



Department of National Defence - Royal
Military College
ATTN: CANDICE CASUCCI
Environmental Sciences Group
Kingston ON K7K7B4

Date Received: 23-AUG-13
Report Date: 11-SEP-13 07:59 (MT)
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Client Phone: 613-541-6000

Certificate of Analysis

Lab Work Order #: L1352393
Project P.O. #: W0114-4501043958
Job Reference: 13-084 PIN-4
C of C Numbers:
Legal Site Desc:

Comments:

05-SEP-13: Changed metals list to report only those requested on quote GAB/LO
11-SEP-13: Removed pH Hold Time qualifier GAB/LO

Gayle Braun
Senior Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1352393-1 2013-09330 Sampled By: KE/MM on 13-AUG-13 Matrix: WATER								
Physical Tests								
pH		6.89		0.10	pH units	24-AUG-13	24-AUG-13	R2679038
Total Metals								
Arsenic (As)-Total		0.0060		0.0010	mg/L	27-AUG-13	27-AUG-13	R2680631
Cadmium (Cd)-Total		0.000437		0.000090	mg/L	27-AUG-13	27-AUG-13	R2680631
Chromium (Cr)-Total		0.0238		0.00050	mg/L	27-AUG-13	27-AUG-13	R2680631
Cobalt (Co)-Total		0.0201		0.00050	mg/L	27-AUG-13	27-AUG-13	R2680631
Copper (Cu)-Total		0.0484		0.0010	mg/L	27-AUG-13	27-AUG-13	R2680631
Lead (Pb)-Total		0.00861		0.00050	mg/L	27-AUG-13	27-AUG-13	R2680631
Mercury (Hg)-Total		<0.00010		0.00010	mg/L	27-AUG-13	27-AUG-13	R2680404
Nickel (Ni)-Total		0.0697		0.0010	mg/L	27-AUG-13	27-AUG-13	R2680631
Zinc (Zn)-Total		0.791		0.0030	mg/L	27-AUG-13	27-AUG-13	R2680631
Hydrocarbons								
F1 (C6-C10)		<100		100	ug/L		29-AUG-13	
F2 (C10-C16)		<100		100	ug/L		29-AUG-13	
F3 (C16-C34)		<150		150	ug/L		29-AUG-13	
F4 (C34-C50)		<250		250	ug/L		29-AUG-13	
Total Hydrocarbons (C6-C50)		<250		250	ug/L		29-AUG-13	
Chrom. to baseline at nC50		YES				28-AUG-13	29-AUG-13	R2682441
Surrogate: 2-Bromobenzotrifluoride		75.5		50-150	%	28-AUG-13	29-AUG-13	R2682441
Surrogate: 3,4-Dichlorotoluene		78.1		60-140	%		28-AUG-13	R2681030
Polychlorinated Biphenyls								
Aroclor 1242		<0.020		0.020	ug/L	27-AUG-13	29-AUG-13	R2681410
Aroclor 1248		<0.020		0.020	ug/L	27-AUG-13	29-AUG-13	R2681410
Aroclor 1254		0.043		0.020	ug/L	27-AUG-13	29-AUG-13	R2681410
Aroclor 1260		<0.020		0.020	ug/L	27-AUG-13	29-AUG-13	R2681410
Total PCBs		0.043		0.040	ug/L	27-AUG-13	29-AUG-13	R2681410
Surrogate: d14-Terphenyl		88.1		50-150	%	27-AUG-13	29-AUG-13	R2681410
L1352393-2 2013-09331 Sampled By: KE/MM on 13-AUG-13 Matrix: WATER								
Physical Tests								
pH		6.90		0.10	pH units	24-AUG-13	24-AUG-13	R2679038
Total Metals								
Arsenic (As)-Total		0.0065		0.0010	mg/L	27-AUG-13	27-AUG-13	R2680631
Cadmium (Cd)-Total		0.000294		0.000090	mg/L	27-AUG-13	27-AUG-13	R2680631
Chromium (Cr)-Total		0.0216		0.00050	mg/L	27-AUG-13	27-AUG-13	R2680631
Cobalt (Co)-Total		0.0195		0.00050	mg/L	27-AUG-13	27-AUG-13	R2680631
Copper (Cu)-Total		0.0701		0.0010	mg/L	27-AUG-13	27-AUG-13	R2680631
Lead (Pb)-Total		0.00752		0.00050	mg/L	27-AUG-13	27-AUG-13	R2680631
Mercury (Hg)-Total		<0.00010		0.00010	mg/L	27-AUG-13	27-AUG-13	R2680404
Nickel (Ni)-Total		0.0611		0.0010	mg/L	27-AUG-13	27-AUG-13	R2680631
Zinc (Zn)-Total		0.444		0.0030	mg/L	27-AUG-13	27-AUG-13	R2680631

