

INUVALUIT ENVIRONMENTAL & GEOTECHNICAL INC.  
Attention: SAM BIRD  
Client Project #: A04012A03 CAMP FAREWELL 2010  
P.O. #:  
Site Reference: MACKENZIE DELTA NWT

Quality Assurance Report (Continued)  
Maxxam Job Number: EB050197

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits	
4062440 AN1	RPD	m & p-Xylene	2010/07/02	NC		%	50	
		o-Xylene	2010/07/02	NC		%	50	
		F1 (C6-C10) - BTEX	2010/07/02	NC		%	50	
		(C6-C10)	2010/07/02	NC		%	50	
4063642 AO1	Method Blank	Moisture	2010/06/28	<0.3		%		
	RPD	Moisture	2010/06/28	1		%	20	
4068358 KW4	Matrix Spike	O-TERPHENYL (sur.)	2010/06/30		117	%	70 - 130	
		F2 (C10-C16 Hydrocarbons)	2010/06/30		114	%	70 - 130	
	Spiked Blank	O-TERPHENYL (sur.)	2010/06/30		118	%	70 - 130	
		F2 (C10-C16 Hydrocarbons)	2010/06/30		116	%	80 - 120	
	Method Blank	O-TERPHENYL (sur.)	2010/06/30		126	%	70 - 130	
		F2 (C10-C16 Hydrocarbons)	2010/06/30	<0.1		mg/L		
	RPD	F2 (C10-C16 Hydrocarbons)	2010/06/30	NC		%	40	
		Matrix Spike	4-BROMOFLUOROBENZENE (sur.)	2010/07/02		101	%	70 - 130
	4068942 DR3	Matrix Spike	D4-1,2-DICHLOROETHANE (sur.)	2010/07/02		108	%	70 - 130
			D8-TOLUENE (sur.)	2010/07/02		99	%	70 - 130
Benzene			2010/07/02		98	%	70 - 130	
Toluene			2010/07/02		94	%	70 - 130	
Ethylbenzene			2010/07/02		94	%	70 - 130	
o-Xylene			2010/07/02		89	%	70 - 130	
m & p-Xylene			2010/07/02		88	%	70 - 130	
(C6-C10)			2010/07/02		89	%	70 - 130	
Spiked Blank		4-BROMOFLUOROBENZENE (sur.)	2010/07/02		102	%	70 - 130	
		D4-1,2-DICHLOROETHANE (sur.)	2010/07/02		106	%	70 - 130	
		D8-TOLUENE (sur.)	2010/07/02		100	%	70 - 130	
		Benzene	2010/07/02		95	%	70 - 130	
		Toluene	2010/07/02		92	%	70 - 130	
		Ethylbenzene	2010/07/02		92	%	70 - 130	
		o-Xylene	2010/07/02		88	%	70 - 130	
		m & p-Xylene	2010/07/02		86	%	70 - 130	
Method Blank		(C6-C10)	2010/07/02		98	%	70 - 130	
		4-BROMOFLUOROBENZENE (sur.)	2010/07/02		102	%	70 - 130	
		D4-1,2-DICHLOROETHANE (sur.)	2010/07/02		102	%	70 - 130	
		D8-TOLUENE (sur.)	2010/07/02		99	%	70 - 130	
		Benzene	2010/07/02	<0.4		ug/L		
		Toluene	2010/07/02	<0.4		ug/L		
		Ethylbenzene	2010/07/02	<0.4		ug/L		
		o-Xylene	2010/07/02	<0.4		ug/L		
RPD		Matrix Spike	m & p-Xylene	2010/07/02	<0.8		ug/L	
			Xylenes (Total)	2010/07/02	<0.8		ug/L	
		F1 (C6-C10) - BTEX	2010/07/02	<100		ug/L		
		(C6-C10)	2010/07/02	<100		ug/L		
	Benzene	2010/07/02	NC		%	40		
	Toluene	2010/07/02	NC		%	40		
	Ethylbenzene	2010/07/02	NC		%	40		
	o-Xylene	2010/07/02	NC		%	40		
	m & p-Xylene	2010/07/02	NC		%	40		
	Xylenes (Total)	2010/07/02	NC		%	40		
	F1 (C6-C10) - BTEX	2010/07/02	NC		%	40		
	(C6-C10)	2010/07/02	NC		%	40		
4070945 SV1	Spiked Blank	Soluble (Hot water) Boron (B)	2010/06/30		107	%	80 - 120	
	Method Blank	Soluble (Hot water) Boron (B)	2010/06/30	<0.1		mg/kg		
	RPD	Soluble (Hot water) Boron (B)	2010/06/30	NC		%	35	
4071245 SG8	Matrix Spike	Total Antimony (Sb)	2010/07/01		110	%	75 - 125	
		Total Arsenic (As)	2010/07/01		92	%	75 - 125	

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Quality Assurance Report (Continued)  
Maxxam Job Number: EB050197

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
4071245 SG8	Matrix Spike	Total Barium (Ba)	2010/07/01		NC	%	75 - 125
		Total Cadmium (Cd)	2010/07/01		95	%	75 - 125
		Total Chromium (Cr)	2010/07/01		97	%	75 - 125
		Total Cobalt (Co)	2010/07/01		97	%	75 - 125
		Total Copper (Cu)	2010/07/01		96	%	75 - 125
		Total Lead (Pb)	2010/07/01		91	%	75 - 125
		Total Mercury (Hg)	2010/07/01		95	%	75 - 125
		Total Molybdenum (Mo)	2010/07/01		110	%	75 - 125
		Total Nickel (Ni)	2010/07/01		99	%	75 - 125
		Total Selenium (Se)	2010/07/01		85	%	75 - 125
		Total Silver (Ag)	2010/07/01		97	%	75 - 125
		Total Thallium (Tl)	2010/07/01		92	%	75 - 125
		Total Tin (Sn)	2010/07/01		102	%	75 - 125
		Total Uranium (U)	2010/07/01		86	%	75 - 125
		Total Vanadium (V)	2010/07/01		99	%	75 - 125
	Total Zinc (Zn)	2010/07/01		NC	%	75 - 125	
	QC Standard	Total Arsenic (As)	2010/07/01		109	%	50 - 150
		Total Barium (Ba)	2010/07/01		107	%	69 - 131
		Total Chromium (Cr)	2010/07/01		112	%	41 - 159
		Total Cobalt (Co)	2010/07/01		104	%	75 - 125
		Total Copper (Cu)	2010/07/01		97	%	72 - 127
		Total Lead (Pb)	2010/07/01		89	%	54 - 146
		Total Mercury (Hg)	2010/07/01		79	%	75 - 125
		Total Nickel (Ni)	2010/07/01		115	%	61 - 139
		Total Vanadium (V)	2010/07/01		125	%	50 - 150
		Total Zinc (Zn)	2010/07/01		91	%	72 - 128
	Spiked Blank	Total Antimony (Sb)	2010/07/01		112	%	75 - 125
		Total Arsenic (As)	2010/07/01		92	%	75 - 125
		Total Barium (Ba)	2010/07/01		95	%	75 - 125
		Total Beryllium (Be)	2010/07/01		82	%	75 - 125
		Total Cadmium (Cd)	2010/07/01		95	%	75 - 125
		Total Chromium (Cr)	2010/07/01		97	%	75 - 125
		Total Cobalt (Co)	2010/07/01		98	%	75 - 125
Total Copper (Cu)		2010/07/01		99	%	75 - 125	
Total Lead (Pb)		2010/07/01		94	%	75 - 125	
Total Mercury (Hg)		2010/07/01		92	%	75 - 125	
Total Molybdenum (Mo)		2010/07/01		105	%	75 - 125	
Total Nickel (Ni)		2010/07/01		101	%	75 - 125	
Total Selenium (Se)		2010/07/01		85	%	75 - 125	
Total Silver (Ag)		2010/07/01		97	%	75 - 125	
Total Thallium (Tl)		2010/07/01		95	%	75 - 125	
Total Tin (Sn)	2010/07/01		100	%	75 - 125		
Total Uranium (U)	2010/07/01		98	%	75 - 125		
Total Vanadium (V)	2010/07/01		97	%	75 - 125		
Total Zinc (Zn)	2010/07/01		89	%	75 - 125		
Method Blank	Total Antimony (Sb)	2010/07/01		<1		mg/kg	
	Total Arsenic (As)	2010/07/01		<1		mg/kg	
	Total Barium (Ba)	2010/07/01		<10		mg/kg	
	Total Beryllium (Be)	2010/07/01		<0.4		mg/kg	
	Total Cadmium (Cd)	2010/07/01		<0.1		mg/kg	
	Total Chromium (Cr)	2010/07/01		<1		mg/kg	
	Total Cobalt (Co)	2010/07/01		<1		mg/kg	
	Total Copper (Cu)	2010/07/01		<5		mg/kg	
	Total Lead (Pb)	2010/07/01		<1		mg/kg	
	Total Mercury (Hg)	2010/07/01		<0.05		mg/kg	

