22/07
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Radford-NRU GW Investigation; Radford, VA		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l	
	m,p-Xylene	ND	2.0	0.50	ug/l	
95-47-6	o-Xylene	ND	1.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	107%		87-116%
17060-07-0	1,2-Dichloroethane-D4	116%		76-127%
2037-26-5	Toluene-D8	103%		86-112%
460-00-4	4-Bromofluorobenzene	111%		84-120%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Appendix E

Fish Tissue/Bioaccumulation Data

NORMANDEAU ASSOCIATES

Radford Army Ammunition Plant (New River Unit)

GENERAL FISHERIES INFORMATION SHEET

QA by _____ on _____

Client: Shaw Environmental Inc.

Job Number: NAI Job# 19769.000

Location (General): RFAAP (New River Unit)

Location (Specific): WBG Pond

Sample Date: 21 July 2004

Gear Type: 18 foot electrofishing boat

Purpose of Sample: Fish Tissue Analysis

Start Time: 1056 / 1156 / 2014 / 2052

End Time: 1116 / 1216 / 2036 / 2125 Duration: 161 minutes electrofishing

Notes on Back? Y / N (circle one)

Field Crew: CDDix, JDCobb (Normandeau), Mark Thomas (Shaw Environmental)

Use Fields as Needed for Study Objectives

Species Code	Total Length (mm)	Weight (g)	Disease Codes 1	2	3	4	Trophic Status	Tag Number	Comments
LM	185	138					Water Column Dweller	WBGTS01	Whole Body
LM	170	102						WBGTS02	Whole Body
LM	186	143						WBGTS03	Whole Body
LM	175	97						WBGTS04	Whole Body
LM	175	112						WBGTS05	Whole Body
LM	168	90						WBGTS06	Whole Body
LM	175	101						WBGTS07	Whole Body
LM	197	144						WBGTS15	Fillet
LM	186	144						WBGTS16	Fillet
LM	222	233						WBGTS17	Fillet
LM	188	156						WBGTS18	Fillet
LM	190	145						WBGTS19	Fillet
LM	192	140						WBGTS20	Fillet
LM	200	164					Water Column Dweller	WBGTS21	Fillet
CP	670	10lbs 8oz					Bottom dweller	WBGTS22	Fillet
CC	410	1lbs 15oz					Bottom dweller	WBGTS08	Whole Body

Species Codes: LM = bluegill, CP = common carp, CC = white sucker

NORMANDEAU ASSOCIATES

Radford Army Ammunition Plant (New River Unit)

GENERAL FISHERIES INFORMATION SHEET

Client: Shaw Environmental Inc. QA by _____ on _____

Job Number: NAI Job# 19769.000

Location (General): RFAAP (New River Unit)

Location (Specific): WBG Pond Start Time: _____

Sample Date: 07/21/04 End Time: _____ Duration: _____

Gear Type: 18 ft. electrofishing boat

Purpose of Sample: Fish Tissue Analysis Notes on Back? Y / N (circle one)

Field Crew: CDOix, JDCobb(Normandeau), Mark Thomas (Shaw Envir)

Use Fields as Needed for Study Objectives

Species Code	Total Length (mm)	Weight (g)	Disease Codes 1	2	3	4		Tag Number	Comments
LM	155	75							Released
LM	167	100							Released
LM	182	110							Released
LC	175	108							Released
LM	168	92							Released

Species Codes: LM = bluegill, LC = green sunfish

8-2-94

Mr. Mark,

Copies of the field notes for Radford (RFAAP) Western Burning Ground pond-fish tissue sampling.

Charlie

FAX -6351

Radford Army Ammunition Facility
Western Burning Ground Pond E/F
Fish Tissue Study
Date: Wednesday 7-27-94
Crew: CO Dir. S.D. Cobb (Normandeau)
Mark Thomas (Shaw Environmental)
Arrived at Western Burning Ground Pond at 1000 hrs
Weather: Sunny, Hot, Humid
Gear: 18 ft. electrofishing boat
P-Chem data for Pond taken @ 30 ft. offshore from Dam Crest
Time: 1025 hrs

	H2O Temp (°C)	DO (mg/l)	pH	Conductivity
Surface	21.0	11.89	7.67	501
Bottom @ 7 ft.	17.0	8.12	7.02	540