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1352393-2 2013-09331 Sampled By: KE/MM on 13-AUG-13 Matrix: WATER								
Total Metals								
Hydrocarbons								
F1 (C6-C10)		<100		100	ug/L		29-AUG-13	
F2 (C10-C16)		<100		100	ug/L		29-AUG-13	
F3 (C16-C34)		<150		150	ug/L		29-AUG-13	
F4 (C34-C50)		<250		250	ug/L		29-AUG-13	
Total Hydrocarbons (C6-C50)		<250		250	ug/L		29-AUG-13	
Chrom. to baseline at nC50		YES				28-AUG-13	29-AUG-13	R2682441
Surrogate: 2-Bromobenzotrifluoride		64.6		50-150	%	28-AUG-13	29-AUG-13	R2682441
Surrogate: 3,4-Dichlorotoluene		101.6		60-140	%		28-AUG-13	R2681030
Polychlorinated Biphenyls								
Aroclor 1242		<0.020		0.020	ug/L	27-AUG-13	29-AUG-13	R2681410
Aroclor 1248		<0.020		0.020	ug/L	27-AUG-13	29-AUG-13	R2681410
Aroclor 1254		0.035		0.020	ug/L	27-AUG-13	29-AUG-13	R2681410
Aroclor 1260		<0.020		0.020	ug/L	27-AUG-13	29-AUG-13	R2681410
Total PCBs		<0.040		0.040	ug/L	27-AUG-13	29-AUG-13	R2681410
Surrogate: d14-Terphenyl		86.3		50-150	%	27-AUG-13	29-AUG-13	R2681410
L1352393-3 2013-09332 Sampled By: KE/MM on 13-AUG-13 Matrix: WATER								
Physical Tests								
pH		7.15		0.10	pH units	24-AUG-13	24-AUG-13	R2679038
Total Metals								
Arsenic (As)-Total		0.0015		0.0010	mg/L	27-AUG-13	27-AUG-13	R2680631
Cadmium (Cd)-Total		0.000119		0.000090	mg/L	27-AUG-13	27-AUG-13	R2680631
Chromium (Cr)-Total		0.211		0.00050	mg/L	27-AUG-13	27-AUG-13	R2680631
Cobalt (Co)-Total		0.00790		0.00050	mg/L	27-AUG-13	27-AUG-13	R2680631
Copper (Cu)-Total		0.0158		0.0010	mg/L	27-AUG-13	27-AUG-13	R2680631
Lead (Pb)-Total		0.00251		0.00050	mg/L	27-AUG-13	27-AUG-13	R2680631
Mercury (Hg)-Total		<0.00010		0.00010	mg/L	27-AUG-13	27-AUG-13	R2680404
Nickel (Ni)-Total		0.0633		0.0010	mg/L	27-AUG-13	27-AUG-13	R2680631
Zinc (Zn)-Total		0.0394		0.0030	mg/L	27-AUG-13	27-AUG-13	R2680631
Hydrocarbons								
F1 (C6-C10)		<100		100	ug/L		29-AUG-13	
F2 (C10-C16)		<100		100	ug/L		29-AUG-13	
F3 (C16-C34)		<150		150	ug/L		29-AUG-13	
F4 (C34-C50)		<250		250	ug/L		29-AUG-13	
Total Hydrocarbons (C6-C50)		<250		250	ug/L		29-AUG-13	
Chrom. to baseline at nC50		YES				28-AUG-13	29-AUG-13	R2682441
Surrogate: 2-Bromobenzotrifluoride		73.5		50-150	%	28-AUG-13	29-AUG-13	R2682441
Surrogate: 3,4-Dichlorotoluene		121.0		60-140	%		28-AUG-13	R2681030
Polychlorinated Biphenyls								
Aroclor 1242		<0.020		0.020	ug/L	27-AUG-13	29-AUG-13	R2681410