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4071245 SG8	Method Blank	Total Molybdenum (Mo)	2010/07/01	<0.4		mg/kg		
		Total Nickel (Ni)	2010/07/01	<1		mg/kg		
		Total Selenium (Se)	2010/07/01	<0.5		mg/kg		
		Total Silver (Ag)	2010/07/01	<1		mg/kg		
		Total Thallium (Tl)	2010/07/01	<0.3		mg/kg		
		Total Tin (Sn)	2010/07/01	<1		mg/kg		
		Total Uranium (U)	2010/07/01	<1		mg/kg		
		Total Vanadium (V)	2010/07/01	<1		mg/kg		
		Total Zinc (Zn)	2010/07/01	<10		mg/kg		
		RPD	Total Antimony (Sb)	2010/07/01	NC		%	35
			Total Arsenic (As)	2010/07/01	NC		%	35
			Total Barium (Ba)	2010/07/01	12.2		%	35
			Total Beryllium (Be)	2010/07/01	NC		%	35
			Total Cadmium (Cd)	2010/07/01	NC		%	35
			Total Chromium (Cr)	2010/07/01	7.3		%	35
			Total Cobalt (Co)	2010/07/01	NC		%	35
			Total Copper (Cu)	2010/07/01	NC		%	35
	Total Lead (Pb)		2010/07/01	NC		%	35	
	Total Mercury (Hg)		2010/07/01	NC		%	35	
	Total Molybdenum (Mo)		2010/07/01	NC		%	35	
	Total Nickel (Ni)		2010/07/01	4.3		%	35	
	Total Selenium (Se)		2010/07/01	NC		%	35	
	Total Silver (Ag)		2010/07/01	NC		%	35	
	Total Thallium (Tl)		2010/07/01	NC		%	35	
	Total Tin (Sn)		2010/07/01	NC		%	35	
	Total Uranium (U)		2010/07/01	NC		%	35	
	Total Vanadium (V)		2010/07/01	9.8		%	35	
	Total Zinc (Zn)	2010/07/01	NC		%	35		
	4075065 SG8	Matrix Spike	Total Aluminum (Al)	2010/07/03		91	%	80 - 120
			Total Arsenic (As)	2010/07/03		94	%	80 - 120
			Total Beryllium (Be)	2010/07/03		82	%	80 - 120
			Total Chromium (Cr)	2010/07/03		113	%	80 - 120
			Total Cobalt (Co)	2010/07/03		113	%	80 - 120
			Total Copper (Cu)	2010/07/03		100	%	80 - 120
			Total Lead (Pb)	2010/07/03		102	%	80 - 120
Total Nickel (Ni)			2010/07/03		NC	%	80 - 120	
Total Selenium (Se)			2010/07/03		83	%	80 - 120	
Total Silver (Ag)			2010/07/03		104	%	80 - 120	
Total Thallium (Tl)			2010/07/03		104	%	80 - 120	
Total Tin (Sn)			2010/07/03		116	%	80 - 120	
Total Titanium (Ti)			2010/07/03		119	%	80 - 120	
Total Uranium (U)			2010/07/03		106	%	80 - 120	
Total Vanadium (V)			2010/07/03		116	%	80 - 120	
Total Zinc (Zn)			2010/07/03		NC	%	80 - 120	
Spiked Blank			Total Aluminum (Al)	2010/07/03		96	%	80 - 120
		Total Antimony (Sb)	2010/07/03		97	%	80 - 120	
		Total Arsenic (As)	2010/07/03		86	%	80 - 120	
		Total Beryllium (Be)	2010/07/03		86	%	80 - 120	
		Total Chromium (Cr)	2010/07/03		109	%	80 - 120	
		Total Cobalt (Co)	2010/07/03		111	%	80 - 120	
		Total Copper (Cu)	2010/07/03		106	%	80 - 120	
		Total Lead (Pb)	2010/07/03		109	%	80 - 120	
		Total Molybdenum (Mo)	2010/07/03		113	%	80 - 120	
		Total Nickel (Ni)	2010/07/03		110	%	80 - 120	
		Total Selenium (Se)	2010/07/03		86	%	80 - 120	

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Quality Assurance Report (Continued)

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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits	
4075065 SG8	Spiked Blank	Total Silver (Ag)	2010/07/03		93	%	80 - 120	
		Total Thallium (Tl)	2010/07/03		108	%	80 - 120	
		Total Tin (Sn)	2010/07/03		108	%	80 - 120	
		Total Titanium (Ti)	2010/07/03		111	%	80 - 120	
		Total Uranium (U)	2010/07/03		109	%	80 - 120	
		Total Vanadium (V)	2010/07/03		110	%	80 - 120	
	Method Blank	Total Zinc (Zn)	2010/07/03			84	%	80 - 120
		Total Aluminum (Al)	2010/07/03	<0.001			mg/L	
		Total Antimony (Sb)	2010/07/03	<0.0002			mg/L	
		Total Arsenic (As)	2010/07/03	<0.0002			mg/L	
		Total Beryllium (Be)	2010/07/03	<0.001			mg/L	
		Total Chromium (Cr)	2010/07/03	<0.001			mg/L	
		Total Cobalt (Co)	2010/07/03	<0.0003			mg/L	
		Total Copper (Cu)	2010/07/03	<0.0002			mg/L	
		Total Lead (Pb)	2010/07/03	<0.0002			mg/L	
		Total Molybdenum (Mo)	2010/07/03	0.0004, RDL=0.0002			mg/L	
		Total Nickel (Ni)	2010/07/03	<0.0005			mg/L	
		Total Selenium (Se)	2010/07/03	<0.0002			mg/L	
		Total Silver (Ag)	2010/07/03	<0.0001			mg/L	
		Total Thallium (Tl)	2010/07/03	<0.0002			mg/L	
		Total Tin (Sn)	2010/07/03	<0.001			mg/L	
	Total Titanium (Ti)	2010/07/03	<0.001			mg/L		
	Total Uranium (U)	2010/07/03	<0.0001			mg/L		
	Total Vanadium (V)	2010/07/03	<0.001			mg/L		
	Total Zinc (Zn)	2010/07/03	<0.003			mg/L		
	RPD	Total Aluminum (Al)	2010/07/03	NC			%	20
		Total Antimony (Sb)	2010/07/03	NC			%	20
		Total Arsenic (As)	2010/07/03	1.2			%	20
		Total Beryllium (Be)	2010/07/03	NC			%	20
		Total Chromium (Cr)	2010/07/03	NC			%	20
		Total Cobalt (Co)	2010/07/03	0.4			%	20
		Total Copper (Cu)	2010/07/03	NC			%	20
		Total Lead (Pb)	2010/07/03	3.2			%	20
Total Molybdenum (Mo)		2010/07/03	1.2			%	20	
Total Nickel (Ni)		2010/07/03	1.9			%	20	
Total Selenium (Se)		2010/07/03	1.8			%	20	
Total Silver (Ag)		2010/07/03	NC			%	20	
Total Thallium (Tl)	2010/07/03	NC			%	20		
Total Tin (Sn)	2010/07/03	NC			%	20		
Total Titanium (Ti)	2010/07/03	NC			%	20		
Total Uranium (U)	2010/07/03	0.7			%	20		
Total Vanadium (V)	2010/07/03	NC			%	20		
Total Zinc (Zn)	2010/07/03	1.6			%	20		
4075518 KL4	Matrix Spike	Total Barium (Ba)	2010/07/03		86	%	80 - 120	
		Total Boron (B)	2010/07/03		99	%	80 - 120	
		Total Calcium (Ca)	2010/07/03		NC	%	80 - 120	
		Total Iron (Fe)	2010/07/03		NC	%	80 - 120	
		Total Lithium (Li)	2010/07/03		109	%	80 - 120	
		Total Magnesium (Mg)	2010/07/03		NC	%	80 - 120	
		Total Manganese (Mn)	2010/07/03		93	%	80 - 120	
		Total Phosphorus (P)	2010/07/03		102	%	80 - 120	
		Total Potassium (K)	2010/07/03		99	%	80 - 120	
		Total Silicon (Si)	2010/07/03		88	%	80 - 120	
		Total Sodium (Na)	2010/07/03		93	%	80 - 120	
		Total Strontium (Sr)	2010/07/03		88	%	80 - 120	