(PChem data collected using a Horiba Model U-10 Multi-meter)

E/F Run #1 (DC 300 volts - 6-7 Amps output)
Times: 1454 - 1116 (26 minutes)
Note: electrofished around the entire perimeter of the Pond. Collected a total of 3 Bluegills only!! Not many fish were observed. (No bass or catfish)

RFAAP
-WBG Pond (cont'd)

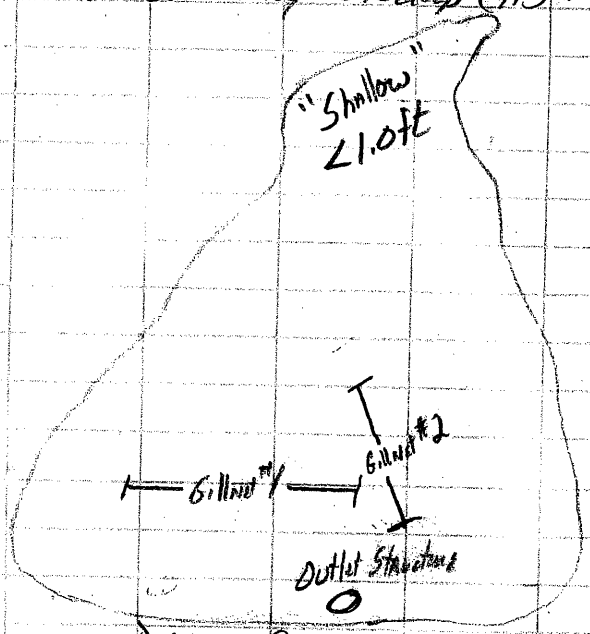
7-21-04

Conductivity appears to be a problem. At 3 several fish were observed "skirting" through the electrical field.

We decided to set two gillnets

Gillnet #1 - 50 ft. long x 6 ft. deep (3.0" mesh)

Gillnet #2 - 50 ft long x 6 ft deep (1.5" mesh)



Set Times:

Gillnet #1 1127 hrs

Gillnet #2 1137 hrs

RFAAP
WBG Pond (cont'd)

7-21-04

Run #2 E/F Times: 1156 - 1216 (21 minutes)

Note Run #2 we were using AC output on 300 volt setting, output current was 5 - 6 amps. (Caught 15 bluegills during Run #2 - No bass or catfish were observed)

Gillnets were checked after 1 hr.

Gillnet #1 (3.0" mesh) Pull Time: 1230
- NO Fish

Gillnet #2 (1.5" mesh) Pull Time 1240
- 2 bluegills

Gillnets were RESET immediately in the same area

We processed fish for tissue analysis from 1238 till 1330 hrs. (See fish data sheets)

We purchased two rod & reel outfits from Walmart. The field crew fished from @ 1500 hrs till 1715 hrs. We caught 9 more bluegills. No bass or catfish were caught. We utilized several types of tackle including; Night crawlers, catfish stink baits, and BASS lures,

RFAAP
-WBG Pond (cont'd)

7-21-04

We decided against using both the 30 ft. bag seine & Trapnet due to the dense Aquatic vegetation present. Approximately 90% of the entire pond is covered with dense Aquatic vegetation And Algae!!)

E/F Run #3 (Approximately at Dusk)
E/F Times: 2014-2036 (22 minutes)
Current - AC Output
Made 2 complete passes around the perimeter of pond. Collected 1 Large Common Carp and 1 white Sucker (both to be utilized for tissue Analysis)

E/F Run #4 → (After dark E/F with lights)
- Current - both AC & DC Current
E/F Times: 2252-2325 (33 minutes)
- NO Fish Collected!

Gillnet #1 3.0" Mesh
Pull Time 2010 hrs - No Fish

Gillnet #2 1.5" Mesh
Pull Time 2045 - 2 Bluegills (released)
+ 1 Large Snapping Turtle (Released)

RFAAP
-WBG Pond

7-21-04

Loaded up E/F Boat and gear at 2200 hrs. JDC + CAO boarded in vehicle passes & ID Badges to the Guards at the New River Unit of Radford Army Ammunition Plant (RFAAP)
No Largemouth Bass (the preferred water column dwelling fish) or Catfish (the preferred bottom dwelling fish) were collected, nor were either species observed during the sampling event.
Returned to our hotel at @ 2300 hrs.