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1352393-3	2013-09332							
Sampled By:	KE/MM on 13-AUG-13							
Matrix:	WATER							
Polychlorinated Biphenyls								
Aroclor 1248		<0.020		0.020	ug/L	27-AUG-13	29-AUG-13	R2681410
Aroclor 1254		<0.020		0.020	ug/L	27-AUG-13	29-AUG-13	R2681410
Aroclor 1260		<0.020		0.020	ug/L	27-AUG-13	29-AUG-13	R2681410
Total PCBs		<0.040		0.040	ug/L	27-AUG-13	29-AUG-13	R2681410
Surrogate: d14-Terphenyl		89.9		50-150	%	27-AUG-13	29-AUG-13	R2681410
L1352393-4	2013-09333							
Sampled By:	KE/MM on 13-AUG-13							
Matrix:	WATER							
Physical Tests								
pH		7.30		0.10	pH units	24-AUG-13	24-AUG-13	R2679038
Total Metals								
Arsenic (As)-Total		<0.010	DLM	0.010	mg/L	27-AUG-13	28-AUG-13	R2680631
Cadmium (Cd)-Total		<0.00090	DLM	0.00090	mg/L	27-AUG-13	28-AUG-13	R2680631
Chromium (Cr)-Total		6.78	DLM	0.0050	mg/L	27-AUG-13	28-AUG-13	R2680631
Cobalt (Co)-Total		0.0419	DLM	0.0050	mg/L	27-AUG-13	28-AUG-13	R2680631
Copper (Cu)-Total		0.115	DLM	0.010	mg/L	27-AUG-13	28-AUG-13	R2680631
Lead (Pb)-Total		<0.0050	DLM	0.0050	mg/L	27-AUG-13	28-AUG-13	R2680631
Mercury (Hg)-Total		0.00014		0.00010	mg/L	27-AUG-13	27-AUG-13	R2680404
Nickel (Ni)-Total		2.00	DLM	0.010	mg/L	27-AUG-13	28-AUG-13	R2680631
Zinc (Zn)-Total		0.793	DLM	0.030	mg/L	27-AUG-13	28-AUG-13	R2680631
Hydrocarbons								
F1 (C6-C10)		<100		100	ug/L		29-AUG-13	
F2 (C10-C16)		<100		100	ug/L		29-AUG-13	
F3 (C16-C34)		<150		150	ug/L		29-AUG-13	
F4 (C34-C50)		<250		250	ug/L		29-AUG-13	
Total Hydrocarbons (C6-C50)		<250		250	ug/L		29-AUG-13	
Chrom. to baseline at nC50		YES				28-AUG-13	29-AUG-13	R2682441
Surrogate: 2-Bromobenzotrifluoride		62.0		50-150	%	28-AUG-13	29-AUG-13	R2682441
Surrogate: 3,4-Dichlorotoluene		80.2		60-140	%		28-AUG-13	R2681030
Polychlorinated Biphenyls								
Aroclor 1242		<0.020		0.020	ug/L	27-AUG-13	29-AUG-13	R2681410
Aroclor 1248		<0.020		0.020	ug/L	27-AUG-13	29-AUG-13	R2681410
Aroclor 1254		0.034		0.020	ug/L	27-AUG-13	29-AUG-13	R2681410
Aroclor 1260		<0.020		0.020	ug/L	27-AUG-13	29-AUG-13	R2681410
Total PCBs		<0.040		0.040	ug/L	27-AUG-13	29-AUG-13	R2681410
Surrogate: d14-Terphenyl		91.8		50-150	%	27-AUG-13	29-AUG-13	R2681410
L1352393-5	2013-09334							
Sampled By:	KE/MM on 14-AUG-13							
Matrix:	WATER							
Physical Tests								
pH		8.82		0.10	pH units	24-AUG-13	24-AUG-13	R2679038
Total Metals								
Arsenic (As)-Total		<0.0010		0.0010	mg/L	27-AUG-13	28-AUG-13	R2680631