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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits		
4075518 KL4	Spiked Blank	Total Barium (Ba)	2010/07/03		87	%	80 - 120		
		Total Boron (B)	2010/07/03		95	%	80 - 120		
		Total Calcium (Ca)	2010/07/03		93	%	80 - 120		
		Total Iron (Fe)	2010/07/03		95	%	80 - 120		
		Total Lithium (Li)	2010/07/03		105	%	80 - 120		
		Total Magnesium (Mg)	2010/07/03		91	%	80 - 120		
		Total Manganese (Mn)	2010/07/03		92	%	80 - 120		
		Total Phosphorus (P)	2010/07/03		97	%	80 - 120		
		Total Potassium (K)	2010/07/03		94	%	80 - 120		
		Total Silicon (Si)	2010/07/03		88	%	80 - 120		
		Total Sodium (Na)	2010/07/03		93	%	80 - 120		
		Total Strontium (Sr)	2010/07/03		90	%	80 - 120		
		Method Blank	Total Barium (Ba)	2010/07/03	<0.01			mg/L	
			Total Boron (B)	2010/07/03	<0.02			mg/L	
			Total Calcium (Ca)	2010/07/03	<0.3			mg/L	
			Total Iron (Fe)	2010/07/03	<0.06			mg/L	
			Total Lithium (Li)	2010/07/03	<0.02			mg/L	
			Total Magnesium (Mg)	2010/07/03	<0.2			mg/L	
			Total Manganese (Mn)	2010/07/03	<0.004			mg/L	
	Total Phosphorus (P)		2010/07/03	<0.1			mg/L		
	Total Potassium (K)		2010/07/03	<0.3			mg/L		
	Total Silicon (Si)		2010/07/03	<0.1			mg/L		
	Total Sodium (Na)		2010/07/03	<0.5			mg/L		
	Total Strontium (Sr)		2010/07/03	<0.02			mg/L		
	RPD		Total Sulphur (S)	2010/07/03	<0.2			mg/L	
			Total Barium (Ba)	2010/07/03	1.5			%	20
		Total Boron (B)	2010/07/03	NC			%	20	
		Total Calcium (Ca)	2010/07/03	2.5			%	20	
		Total Iron (Fe)	2010/07/03	2.3			%	20	
		Total Lithium (Li)	2010/07/03	NC			%	20	
		Total Magnesium (Mg)	2010/07/03	1.8			%	20	
		Total Manganese (Mn)	2010/07/03	2.3			%	20	
		Total Phosphorus (P)	2010/07/03	NC			%	20	
Total Potassium (K)		2010/07/03	2.2			%	20		
Total Silicon (Si)	2010/07/03	1.8			%	20			
Total Sodium (Na)	2010/07/03	0.2			%	20			
Total Strontium (Sr)	2010/07/03	1.6			%	20			
Total Sulphur (S)	2010/07/03	1.8			%	20			

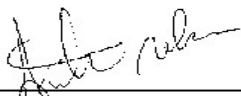
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.  
 Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.  
 QC Standard: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.  
 Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.  
 Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.  
 Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.  
 NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.  
 NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

## Validation Signature Page

Maxxam Job #: B050197

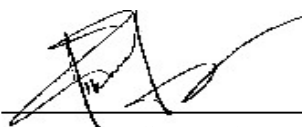
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The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



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AJITH NELSON, Analyst 2



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DINA TLEUGABULOVA, Ph.D., Scientific Specialist



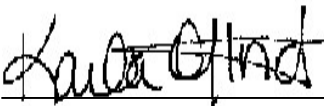
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HUA WO, Organics Supervisor



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JIM TJATHAS, Analyst 2



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KARLA OFFORD, Senior Analyst

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



06/10/14

Calgary: 4000 19th St. NE, T2E 6P6  
Edmonton: 9331 - 48 Street, T6B 2N6

Ph: (403) 291-3077 Fax: (403) 735-2241 Toll free: (800) 380-7247  
Ph: (780) 465-1212 Fax: (780) 450-4187 Toll free: (877) 465-8989  
www.maxxamanalytics.com

BOS0197/35/DK

81095

CHAIN OF CUSTODY

Page 1 of 1

**Invoice To:** Require Report? Yes  No

**Company Name:** Shell Canada

**Contact Name:** Randall Warren

**Address:** 400-4th St. SW. Calgary

**Prov:** Alta **PC:**

**Contact #s:** Ph: 413-697-2521 Fax:

**Report To:**

IEG Consultants

500, 2618 Hopywell Place NE

Calgary

**Prov:** Alta **PC:** T1V 7J7

**Ph:** 403-910-1382 **Fax:**

**PO # / AFE #:**

**Quotation #:**

**Project #:** A04012403

**Project Name:** Camp Farewell 2010

**Location:** Mackenzie Delta NWT

**Sampler's Initials:** KE

**DETECTION LIMIT REQUIREMENTS:**

Check the applicable criterion and indicate land use

- AT1
- CCME
- OTHER

**REPORT DISTRIBUTION:**

**EMAIL ADDRESS(S):**

shirley.ieg.ca  
r.pearson@klh.com

**SERVICE REQUESTED:**

RUSH (Please ensure you contact the lab to reserve)

Date Required:

REGULAR Turnaround (5 to 7 Days)

Sample Identification	Matrix S/W	Date & Time Sampled Year/Month/Day	SOILS (protocols defined on back)					WATERS (protocols defined on back)					OTHER TEST(S)			*HOLD for 60 Days # of Containers Submitted		
			BTEX F1-F4	Sieve (75 micron)	Salinity 4	Regulated Metals (CCME / AT1)	Assessment (CP Metals)	Paint Filter <input type="checkbox"/> Flashpoint <input type="checkbox"/> pH (1:1)	TCLP <input type="checkbox"/> BTEX <input type="checkbox"/> Metals	BTEX F1 <input type="checkbox"/> VOCs	BTEX F1-F2 <input type="checkbox"/> BTEX F1-F4	Routine Winter Package <input type="checkbox"/> Turb <input type="checkbox"/> F	Total <input type="checkbox"/> Preserved <input checked="" type="checkbox"/> Not Preserved	Dissolved <input type="checkbox"/> Preserved <input type="checkbox"/> Not Preserved	Filtered <input type="checkbox"/> Not Filtered		Mercury <input type="checkbox"/> Total <input type="checkbox"/> Dissolved	Ammonia <input type="checkbox"/> TKH <input type="checkbox"/> COD
1 101	S	2010/06/22	X	X						X	X							1
2 102	N	↓								X	X							1
3 103	N									X	X							1
4 104	S		X	X														1
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		

\*All samples are held for 60 calendar days after sample receipt. For long term storage please contact your project manager.

Maxxam Job #:

Reinquished By: SAM BIRD

Date/Time: June 23, 2010 14:50

Sign and Print:

COMMENTS/SPECIAL INSTRUCTIONS:

If volumes Volumes may be insufficient contact Sam Bird for priorities

# JARS USED & NOT SUBMITTED

Received By

JEN NEWMAN  
2010/06/24 08:00

Temperature:

ice

7 5 6 Y

CUSTODY SEAL YES / NO

## Attachment 2 Water Analytical Data







Your Project #: A04012A03  
 Site: CAMP FAREWELL  
 Your C.O.C. #: A020342

**Attention: SAM BIRD**  
 IEG ENVIRONMENTAL  
 500-2618 HOPEWELL PLACE NE  
 CALGARY, AB  
 CANADA T1Y 7J7

**Report Date: 2010/09/20**

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B084221**  
**Received: 2010/09/11, 11:20**

Sample Matrix: Water  
 # Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity (pp, total), CO3,HCO3,OH	4	N/A	2010/09/15	AB SOP-00005	SM 2320-B
BTEX/F1 in Water by HS GC/MS	4	N/A	2010/09/14	EENVSOP-00004 EENVSOP-00002	EPA 8260C/CCME
Cadmium - low level CCME - Dissolved	4	N/A	2010/09/19	CAL SOP-00191	EPA SW-846 6020A
Cadmium - low level CCME (Total)	4	2010/09/13	2010/09/19	CAL SOP-00191	EPA SW-846 6020A
Chloride (IC)	4	N/A	2010/09/15	EENVSOP-00055	SM 4110-B
Conductivity	4	N/A	2010/09/15	AB SOP-00005	SM 2510-B
CCME Hydrocarbons (F2-F4 in water)	4	2010/09/14	2010/09/15	EENVSOP-00007 AB WI-00017	EPA3510C/CCME PHCCWS
Hardness	4	N/A	2010/09/16	CAL WI-00053	AEMM, Method 423
Elements by ICP - Dissolved	1	N/A	2010/09/15	AB SOP-00042	EPA 200.7
Elements by ICP - Dissolved	3	N/A	2010/09/16	AB SOP-00042	EPA 200.7
Elements by ICP - Total	1	2010/09/15	2010/09/15	AB SOP-00042	EPA 200.7
Elements by ICP - Total	3	2010/09/15	2010/09/16	AB SOP-00042	EPA 200.7
Elements by ICPMS - Dissolved	3	N/A	2010/09/14	AB SOP-00043	EPA 200.8
Elements by ICPMS - Dissolved	1	N/A	2010/09/15	AB SOP-00043	EPA 200.8
Elements by ICPMS - Total	4	2010/09/15	2010/09/16	AB SOP-00043	EPA 200.8
Ion Balance	4	N/A	2010/09/16	CAL WI-00053	SM 1030E
Sum of cations, anions	4	N/A	2010/09/16	Calc	
Nitrate and Nitrite	4	N/A	2010/09/16	Calc	
Nitrate + Nitrite-N (calculated)	4	N/A	2010/09/16	AB SOP-00023	SM 4110-B
Nitrogen, (Nitrite, Nitrate) by IC	4	N/A	2010/09/15	AB SOP-00023	SM 4110-B
pH (Alkalinity titrator)	4	N/A	2010/09/15	AB SOP-00005	SM 4500-H+B
Sulphate (SO4)	4	N/A	2010/09/15	EENVSOP-00055	SM 4110-B
Total Dissolved Solids (Calculated)	4	N/A	2010/09/16		SM 1030E

./2



Your Project #: A04012A03  
Site: CAMP FAREWELL  
Your C.O.C. #: A020342

**Attention: SAM BIRD**  
IEG ENVIRONMENTAL  
500-2618 HOPEWELL PLACE NE  
CALGARY, AB  
CANADA T1Y 7J7

**Report Date: 2010/09/20**

**CERTIFICATE OF ANALYSIS**

-2-

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

ABDULKADIR DAKANE, B.Sc., Project Manager  
Email: [abdulkadir.dakane@maxxamanalytics.com](mailto:abdulkadir.dakane@maxxamanalytics.com)  
Phone# (780) 577-7100

=====  
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2

**AT1 BTEX AND F1-F4 IN WATER (WATER)**

Maxxam ID		W90680	W90746	W90747	W90748		
Sampling Date		2010/09/09	2010/09/09	2010/09/09	2010/09/09		
COC Number		A020342	A020342	A020342	A020342		
	<b>Units</b>	<b>SW001</b>	<b>SW002</b>	<b>SW003</b>	<b>SW004</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Extractable Hydrocarbons</b>							
F2 (C10-C16 Hydrocarbons)	mg/L	0.1	0.1	0.2	0.1	0.1	4256804
F3 (C16-C34 Hydrocarbons)	mg/L	0.4	0.4	0.3	0.3	0.1	4256804
F4 (C34-C50 Hydrocarbons)	mg/L	<0.1	<0.1	<0.1	<0.1	0.1	4256804
Reached Baseline at C50	mg/L	Yes	Yes	Yes	Yes	N/A	4256804
<b>Volatiles</b>							
Benzene	ug/L	<0.4	<0.4	2.0	<0.4	0.4	4256839
Toluene	ug/L	<0.4	<0.4	34	<0.4	0.4	4256839
Ethylbenzene	ug/L	<0.4	<0.4	<0.4	<0.4	0.4	4256839
o-Xylene	ug/L	<0.4	<0.4	1.4	<0.4	0.4	4256839
m & p-Xylene	ug/L	<0.8	<0.8	<0.8	<0.8	0.8	4256839
Xylenes (Total)	ug/L	<0.8	<0.8	1.4	<0.8	0.8	4256839
F1 (C6-C10) - BTEX	ug/L	<100	<100	<100	<100	100	4256839
(C6-C10)	ug/L	<100	<100	<100	<100	100	4256839
<b>Surrogate Recovery (%)</b>							
4-BROMOFLUOROBENZENE (sur.)	%	100	98	96	99	N/A	4256839
D4-1,2-DICHLOROETHANE (sur.)	%	99	100	99	99	N/A	4256839
D8-TOLUENE (sur.)	%	97	97	97	97	N/A	4256839
O-TERPHENYL (sur.)	%	101	94	86	96	N/A	4256804

N/A = Not Applicable  
RDL = Reportable Detection Limit

**ROUTINE WATER (WATER)**

Maxxam ID		W90680		W90746	W90747		W90748		
Sampling Date		2010/09/09		2010/09/09	2010/09/09		2010/09/09		
COC Number		A020342		A020342	A020342		A020342		
	<b>Units</b>	<b>SW001</b>	<b>RDL</b>	<b>SW002</b>	<b>SW003</b>	<b>RDL</b>	<b>SW004</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Calculated Parameters</b>									
Anion Sum	meq/L	53	N/A	53	43	N/A	11	N/A	4255406
Cation Sum	meq/L	59	N/A	60	48	N/A	12	N/A	4255406
Hardness (CaCO3)	mg/L	219	0.5	228	292	0.5	363	0.5	4255403
Ion Balance	N/A	1.1	0.01	1.1	1.1	0.01	1.1	0.01	4255404
Dissolved Nitrate (NO3)	mg/L	<1	1	0.4	0.3	0.1	0.2	0.1	4255408
Nitrate plus Nitrite (N)	mg/L	<0.3	0.3	0.08	0.07	0.03	0.05	0.03	4255409
Dissolved Nitrite (NO2)	mg/L	<1	1	<0.1	<0.1	0.1	<0.1	0.1	4255408
Total Dissolved Solids	mg/L	2950	10	2990	2390	10	545	10	4255413
<b>Misc. Inorganics</b>									
Conductivity	uS/cm	4300	1	4300	3500	1	970	1	4259356
pH	N/A	9.00	N/A	9.00	8.18	N/A	7.85	N/A	4259355
<b>Anions</b>									
Alkalinity (PP as CaCO3)	mg/L	170 (1)	5	190 (1)	9 (1)	5	<0.5	0.5	4259313
Alkalinity (Total as CaCO3)	mg/L	2400 (1)	5	2400 (1)	2000 (1)	5	480	0.5	4259313
Bicarbonate (HCO3)	mg/L	2500 (1)	5	2500 (1)	2400 (1)	5	580	0.5	4259313
Carbonate (CO3)	mg/L	200 (1)	5	230 (1)	10 (1)	5	<0.5	0.5	4259313
Hydroxide (OH)	mg/L	<5 (1)	5	<5 (1)	<5 (1)	5	<0.5	0.5	4259313
<b>Nutrients</b>									
Dissolved Nitrite (N)	mg/L	<0.3 (1)	0.3	<0.03 (1)	<0.03 (1)	0.03	<0.03 (1)	0.03	4261232
Dissolved Nitrate (N)	mg/L	<0.3 (1)	0.3	0.08 (1)	0.07 (1)	0.03	0.05 (1)	0.03	4261232

RDL = Reportable Detection Limit  
( 1 ) Detection limits raised due to matrix interference