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1352393-5 2013-09334 Sampled By: KE/MM on 14-AUG-13 Matrix: WATER								
Total Metals								
Cadmium (Cd)-Total		<0.000090		0.000090	mg/L	27-AUG-13	28-AUG-13	R2680631
Chromium (Cr)-Total		0.00161		0.00050	mg/L	27-AUG-13	28-AUG-13	R2680631
Cobalt (Co)-Total		<0.00050		0.00050	mg/L	27-AUG-13	28-AUG-13	R2680631
Copper (Cu)-Total		<0.0010		0.0010	mg/L	27-AUG-13	28-AUG-13	R2680631
Lead (Pb)-Total		<0.00050		0.00050	mg/L	27-AUG-13	28-AUG-13	R2680631
Mercury (Hg)-Total		<0.00010		0.00010	mg/L	27-AUG-13	27-AUG-13	R2680404
Nickel (Ni)-Total		<0.0010		0.0010	mg/L	27-AUG-13	28-AUG-13	R2680631
Zinc (Zn)-Total		0.0073		0.0030	mg/L	27-AUG-13	28-AUG-13	R2680631
Hydrocarbons								
F1 (C6-C10)		<100		100	ug/L		29-AUG-13	
F2 (C10-C16)		<100		100	ug/L		29-AUG-13	
F3 (C16-C34)		<150		150	ug/L		29-AUG-13	
F4 (C34-C50)		<250		250	ug/L		29-AUG-13	
Total Hydrocarbons (C6-C50)		<250		250	ug/L		29-AUG-13	
Chrom. to baseline at nC50		YES				28-AUG-13	29-AUG-13	R2682441
Surrogate: 2-Bromobenzotrifluoride		67.5		50-150	%	28-AUG-13	29-AUG-13	R2682441
Surrogate: 3,4-Dichlorotoluene		91.9		60-140	%		28-AUG-13	R2681030
Polychlorinated Biphenyls								
Aroclor 1242		<0.020		0.020	ug/L	27-AUG-13	29-AUG-13	R2681410
Aroclor 1248		<0.020		0.020	ug/L	27-AUG-13	29-AUG-13	R2681410
Aroclor 1254		<0.020		0.020	ug/L	27-AUG-13	29-AUG-13	R2681410
Aroclor 1260		<0.020		0.020	ug/L	27-AUG-13	29-AUG-13	R2681410
Total PCBs		<0.040		0.040	ug/L	27-AUG-13	29-AUG-13	R2681410
Surrogate: d14-Terphenyl		92.1		50-150	%	27-AUG-13	29-AUG-13	R2681410
L1352393-6 2013-09335 Sampled By: KE/MM on 14-AUG-13 Matrix: WATER								
Physical Tests								
pH		7.61		0.10	pH units	24-AUG-13	24-AUG-13	R2679038
Total Metals								
Arsenic (As)-Total		<0.0010		0.0010	mg/L	27-AUG-13	28-AUG-13	R2680631
Cadmium (Cd)-Total		<0.000090		0.000090	mg/L	27-AUG-13	28-AUG-13	R2680631
Chromium (Cr)-Total		0.00414		0.00050	mg/L	27-AUG-13	28-AUG-13	R2680631
Cobalt (Co)-Total		0.00069		0.00050	mg/L	27-AUG-13	28-AUG-13	R2680631
Copper (Cu)-Total		0.0050		0.0010	mg/L	27-AUG-13	28-AUG-13	R2680631
Lead (Pb)-Total		0.00145		0.00050	mg/L	27-AUG-13	28-AUG-13	R2680631
Mercury (Hg)-Total		<0.00010		0.00010	mg/L	27-AUG-13	27-AUG-13	R2680404
Nickel (Ni)-Total		0.0038		0.0010	mg/L	27-AUG-13	28-AUG-13	R2680631
Zinc (Zn)-Total		0.0134		0.0030	mg/L	27-AUG-13	28-AUG-13	R2680631
Hydrocarbons								
F1 (C6-C10)		<100		100	ug/L		29-AUG-13	
F2 (C10-C16)		<100		100	ug/L		29-AUG-13	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1352393-6 2013-09335 Sampled By: KE/MM on 14-AUG-13 Matrix: WATER								
Hydrocarbons								
F3 (C16-C34)		<150		150	ug/L		29-AUG-13	
F4 (C34-C50)		<250		250	ug/L		29-AUG-13	
Total Hydrocarbons (C6-C50)		<250		250	ug/L		29-AUG-13	
Chrom. to baseline at nC50		YES				28-AUG-13	29-AUG-13	R2682441
Surrogate: 2-Bromobenzotrifluoride		65.4		50-150	%	28-AUG-13	29-AUG-13	R2682441
Surrogate: 3,4-Dichlorotoluene		104.3		60-140	%		28-AUG-13	R2681030
Polychlorinated Biphenyls								
Aroclor 1242		<0.020		0.020	ug/L	27-AUG-13	29-AUG-13	R2681410
Aroclor 1248		<0.020		0.020	ug/L	27-AUG-13	29-AUG-13	R2681410
Aroclor 1254		<0.020		0.020	ug/L	27-AUG-13	29-AUG-13	R2681410
Aroclor 1260		<0.020		0.020	ug/L	27-AUG-13	29-AUG-13	R2681410
Total PCBs		<0.040		0.040	ug/L	27-AUG-13	29-AUG-13	R2681410
Surrogate: d14-Terphenyl		88.4		50-150	%	27-AUG-13	29-AUG-13	R2681410
L1352393-7 2013-09336 Sampled By: KE/MM on 14-AUG-13 Matrix: WATER								
Physical Tests								
pH		7.55		0.10	pH units	24-AUG-13	24-AUG-13	R2679038
Total Metals								
Arsenic (As)-Total		0.0016		0.0010	mg/L	27-AUG-13	28-AUG-13	R2680631
Cadmium (Cd)-Total		<0.000090		0.000090	mg/L	27-AUG-13	28-AUG-13	R2680631
Chromium (Cr)-Total		0.0246		0.00050	mg/L	27-AUG-13	28-AUG-13	R2680631
Cobalt (Co)-Total		0.00058		0.00050	mg/L	27-AUG-13	28-AUG-13	R2680631
Copper (Cu)-Total		0.0105		0.0010	mg/L	27-AUG-13	28-AUG-13	R2680631
Lead (Pb)-Total		0.00111		0.00050	mg/L	27-AUG-13	28-AUG-13	R2680631
Mercury (Hg)-Total		<0.00010		0.00010	mg/L	27-AUG-13	27-AUG-13	R2680404
Nickel (Ni)-Total		0.0106		0.0010	mg/L	27-AUG-13	28-AUG-13	R2680631
Zinc (Zn)-Total		0.0226		0.0030	mg/L	27-AUG-13	28-AUG-13	R2680631
Hydrocarbons								
F1 (C6-C10)		<100		100	ug/L		29-AUG-13	
F2 (C10-C16)		360		100	ug/L		29-AUG-13	
F3 (C16-C34)		<150		150	ug/L		29-AUG-13	
F4 (C34-C50)		<250		250	ug/L		29-AUG-13	
Total Hydrocarbons (C6-C50)		360		250	ug/L		29-AUG-13	
Chrom. to baseline at nC50		YES				28-AUG-13	29-AUG-13	R2682441
Surrogate: 2-Bromobenzotrifluoride		72.0		50-150	%	28-AUG-13	29-AUG-13	R2682441
Surrogate: 3,4-Dichlorotoluene		105.3		60-140	%		28-AUG-13	R2681030
Polychlorinated Biphenyls								
Aroclor 1242		<0.20	DLM	0.20	ug/L	27-AUG-13	29-AUG-13	R2681410
Aroclor 1248		<0.20	DLM	0.20	ug/L	27-AUG-13	29-AUG-13	R2681410
Aroclor 1254		<0.20	DLM	0.20	ug/L	27-AUG-13	29-AUG-13	R2681410
Aroclor 1260		<0.20	DLM	0.20	ug/L	27-AUG-13	29-AUG-13	R2681410