**REGULATED METALS (CCME/AT1) - DISSOLVED**

Maxxam ID		W90680	W90746	W90747		W90748		
Sampling Date		2010/09/09	2010/09/09	2010/09/09		2010/09/09		
COC Number		A020342	A020342	A020342		A020342		
	<b>Units</b>	<b>SW001</b>	<b>SW002</b>	<b>SW003</b>	<b>RDL</b>	<b>SW004</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Low Level Elements</b>								
Dissolved Cadmium (Cd)	ug/L	6	4	3	3	<0.005	0.005	4255549
<b>Elements</b>								
Dissolved Aluminum (Al)	mg/L	7.1 (1)	6.8 (1)	4.7 (1)	0.5	0.042	0.001	4258971
Dissolved Antimony (Sb)	mg/L	<0.1	<0.1	<0.1	0.1	0.011 (1)	0.0002	4258971
Dissolved Arsenic (As)	mg/L	0.1	<0.1	<0.1	0.1	<0.0002	0.0002	4258971
Dissolved Barium (Ba)	mg/L	0.85	0.92	0.75	0.01	0.20	0.01	4263523
Dissolved Beryllium (Be)	mg/L	<0.5	<0.5	<0.5	0.5	<0.001	0.001	4258971
Dissolved Boron (B)	mg/L	0.03	0.03	<0.02	0.02	<0.02	0.02	4263523
Dissolved Calcium (Ca)	mg/L	50	52	71	0.3	81 (2)	0.3	4263523
Dissolved Chromium (Cr)	mg/L	<0.5 (1)	<0.5 (1)	<0.5 (1)	0.5	0.006 (1)	0.001	4258971
Dissolved Cobalt (Co)	mg/L	<0.2	<0.2	<0.2	0.2	0.0011	0.0003	4258971
Dissolved Copper (Cu)	mg/L	0.1	<0.1	<0.1	0.1	0.0007	0.0002	4258971
Dissolved Iron (Fe)	mg/L	7.9	8.4	15	0.06	1.1	0.06	4263523
Dissolved Lead (Pb)	mg/L	<0.1	<0.1	<0.1	0.1	<0.0002	0.0002	4258971
Dissolved Lithium (Li)	mg/L	<0.02	<0.02	<0.02	0.02	<0.02	0.02	4263523
Dissolved Magnesium (Mg)	mg/L	23	24	28	0.2	39 (2)	0.2	4263523
Dissolved Manganese (Mn)	mg/L	1.7	1.7	3.7	0.004	0.11	0.004	4263523
Dissolved Molybdenum (Mo)	mg/L	0.5	0.2	<0.1	0.1	<0.0002	0.0002	4258971
Dissolved Nickel (Ni)	mg/L	<0.3	<0.3	<0.3	0.3	0.010	0.0005	4258971
Dissolved Phosphorus (P)	mg/L	4.4	4.3	3.0	0.1	0.2 (3)	0.1	4263523
Dissolved Potassium (K)	mg/L	4.5	4.6	4.3	0.3	0.3 (3)	0.3	4263523
Dissolved Selenium (Se)	mg/L	<0.1	<0.1	<0.1	0.1	0.0011 (1)	0.0002	4258971
Dissolved Silicon (Si)	mg/L	5.1	5.3	5.4	0.1	3.4	0.1	4263523
Dissolved Silver (Ag)	mg/L	<0.05	<0.05	<0.05	0.05	<0.0001	0.0001	4258971
Dissolved Sodium (Na)	mg/L	1200 (4)	1300 (4)	950 (5)	5	99	0.5	4263523
Dissolved Strontium (Sr)	mg/L	0.18	0.19	0.20	0.02	0.17 (2)	0.02	4263523
Dissolved Sulphur (S)	mg/L	43	45	24	0.2	1.7	0.2	4263523
Dissolved Thallium (Tl)	mg/L	<0.1	<0.1	<0.1	0.1	<0.0002	0.0002	4258971
Dissolved Tin (Sn)	mg/L	<0.5	<0.5	<0.5	0.5	<0.001	0.001	4258971

RDL = Reportable Detection Limit

- ( 1 ) Dissolved greater than total. Reanalysis yields similar results.
  - ( 2 ) Dissolved greater than total. Results within acceptable limits of precision.
  - ( 3 ) Dissolved greater than total. Results are within limits of uncertainty(MU).
  - ( 4 ) Detection limits raised due to dilution to bring analyte within the calibrated range.
  - ( 5 ) Detection limits raised due to dilution to bring analyte within the calibrated range.
- Dissolved greater than total. Results within acceptable limits of precision.



**REGULATED METALS (CCME/AT1) - DISSOLVED**

Maxxam ID		W90680	W90746	W90747		W90748		
Sampling Date		2010/09/09	2010/09/09	2010/09/09		2010/09/09		
COC Number		A020342	A020342	A020342		A020342		
	<b>Units</b>	<b>SW001</b>	<b>SW002</b>	<b>SW003</b>	<b>RDL</b>	<b>SW004</b>	<b>RDL</b>	<b>QC Batch</b>

Dissolved Titanium (Ti)	mg/L	<0.5	<0.5	<0.5	0.5	0.003	0.001	4258971
Dissolved Uranium (U)	mg/L	0.20	<0.05	<0.05	0.05	<0.0001	0.0001	4258971
Dissolved Vanadium (V)	mg/L	<0.5	<0.5	<0.5	0.5	<0.001	0.001	4258971
Dissolved Zinc (Zn)	mg/L	<2	<2	<2	2	0.018 (1)	0.003	4258971

RDL = Reportable Detection Limit  
 ( 1 ) Dissolved greater than total. Reanalysis yields similar results.

**REGULATED METALS (CCME/AT1) - TOTAL**

Maxxam ID		W90680	W90746	W90747		W90748		
Sampling Date		2010/09/09	2010/09/09	2010/09/09		2010/09/09		
COC Number		A020342	A020342	A020342		A020342		
	<b>Units</b>	<b>SW001</b>	<b>SW002</b>	<b>SW003</b>	<b>RDL</b>	<b>SW004</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Low Level Elements</b>								
Total Cadmium (Cd)	ug/L	5	6	<3	3	0.3	0.1	4256086
<b>Elements</b>								
Total Aluminum (Al)	mg/L	4.1	4.1	2.4	0.5	0.09	0.02	4263565
Total Antimony (Sb)	mg/L	<0.1	<0.1	<0.1	0.1	<0.004	0.004	4263565
Total Arsenic (As)	mg/L	<0.1	<0.1	<0.1	0.1	<0.004	0.004	4263565
Total Barium (Ba)	mg/L	1.5	1.9	1.1	0.01	0.20	0.01	4263446
Total Beryllium (Be)	mg/L	<0.5	<0.5	<0.5	0.5	<0.02	0.02	4263565
Total Boron (B)	mg/L	0.03	0.03	<0.02	0.02	<0.02	0.02	4263446
Total Calcium (Ca)	mg/L	58	60	79	0.3	80	0.3	4263446
Total Chromium (Cr)	mg/L	<0.5	<0.5	<0.5	0.5	<0.02	0.02	4263565
Total Cobalt (Co)	mg/L	<0.2	<0.2	<0.2	0.2	<0.006	0.006	4263565
Total Copper (Cu)	mg/L	<0.1	<0.1	<0.1	0.1	<0.004	0.004	4263565
Total Iron (Fe)	mg/L	30	31	27	0.06	1.4	0.06	4263446
Total Lead (Pb)	mg/L	<0.1	<0.1	<0.1	0.1	<0.004	0.004	4263565
Total Lithium (Li)	mg/L	<0.02	<0.02	<0.02	0.02	<0.02	0.02	4263446
Total Magnesium (Mg)	mg/L	27	27	31	0.2	39	0.2	4263446
Total Manganese (Mn)	mg/L	2.5	2.7	4.3	0.004	0.21	0.004	4263446
Total Molybdenum (Mo)	mg/L	0.2	<0.1	<0.1	0.1	0.027	0.004	4263565
Total Nickel (Ni)	mg/L	0.3	0.3	<0.3	0.3	0.02	0.01	4263565
Total Phosphorus (P)	mg/L	5.9	6.0	3.8	0.1	0.2	0.1	4263446
Total Potassium (K)	mg/L	5.6	5.8	4.6	0.3	0.3	0.3	4263446
Total Selenium (Se)	mg/L	<0.1	<0.1	<0.1	0.1	<0.004	0.004	4263565
Total Silicon (Si)	mg/L	14	15	9.3	0.1	3.4	0.1	4263446
Total Silver (Ag)	mg/L	<0.05	<0.05	<0.05	0.05	<0.002	0.002	4263565
Total Sodium (Na)	mg/L	1300 (1)	1300 (1)	900 (1)	5	100	0.5	4263446
Total Strontium (Sr)	mg/L	0.23	0.24	0.23	0.02	0.16	0.02	4263446
Total Sulphur (S)	mg/L	51	52	27	0.2	1.7	0.2	4263446
Total Thallium (Tl)	mg/L	<0.1	<0.1	<0.1	0.1	<0.004	0.004	4263565
Total Tin (Sn)	mg/L	<0.5	<0.5	<0.5	0.5	<0.02	0.02	4263565
Total Titanium (Ti)	mg/L	<0.5	<0.5	<0.5	0.5	<0.02	0.02	4263565
Total Uranium (U)	mg/L	<0.05	<0.05	<0.05	0.05	<0.002	0.002	4263565
Total Vanadium (V)	mg/L	<0.5	<0.5	<0.5	0.5	<0.02	0.02	4263565

RDL = Reportable Detection Limit  
( 1 ) Detection limits raised due to dilution to bring analyte within the calibrated range.



Maxxam Job #: B084221  
 Report Date: 2010/09/20

IEG ENVIRONMENTAL  
 Client Project #: A04012A03  
 Site Reference: CAMP FAREWELL  
 Sampler Initials: RL

**REGULATED METALS (CCME/AT1) - TOTAL**

Maxxam ID		W90680	W90746	W90747		W90748		
Sampling Date		2010/09/09	2010/09/09	2010/09/09		2010/09/09		
COC Number		A020342	A020342	A020342		A020342		
	<b>Units</b>	<b>SW001</b>	<b>SW002</b>	<b>SW003</b>	<b>RDL</b>	<b>SW004</b>	<b>RDL</b>	<b>QC Batch</b>

Total Zinc (Zn)	mg/L	<2	<2	<2	2	<0.06	0.06	4263565
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RDL = Reportable Detection Limit

**RESULTS OF CHEMICAL ANALYSES OF WATER**

Maxxam ID		W90680	W90746		W90747	W90748	W90748		
Sampling Date		2010/09/09	2010/09/09		2010/09/09	2010/09/09	2010/09/09		
COC Number		A020342	A020342		A020342	A020342	A020342		
	<b>Units</b>	<b>SW001</b>	<b>SW002</b>	<b>RDL</b>	<b>SW003</b>	<b>SW004</b>	<b>SW004 Lab-Dup</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Anions</b>									
Dissolved Chloride (Cl)	mg/L	62	63	0.5	55	39	39	0.5	4261635
Dissolved Sulphate (SO4)	mg/L	120 (1)	130 (1)	1	64	<0.5	N/A	0.5	4261536

N/A = Not Applicable  
 RDL = Reportable Detection Limit  
 ( 1 ) Detection limits raised due to dilution to bring analyte within the calibrated range.

Package 1	4.3°C
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Each temperature is the average of up to three cooler temperatures taken at receipt

**General Comments**

Sample W90680-01: Detection limits raised due to sample matrix. Parameters affected are Al, Cr, Co, Cu, Pb, Sb, Mo, Ni, Se, Ag, As, Tl, Sn, Ti, U, V, Zn, Be, Cd.

Sample W90746-01: Detection limits raised due to sample matrix. Parameters affected are Al, Cr, Co, Cu, Pb, Sb, Mo, Ni, Se, Ag, As, Tl, Sn, Ti, U, V, Zn, Be, Cd.

Sample W90747-01: Detection limits raised due to sample matrix. Parameters affected are Al, Cr, Co, Cu, Pb, Sb, Mo, Ni, Se, Ag, As, Tl, Sn, Ti, U, V, Zn, Be, Cd.

Sample W90748-01: Detection limits raised due to sample matrix. Parameters affected are Cr, Co, Cu, Pb, Sb, Mo, Ni, Se, Ag, As, Tl, Sn, U, V, Zn, Be, Cd, Hg, Ba.

**Results relate only to the items tested.**



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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits		
4256804 RC6	Spiked Blank	F2 (C10-C16 Hydrocarbons)	2010/09/15		100	%	80 - 120		
		F3 (C16-C34 Hydrocarbons)	2010/09/15		93	%	80 - 120		
		F4 (C34-C50 Hydrocarbons)	2010/09/15		94	%	80 - 120		
		O-TERPHENYL (sur.)	2010/09/15		96	%	70 - 130		
	Method Blank	F2 (C10-C16 Hydrocarbons)	2010/09/15	<0.1			mg/L		
		F3 (C16-C34 Hydrocarbons)	2010/09/15	<0.1			mg/L		
		F4 (C34-C50 Hydrocarbons)	2010/09/15	<0.1			mg/L		
		O-TERPHENYL (sur.)	2010/09/15		97	%		70 - 130	
		4256839 AN1	Matrix Spike	4-BROMOFLUOROBENZENE (sur.)	2010/09/14		100	%	70 - 130
				D4-1,2-DICHLOROETHANE (sur.)	2010/09/14		101	%	70 - 130
D8-TOLUENE (sur.)	2010/09/14				97	%	70 - 130		
Benzene	2010/09/14				104	%	70 - 130		
Toluene	2010/09/14				92	%	70 - 130		
Ethylbenzene	2010/09/14				98	%	70 - 130		
o-Xylene	2010/09/14				100	%	70 - 130		
m & p-Xylene (C6-C10)	2010/09/14				97	%	70 - 130		
Spiked Blank	4-BROMOFLUOROBENZENE (sur.)			2010/09/14		95	%		70 - 130
	D4-1,2-DICHLOROETHANE (sur.)			2010/09/14		100	%		70 - 130
	D8-TOLUENE (sur.)	2010/09/14		95	%		70 - 130		
	Benzene	2010/09/14		101	%		70 - 130		
	Toluene	2010/09/14		101	%		70 - 130		
	Ethylbenzene	2010/09/14		93	%		70 - 130		
	o-Xylene	2010/09/14		99	%		70 - 130		
	m & p-Xylene (C6-C10)	2010/09/14		100	%		70 - 130		
	Method Blank	4-BROMOFLUOROBENZENE (sur.)	2010/09/14		99	%		70 - 130	
		D4-1,2-DICHLOROETHANE (sur.)	2010/09/14		106	%		70 - 130	
D8-TOLUENE (sur.)		2010/09/14		97	%		70 - 130		
Benzene		2010/09/14	<0.4			ug/L			
Toluene		2010/09/14	<0.4			ug/L			
Ethylbenzene		2010/09/14	<0.4			ug/L			
o-Xylene		2010/09/14	<0.4			ug/L			
m & p-Xylene		2010/09/14	<0.8			ug/L			
Xylenes (Total)		2010/09/14	<0.8			ug/L			
F1 (C6-C10) - BTEX (C6-C10)		2010/09/14	<100			ug/L			
RPD	Benzene	2010/09/14		NC		%	40		
	Toluene	2010/09/14		NC		%	40		
	Ethylbenzene	2010/09/14		NC		%	40		
	o-Xylene	2010/09/14		NC		%	40		
	m & p-Xylene	2010/09/14		NC		%	40		
	Xylenes (Total)	2010/09/14		NC		%	40		
	F1 (C6-C10) - BTEX (C6-C10)	2010/09/14		NC		%	40		
	4258971 EO1	Matrix Spike	Dissolved Aluminum (Al)	2010/09/14		89	%	80 - 120	
			Dissolved Antimony (Sb)	2010/09/14		99	%	80 - 120	
			Dissolved Arsenic (As)	2010/09/14		87	%	80 - 120	
Dissolved Beryllium (Be)			2010/09/14		91	%	80 - 120		
Dissolved Chromium (Cr)			2010/09/14		93	%	80 - 120		
Dissolved Cobalt (Co)			2010/09/14		93	%	80 - 120		
Dissolved Copper (Cu)			2010/09/14		86	%	80 - 120		
Dissolved Lead (Pb)			2010/09/14		94	%	80 - 120		
Dissolved Molybdenum (Mo)			2010/09/14		100	%	80 - 120		
Dissolved Nickel (Ni)			2010/09/14		90	%	80 - 120		