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1352393-7	2013-09336							
Sampled By:	KE/MM on 14-AUG-13							
Matrix:	WATER							
Polychlorinated Biphenyls								
Total PCBs		<0.40	DLM	0.40	ug/L	27-AUG-13	29-AUG-13	R2681410
Surrogate: d14-Terphenyl		102.4		50-150	%	27-AUG-13	29-AUG-13	R2681410

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Mercury (Hg)-Total	MS-B	L1352393-1, -2, -3, -4, -5, -6, -7

Sample Parameter Qualifier key listed:

Qualifier	Description
DLM	Detection Limit Adjusted For Sample Matrix Effects
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ETL-TVH,TEH-LOW-WT	Water	CCME Total Hydrocarbons	CCME CWS-PHC DEC-2000 - PUB# 1310-W
F1-HS-WT	Water	F1 (O.Reg.153/04) Fraction F1 is determined by analyzing by headspace-GC/FID.	E3421/CCME (HS)
F2-F4-LOW-WT	Water	F2-F4 (O.Reg.153/04)	MOE DECPH-E3421/CCME TIER 1
HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS Liquid sample is digested with a heated, strong, mixed acid solution to convert all forms of mercury to divalent mercury. The divalent mercury is then reduced to elemental mercury, sparged from solution and analyzed by CVAAS.	EPA SW846 7470A
MET-T-MS-WT	Water	Total Metals in Water by ICPMS The concentration of metals is determined on an unfiltered aqueous sample.	EPA 200.8 The sample is digested with nitric acid and then analyzed directly by ICP-MS.
PCB-WT	Water	Polychlorinated Biphenyls PCBs are extracted from an aqueous sample at neutral pH with aliquots of dichloromethane using a modified separatory funnel technique. The extracts are analyzed by GC/MSD.	EPA 8082
PH-WT	Water	pH Water samples are analyzed directly by a calibrated pH meter.	APHA 4500 H-Electrode
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwv - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1352393

Report Date: 11-SEP-13

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Client: Department of National Defence - Royal Military College
Environmental Sciences Group
Kingston ON K7K7B4

Contact: CANDICE CASUCCI

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-WT								
Water								
Batch	R2681030							
WG1734655-1	CVS							
F1 (C6-C10)			93.8		%		80-120	28-AUG-13
WG1734655-4	DUP	WG1734655-3						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	28-AUG-13
WG1734655-2	MB							
F1 (C6-C10)			<100		ug/L		100	28-AUG-13
Surrogate: 3,4-Dichlorotoluene			102.1		%		60-140	28-AUG-13
WG1734655-5	MS	WG1734655-3						
F1 (C6-C10)			77.9		%		50-150	28-AUG-13
F2-F4-LOW-WT								
Water								
Batch	R2682441							
WG1735093-1	CVS							
F2 (C10-C16)			103.5		%		50-150	29-AUG-13
F3 (C16-C34)			100.7		%		50-150	29-AUG-13
F4 (C34-C50)			106.0		%		50-150	29-AUG-13
WG1733891-2	LCS							
F2 (C10-C16)			88.0		%		50-150	29-AUG-13
F3 (C16-C34)			100.6		%		50-150	29-AUG-13
F4 (C34-C50)			105.6		%		50-150	29-AUG-13
WG1733891-3	LCSD	WG1733891-2						
F2 (C10-C16)		88.0	86.0		%	2.3	50	29-AUG-13
F3 (C16-C34)		100.6	97.4		%	3.2	50	29-AUG-13
F4 (C34-C50)		105.6	105.7		%	0.1	50	29-AUG-13
WG1733891-1	MB							
F2 (C10-C16)			<100		ug/L		100	29-AUG-13
F3 (C16-C34)			<150		ug/L		150	29-AUG-13
F4 (C34-C50)			<250		ug/L		250	29-AUG-13
Surrogate: 2-Bromobenzotrifluoride			70.8		%		50-150	29-AUG-13
HG-T-CVAA-WT								
Water								
Batch	R2680404							
WG1733956-3	DUP	L1352381-1						
Mercury (Hg)-Total		0.00240	0.00213		mg/L	12	20	27-AUG-13
WG1733956-2	LCS							
Mercury (Hg)-Total			99.5		%		80-120	27-AUG-13
WG1733956-1	MB							
Mercury (Hg)-Total			<0.00010		mg/L		0.0001	27-AUG-13
WG1733956-4	MS	L1352381-2						

Quality Control Report

Workorder: L1352393

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Client: Department of National Defence - Royal Military College
Environmental Sciences Group
Kingston ON K7K7B4

Contact: CANDICE CASUCCI

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-CVAA-WT		Water						
Batch	R2680404							
WG1733956-4 MS		L1352381-2						
Mercury (Hg)-Total			N/A	MS-B	%		-	27-AUG-13
MET-T-MS-WT		Water						
Batch	R2680631							
WG1734962-1 CVS								
Arsenic (As)-Total			104.5		%		80-120	27-AUG-13
Cadmium (Cd)-Total			103.0		%		80-120	27-AUG-13
Chromium (Cr)-Total			101.6		%		80-120	27-AUG-13
Cobalt (Co)-Total			102.1		%		80-120	27-AUG-13
Copper (Cu)-Total			102.9		%		80-120	27-AUG-13
Lead (Pb)-Total			99.2		%		80-120	27-AUG-13
Nickel (Ni)-Total			101.0		%		80-120	27-AUG-13
Zinc (Zn)-Total			102.1		%		80-120	27-AUG-13
WG1734962-3 CVS								
Arsenic (As)-Total			104.3		%		80-120	28-AUG-13
Cadmium (Cd)-Total			101.8		%		80-120	28-AUG-13
Chromium (Cr)-Total			107.4		%		80-120	28-AUG-13
Cobalt (Co)-Total			100.8		%		80-120	28-AUG-13
Copper (Cu)-Total			102.4		%		80-120	28-AUG-13
Lead (Pb)-Total			98.4		%		80-120	28-AUG-13
Nickel (Ni)-Total			100.2		%		80-120	28-AUG-13
Zinc (Zn)-Total			101.3		%		80-120	28-AUG-13
WG1734589-4 DUP		WG1734589-3						
Arsenic (As)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	27-AUG-13
Cadmium (Cd)-Total		<0.000090	<0.000090	RPD-NA	mg/L	N/A	20	27-AUG-13
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	27-AUG-13
Cobalt (Co)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	27-AUG-13
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	27-AUG-13
Lead (Pb)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	27-AUG-13
Nickel (Ni)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	27-AUG-13
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	27-AUG-13
WG1734589-2 LCS								
Arsenic (As)-Total			94.8		%		80-120	27-AUG-13
Cadmium (Cd)-Total			95.8		%		80-120	27-AUG-13



Environmental

Quality Control Report

Workorder: L1352393

Report Date: 11-SEP-13

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Client: Department of National Defence - Royal Military College
Environmental Sciences Group
Kingston ON K7K7B4

Contact: CANDICE CASUCCI

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	Water							
Batch	R2680631							
WG1734589-2 LCS								
Chromium (Cr)-Total			94.6		%		80-120	27-AUG-13
Cobalt (Co)-Total			91.7		%		80-120	27-AUG-13
Copper (Cu)-Total			93.6		%		80-120	27-AUG-13
Lead (Pb)-Total			94.7		%		80-120	27-AUG-13
Nickel (Ni)-Total			93.1		%		80-120	27-AUG-13
Zinc (Zn)-Total			94.4		%		80-120	27-AUG-13
WG1734589-1 MB								
Arsenic (As)-Total			<0.0010		mg/L		0.001	27-AUG-13
Cadmium (Cd)-Total			<0.000090		mg/L		0.00009	27-AUG-13
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	27-AUG-13
Cobalt (Co)-Total			<0.00050		mg/L		0.0005	27-AUG-13
Copper (Cu)-Total			<0.0010		mg/L		0.001	27-AUG-13
Lead (Pb)-Total			<0.00050		mg/L		0.0005	27-AUG-13
Nickel (Ni)-Total			<0.0010		mg/L		0.001	27-AUG-13
Zinc (Zn)-Total			<0.0030		mg/L		0.003	27-AUG-13
WG1734589-5 MS		WG1734589-3						
Arsenic (As)-Total			98.4		%		70-130	27-AUG-13
Cadmium (Cd)-Total			99.5		%		70-130	27-AUG-13
Chromium (Cr)-Total			98.2		%		70-130	27-AUG-13
Cobalt (Co)-Total			94.5		%		70-130	27-AUG-13
Copper (Cu)-Total			98.1		%		70-130	27-AUG-13
Lead (Pb)-Total			97.3		%		70-130	27-AUG-13
Nickel (Ni)-Total			95.3		%		70-130	27-AUG-13
Zinc (Zn)-Total			99.1		%		70-130	27-AUG-13
PCB-WT	Water							
Batch	R2681410							
WG1734907-1 CVS								
Aroclor 1242			95.2		%		70-130	28-AUG-13
Aroclor 1248			93.5		%		70-130	28-AUG-13
Aroclor 1254			96.2		%		70-130	28-AUG-13
Aroclor 1260			100.0		%		70-130	28-AUG-13
WG1733801-2 LCS								
Aroclor 1242			83.6		%		65-130	28-AUG-13
Aroclor 1248			78.9		%		65-130	28-AUG-13