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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
4258971 EO1	Matrix Spike	Dissolved Selenium (Se)	2010/09/14		87	%	80 - 120
		Dissolved Silver (Ag)	2010/09/14		92	%	80 - 120
		Dissolved Thallium (Tl)	2010/09/14		95	%	80 - 120
		Dissolved Tin (Sn)	2010/09/14		95	%	80 - 120
		Dissolved Titanium (Ti)	2010/09/14		95	%	80 - 120
		Dissolved Uranium (U)	2010/09/14		93	%	80 - 120
		Dissolved Vanadium (V)	2010/09/14		97	%	80 - 120
	Spiked Blank	Dissolved Zinc (Zn)	2010/09/14		80	%	80 - 120
		Dissolved Aluminum (Al)	2010/09/14		93	%	80 - 120
		Dissolved Antimony (Sb)	2010/09/14		84	%	80 - 120
		Dissolved Arsenic (As)	2010/09/14		85	%	80 - 120
		Dissolved Beryllium (Be)	2010/09/14		97	%	80 - 120
		Dissolved Chromium (Cr)	2010/09/14		93	%	80 - 120
		Dissolved Cobalt (Co)	2010/09/14		95	%	80 - 120
		Dissolved Copper (Cu)	2010/09/14		91	%	80 - 120
		Dissolved Lead (Pb)	2010/09/14		98	%	80 - 120
		Dissolved Molybdenum (Mo)	2010/09/14		93	%	80 - 120
		Dissolved Nickel (Ni)	2010/09/14		95	%	80 - 120
		Dissolved Selenium (Se)	2010/09/14		83	%	80 - 120
		Dissolved Silver (Ag)	2010/09/14		94	%	80 - 120
		Dissolved Thallium (Tl)	2010/09/14		98	%	80 - 120
	Method Blank	Dissolved Tin (Sn)	2010/09/14		91	%	80 - 120
		Dissolved Titanium (Ti)	2010/09/14		93	%	80 - 120
		Dissolved Uranium (U)	2010/09/14		92	%	80 - 120
		Dissolved Vanadium (V)	2010/09/14		96	%	80 - 120
		Dissolved Zinc (Zn)	2010/09/14		84	%	80 - 120
		Dissolved Aluminum (Al)	2010/09/14		<0.001		mg/L
		Dissolved Antimony (Sb)	2010/09/14		<0.0002		mg/L
		Dissolved Arsenic (As)	2010/09/14		<0.0002		mg/L
		Dissolved Beryllium (Be)	2010/09/14		<0.001		mg/L
		Dissolved Chromium (Cr)	2010/09/14		<0.001		mg/L
		Dissolved Cobalt (Co)	2010/09/14		<0.0003		mg/L
		Dissolved Copper (Cu)	2010/09/14		<0.0002		mg/L
		Dissolved Lead (Pb)	2010/09/14		<0.0002		mg/L
		Dissolved Molybdenum (Mo)	2010/09/14		<0.0002		mg/L
Dissolved Nickel (Ni)		2010/09/14		<0.0005		mg/L	
Dissolved Selenium (Se)		2010/09/14		<0.0002		mg/L	
RPD		Dissolved Silver (Ag)	2010/09/14		<0.0001		mg/L
	Dissolved Thallium (Tl)	2010/09/14		<0.0002		mg/L	
	Dissolved Tin (Sn)	2010/09/14		<0.001		mg/L	
	Dissolved Titanium (Ti)	2010/09/14		<0.001		mg/L	
	Dissolved Uranium (U)	2010/09/14		<0.0001		mg/L	
	Dissolved Vanadium (V)	2010/09/14		<0.001		mg/L	
	Dissolved Zinc (Zn)	2010/09/14		<0.003		mg/L	
	Dissolved Aluminum (Al)	2010/09/15		15.4		%	20
	Dissolved Antimony (Sb)	2010/09/15		6.5		%	20
	Dissolved Arsenic (As)	2010/09/15		NC		%	20
	Dissolved Beryllium (Be)	2010/09/15		NC		%	20
	Dissolved Chromium (Cr)	2010/09/15		NC		%	20
	Dissolved Cobalt (Co)	2010/09/15		0.6		%	20
Dissolved Copper (Cu)	2010/09/15		4.2		%	20	
Dissolved Lead (Pb)	2010/09/15		NC		%	20	
Dissolved Molybdenum (Mo)	2010/09/15		NC		%	20	
Dissolved Nickel (Ni)	2010/09/15		2.0		%	20	
Dissolved Selenium (Se)	2010/09/15		NC		%	20	



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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
4258971	EO1 RPD	Dissolved Silver (Ag)	2010/09/15	NC		%	20
		Dissolved Thallium (Tl)	2010/09/15	NC		%	20
		Dissolved Tin (Sn)	2010/09/15	NC		%	20
		Dissolved Titanium (Ti)	2010/09/15	NC		%	20
		Dissolved Uranium (U)	2010/09/15	0.3		%	20
		Dissolved Vanadium (V)	2010/09/15	NC		%	20
		Dissolved Zinc (Zn)	2010/09/15	0.8		%	20
4259313	SB8 Spiked Blank	Alkalinity (Total as CaCO3)	2010/09/15		97	%	80 - 120
	Method Blank	Alkalinity (PP as CaCO3)	2010/09/15	<0.5		mg/L	
		Alkalinity (Total as CaCO3)	2010/09/15	<0.5		mg/L	
		Bicarbonate (HCO3)	2010/09/15	<0.5		mg/L	
		Carbonate (CO3)	2010/09/15	<0.5		mg/L	
		Hydroxide (OH)	2010/09/15	<0.5		mg/L	
	RPD	Alkalinity (PP as CaCO3)	2010/09/15	NC		%	20
		Alkalinity (Total as CaCO3)	2010/09/15	4.6		%	20
		Bicarbonate (HCO3)	2010/09/15	4.6		%	20
		Carbonate (CO3)	2010/09/15	NC		%	20
		Hydroxide (OH)	2010/09/15	NC		%	20
4259355	SB8 Spiked Blank	pH	2010/09/15		100	%	97 - 103
	RPD	pH	2010/09/15	0.2		%	5
4259356	SB8 Spiked Blank	Conductivity	2010/09/15		97	%	90 - 110
	Method Blank	Conductivity	2010/09/15	<1		uS/cm	
	RPD	Conductivity	2010/09/15	0.3		%	20
4261232	DC9 Matrix Spike	Dissolved Nitrite (N)	2010/09/15		93	%	80 - 120
		Dissolved Nitrate (N)	2010/09/15		93	%	80 - 120
	Spiked Blank	Dissolved Nitrite (N)	2010/09/15		98	%	80 - 120
		Dissolved Nitrate (N)	2010/09/15		103	%	80 - 120
	Method Blank	Dissolved Nitrite (N)	2010/09/15	<0.003		mg/L	
		Dissolved Nitrate (N)	2010/09/15	0.004, RDL=0.003		mg/L	
	RPD	Dissolved Nitrite (N)	2010/09/15	NC		%	20
		Dissolved Nitrate (N)	2010/09/15	NC		%	20
4261536	DMA Matrix Spike	Dissolved Sulphate (SO4)	2010/09/15		102	%	80 - 120
	Spiked Blank	Dissolved Sulphate (SO4)	2010/09/15		100	%	80 - 120
	Method Blank	Dissolved Sulphate (SO4)	2010/09/15	<0.5		mg/L	
	RPD	Dissolved Sulphate (SO4)	2010/09/15	NC		%	20
4261635	DMA Matrix Spike	Dissolved Chloride (Cl)	2010/09/15		NC	%	80 - 120
	[W90748-01] Spiked Blank	Dissolved Chloride (Cl)	2010/09/15		100	%	80 - 120
	Method Blank	Dissolved Chloride (Cl)	2010/09/15	<0.5		mg/L	
	RPD [W90748-01]	Dissolved Chloride (Cl)	2010/09/15	1		%	20
4263446	SV1 Matrix Spike	Total Barium (Ba)	2010/09/15		95	%	80 - 120
		Total Boron (B)	2010/09/15		105	%	80 - 120
		Total Calcium (Ca)	2010/09/15		NC	%	80 - 120
		Total Iron (Fe)	2010/09/15		NC	%	80 - 120
		Total Lithium (Li)	2010/09/15		100	%	80 - 120
		Total Magnesium (Mg)	2010/09/15		101	%	80 - 120
		Total Manganese (Mn)	2010/09/15		102	%	80 - 120
		Total Phosphorus (P)	2010/09/15		109	%	80 - 120
		Total Potassium (K)	2010/09/15		105	%	80 - 120
		Total Silicon (Si)	2010/09/15		102	%	80 - 120
		Total Sodium (Na)	2010/09/15		100	%	80 - 120
		Total Strontium (Sr)	2010/09/15		101	%	80 - 120
	Spiked Blank	Total Barium (Ba)	2010/09/15		94	%	80 - 120
		Total Boron (B)	2010/09/15		103	%	80 - 120
		Total Calcium (Ca)	2010/09/15		102	%	80 - 120