Environmental

Quality Control Report

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Client: Department of National Defence - Royal Military College
Environmental Sciences Group
Kingston ON K7K7B4

Contact: CANDICE CASUCCI

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PCB-WT								
Water								
Batch	R2681410							
WG1733801-2	LCS							
Aroclor 1254			86.7		%		65-130	28-AUG-13
Aroclor 1260			91.6		%		65-130	28-AUG-13
WG1733801-3	LCSD	WG1733801-2						
Aroclor 1242		83.6	82.5		%	1.3	50	28-AUG-13
Aroclor 1248		78.9	78.9		%	0.0	50	28-AUG-13
Aroclor 1254		86.7	87.7		%	1.1	50	28-AUG-13
Aroclor 1260		91.6	93.1		%	1.7	50	28-AUG-13
WG1733801-1	MB							
Aroclor 1242			<0.020		ug/L		0.02	28-AUG-13
Aroclor 1248			<0.020		ug/L		0.02	28-AUG-13
Aroclor 1254			<0.020		ug/L		0.02	28-AUG-13
Aroclor 1260			<0.020		ug/L		0.02	28-AUG-13
Surrogate: d14-Terphenyl			90.9		%		50-150	28-AUG-13
PH-WT								
Water								
Batch	R2679038							
WG1733366-2	DUP	L1351438-1						
pH		8.47	8.47	J	pH units	0.00	0.2	24-AUG-13
WG1733366-1	LCS							
pH			7.01		pH units		6.9-7.1	24-AUG-13

Quality Control Report

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Client: Department of National Defence - Royal Military College
Environmental Sciences Group
Kingston ON K7K7B4
Contact: CANDICE CASUCCI

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

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Client: Department of National Defence - Royal Military College
Environmental Sciences Group
Kingston ON K7K7B4
Contact: CANDICE CASUCCI

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH	1	13-AUG-13	24-AUG-13 15:15	4	11	days	EHTR
	2	13-AUG-13	24-AUG-13 15:16	4	11	days	EHTR
	3	13-AUG-13	24-AUG-13 15:17	4	11	days	EHTR
	4	13-AUG-13	24-AUG-13 15:18	4	11	days	EHTR
	5	14-AUG-13	24-AUG-13 15:19	4	10	days	EHTR
	6	14-AUG-13	24-AUG-13 15:20	4	10	days	EHTR
	7	14-AUG-13	24-AUG-13 15:21	4	10	days	EHTR
Hydrocarbons							
F1 (O.Reg.153/04)	1	13-AUG-13	28-AUG-13 07:58	14	15	days	EHT
	2	13-AUG-13	28-AUG-13 07:59	14	15	days	EHT
	3	13-AUG-13	28-AUG-13 07:59	14	15	days	EHT
	4	13-AUG-13	28-AUG-13 08:00	14	15	days	EHT

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1352393 were received on 23-AUG-13 15:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Toll Free: 1-800-668-9878

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM Page 1 of 1

C of C # 00000

Phone: (519) 652-6044
Fax: (519) 652-0671
Toll Free: 1-800-668-9878



Note: all TAT Quoted material is in business days which exclude statutory holidays and weekends. TAT samples received past 3:00 pm or Saturday/Sunday begin the next day.

Specify date required	Service requested		2 day TAT (50%)	
	5 day (regular)	X	Next day TAT (100%)	
	3-4 day (25%)		Same day TAT(200%)	

COMPANY NAME		ESG		CRITERIA		Criteria on report YES___ NO___		NUMBER OF CONTAINERS	ANALYSIS REQUEST								PLEASE INDICATE FILTERED PRESERVED OR BOTH <---- (F, P, F/P)					
PROJECT MANAGER		Jasmine King		Reg 153/04		Table 1 2 3											SUBMISSION #: LIS-2393					
PROJECT		13-084 PIN-4		TCLP _____ PWQO _____ ODWS _____ OTHER _____													ENTERED BY:					
ACCOUNT #				REPORT FORMAT/DISTRIBUTION													DATE/TIME					
PHONE / FAX		613-541-6000x6386		EMAIL X_____ FAX _____ BOTH _____		EMAIL																
QUOTE#Q39602		PO #W0114-4501043958		SELECT: PDF __X__ DIGITAL _____ BOTH _____																		
				1 jasmine.king@rmc.ca																		
				EMAIL 2 _____																		
SAMPLING INFORMATION																						
Sample Date/Time		TYPE		MATRIX																		
Date (dd-mm-yy)	Time (24hr) (hh mm)	COMP	GRAB	WATER	SOIL	OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT															
13-Aug-13			x	x			2013-09330															
13-Aug-13			x	x			2013-09331															
13-Aug-13			x	x			2013-09332															
13-Aug-13			x	x			2013-09333															
SPECIAL INSTRUCTIONS/COMMENTS							THE QUESTIONS BELOW MUST BE ANSWERED FOR WATER SAMPLES (CHECK Yes OR No)												SAMPLE CONDITION			
Please refer to quote for detection limits.							Are any samples taken from a regulated DW System? Yes ___ No _X_ If yes, an authorized drinking water COC MUST be used for this submission. Is the water sampled intended to be potable for human consumption? Yes ___ No _X_												MEAN TEMP 10.2°C --- COLD --- COOLING INITIATED --- AMBIENT			
SAMPLED BY: Kathryn Eagles, Mike Musclow							DATE & TIME See ab				RECEIVED BY:				DATE & TIME				OBSERVATIONS			
RELINQUISHED BY: Kathryn Eagles							DATE & TIME 17-Aug				RECEIVED AT LAB BY:				DATE & TIME				INIT			
															If yes add Sif 24 Aug 13, 7:50 pm							

1. Quote number must be provided to ensure proper pricing

2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please



L1352393-COFC

309 Exeter Road, Unit 29
LONDON, ON N6L 1C1
Phone: (519) 652-6044
Fax: (519) 652-0671
Toll Free: 1-800-668-9878



CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM Page 1 of 1

C of C # 00000

Note: all TAT Quoted material is in business days which exclude statutory holidays and weekends. TAT samples received past 3:00 pm or Saturday/Sunday begin the next day.

Specify date required	Service requested		2 day TAT (50%)	
	5 day (regular)	X	Next day TAT (100%)	
	3-4 day (25%)		Same day TAT(200%)	

COMPANY NAME		ESG		CRITERIA		Criteria on report YES___ NO___		ANALYSIS REQUEST												PLEASE INDICATE FILTERED PRESERVED OR BOTH <---- (F, P, F/P)									
PROJECT MANAGER		Jasmine King		Reg 153/04		Table 1 2 3														SUBMISSION #		ENTERED BY:							
PROJECT		13-084 PIN-4		TCLP _____ PWQO _____ ODWS _____ OTHER _____		REPORT FORMAT/DISTRIBUTION		EMAIL		DATE/TIME		COMMENTS		LAB ID															
ACCOUNT #				EMAIL X_____ FAX _____ BOTH _____		SELECT: PDF __X__ DIGITAL _____ BOTH _____		1 jasmine.king@rmc.ca																					
PHONE/FAX		613-541-6000x6386		EMAIL 2 _____																									
QUOTE#Q39602		PO #W0114-4501043958																											
SAMPLING INFORMATION				Sample Date/Time		TYPE		MATRIX		NUMBER OF CONTAINERS		Hg - soil		Metals Scan - soil		F1-F4 - soil		PCB - soil		Metals Scan (Total) - water		F1-F4 - water		PCB - water		pH - water		Hg - Water	
Date (dd-mm-yy)		Time (24hr) (hh:mm)		COMP		GRAB		WATER		SOIL		OTHER		SAMPLE DESCRIPTION TO APPEAR ON REPORT															
14-Aug-13						x		x						2013-09334															
14-Aug-13						x		x						2013-09335															
14-Aug-13						x		x						2013-09336															
SPECIAL INSTRUCTIONS/COMMENTS				THE QUESTIONS BELOW MUST BE ANSWERED FOR WATER SAMPLES (CHECK Yes OR No)												SAMPLE CONDITION													
Please refer to quote for detection limits				Are any samples taken from a regulated DW system? Yes ___ No <u>X</u> If yes, an authorized drinking water COC MUST be used for this submission. Is the water sampled intended to be potable for human consumption? Yes ___ No <u>X</u>												___ COLD ___ COOLING INITIATED ___ AMBIENT				MEAN TEMP									
SAMPLED BY: Kathryn Eagles, Mike Musclow				DATE & TIME See above RECEIVED BY: <u>JK</u>												DATE & TIME				OBSERVATIONS		INIT							
RELINQUISHED BY: Kathryn Eagles				DATE & TIME 17-Aug RECEIVED AT LAB BY: <u>JK</u>												DATE & TIME <u>Aug 24 2013</u>				Yes ___ No ___ If yes add SIF		<u>JK</u>							

1. Quote number must be provided to ensure proper pricing

2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TAT.



L1352393-COFC