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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits	
4263446 SV1	Spiked Blank	Total Iron (Fe)	2010/09/15		104	%	80 - 120	
		Total Lithium (Li)	2010/09/15		99	%	80 - 120	
		Total Magnesium (Mg)	2010/09/15		100	%	80 - 120	
		Total Manganese (Mn)	2010/09/15		102	%	80 - 120	
		Total Phosphorus (P)	2010/09/15		108	%	80 - 120	
		Total Potassium (K)	2010/09/15		103	%	80 - 120	
		Total Silicon (Si)	2010/09/15		100	%	80 - 120	
	Method Blank	Total Sodium (Na)	2010/09/15		99	%	80 - 120	
		Total Strontium (Sr)	2010/09/15		100	%	80 - 120	
		Total Barium (Ba)	2010/09/15	<0.01			mg/L	
		Total Boron (B)	2010/09/15	<0.02			mg/L	
		Total Calcium (Ca)	2010/09/15	<0.3			mg/L	
		Total Iron (Fe)	2010/09/15	<0.06			mg/L	
		Total Lithium (Li)	2010/09/15	<0.02			mg/L	
		Total Magnesium (Mg)	2010/09/15	<0.2			mg/L	
		Total Manganese (Mn)	2010/09/15	<0.004			mg/L	
		Total Phosphorus (P)	2010/09/15	<0.1			mg/L	
		Total Potassium (K)	2010/09/15	<0.3			mg/L	
		Total Silicon (Si)	2010/09/15	<0.1			mg/L	
		Total Sodium (Na)	2010/09/15	<0.5			mg/L	
		Total Strontium (Sr)	2010/09/15	<0.02			mg/L	
		Total Sulphur (S)	2010/09/15	<0.2			mg/L	
		RPD	Total Barium (Ba)	2010/09/15	0.1			%
	Total Boron (B)		2010/09/15	NC			%	20
	Total Calcium (Ca)		2010/09/15	0.2			%	20
	Total Iron (Fe)		2010/09/15	0.2			%	20
	Total Lithium (Li)		2010/09/15	NC			%	20
	Total Magnesium (Mg)		2010/09/15	0.3			%	20
	Total Manganese (Mn)		2010/09/15	2.4			%	20
	Total Phosphorus (P)		2010/09/15	NC			%	20
	Total Potassium (K)		2010/09/15	0.9			%	20
	Total Silicon (Si)		2010/09/15	NC			%	20
	4263523 SV1	Matrix Spike	Total Sodium (Na)	2010/09/15	0.8		%	20
Total Strontium (Sr)			2010/09/15	0.1		%	20	
Total Sulphur (S)			2010/09/15	1.1		%	20	
Dissolved Barium (Ba)			2010/09/15		93	%	80 - 120	
Dissolved Boron (B)			2010/09/15		97	%	80 - 120	
Dissolved Calcium (Ca)			2010/09/15		83	%	80 - 120	
Dissolved Iron (Fe)			2010/09/15		89	%	80 - 120	
Dissolved Lithium (Li)			2010/09/15		101	%	80 - 120	
Dissolved Magnesium (Mg)			2010/09/15		96	%	80 - 120	
Dissolved Manganese (Mn)			2010/09/15		90	%	80 - 120	
Spiked Blank		Dissolved Phosphorus (P)	2010/09/15		103	%	80 - 120	
		Dissolved Potassium (K)	2010/09/15		100	%	80 - 120	
		Dissolved Silicon (Si)	2010/09/15		94	%	80 - 120	
		Dissolved Sodium (Na)	2010/09/15		95	%	80 - 120	
		Dissolved Strontium (Sr)	2010/09/15		92	%	80 - 120	
		Dissolved Barium (Ba)	2010/09/15		97	%	80 - 110	
		Dissolved Boron (B)	2010/09/15		102	%	84 - 117	
Dissolved Calcium (Ca)	2010/09/15		95	%	88 - 115			
Dissolved Iron (Fe)	2010/09/15		95	%	81 - 111			
Dissolved Lithium (Li)	2010/09/15		106	%	82 - 117			
Dissolved Magnesium (Mg)	2010/09/15		105	%	80 - 120			
Dissolved Manganese (Mn)	2010/09/15		96	%	85 - 110			
Dissolved Phosphorus (P)	2010/09/15		106	%	87 - 116			

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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits		
4263523 SV1	Spiked Blank	Dissolved Potassium (K)	2010/09/15		106	%	85 - 117		
		Dissolved Silicon (Si)	2010/09/15		100	%	80 - 120		
		Dissolved Sodium (Na)	2010/09/15		101	%	84 - 118		
		Dissolved Strontium (Sr)	2010/09/15		98	%	83 - 113		
	Method Blank	Dissolved Barium (Ba)	2010/09/15	<0.01			mg/L		
		Dissolved Boron (B)	2010/09/15	<0.02			mg/L		
		Dissolved Calcium (Ca)	2010/09/15	<0.3			mg/L		
		Dissolved Iron (Fe)	2010/09/15	<0.06			mg/L		
		Dissolved Lithium (Li)	2010/09/15	<0.02			mg/L		
		Dissolved Magnesium (Mg)	2010/09/15	<0.2			mg/L		
		Dissolved Manganese (Mn)	2010/09/15	<0.004			mg/L		
		Dissolved Phosphorus (P)	2010/09/15	<0.1			mg/L		
		Dissolved Potassium (K)	2010/09/15	<0.3			mg/L		
		Dissolved Silicon (Si)	2010/09/15	<0.1			mg/L		
		Dissolved Sodium (Na)	2010/09/15	<0.5			mg/L		
		Dissolved Strontium (Sr)	2010/09/15	<0.02			mg/L		
		Dissolved Sulphur (S)	2010/09/15	<0.2			mg/L		
		RPD	Dissolved Calcium (Ca)	2010/09/15	1.4			%	20
			Dissolved Iron (Fe)	2010/09/15	1.8			%	20
			Dissolved Magnesium (Mg)	2010/09/15	0.3			%	20
Dissolved Manganese (Mn)	2010/09/15		0.2			%	20		
4263565 SG8	Matrix Spike	Dissolved Potassium (K)	2010/09/15	0.4		%	20		
		Dissolved Sodium (Na)	2010/09/15	0.9		%	20		
		Total Aluminum (Al)	2010/09/16		101	%	80 - 120		
		Total Antimony (Sb)	2010/09/16		119	%	80 - 120		
		Total Arsenic (As)	2010/09/16		95	%	80 - 120		
		Total Beryllium (Be)	2010/09/16		95	%	80 - 120		
		Total Chromium (Cr)	2010/09/16		112	%	80 - 120		
		Total Cobalt (Co)	2010/09/16		113	%	80 - 120		
		Total Copper (Cu)	2010/09/16		105	%	80 - 120		
		Total Lead (Pb)	2010/09/16		103	%	80 - 120		
		Total Molybdenum (Mo)	2010/09/16		120	%	80 - 120		
		Total Nickel (Ni)	2010/09/16		107	%	80 - 120		
		Total Selenium (Se)	2010/09/16		84	%	80 - 120		
		Total Silver (Ag)	2010/09/16		108	%	80 - 120		
		Total Thallium (Tl)	2010/09/16		101	%	80 - 120		
		Total Tin (Sn)	2010/09/16		115	%	80 - 120		
	Total Titanium (Ti)	2010/09/16		119	%	80 - 120			
	Total Uranium (U)	2010/09/16		110	%	80 - 120			
	Total Vanadium (V)	2010/09/16		118	%	80 - 120			
	Total Zinc (Zn)	2010/09/16		88	%	80 - 120			
Spiked Blank	Total Aluminum (Al)	2010/09/18		100	%	80 - 120			
	Total Antimony (Sb)	2010/09/18		91	%	80 - 120			
	Total Arsenic (As)	2010/09/18		84	%	80 - 120			
	Total Beryllium (Be)	2010/09/18		90	%	80 - 120			
	Total Chromium (Cr)	2010/09/18		104	%	80 - 120			
	Total Cobalt (Co)	2010/09/18		107	%	80 - 120			
	Total Copper (Cu)	2010/09/18		101	%	80 - 120			
	Total Lead (Pb)	2010/09/18		101	%	80 - 120			
	Total Molybdenum (Mo)	2010/09/18		111	%	80 - 120			
	Total Nickel (Ni)	2010/09/18		103	%	80 - 120			
	Total Selenium (Se)	2010/09/18		90	%	80 - 120			
	Total Silver (Ag)	2010/09/18		102	%	80 - 120			
	Total Thallium (Tl)	2010/09/18		97	%	80 - 120			
	Total Tin (Sn)	2010/09/18		103	%	80 - 120			

Quality Assurance Report (Continued)  
 Maxxam Job Number: EB084221

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits		
4263565 SG8	Spiked Blank	Total Titanium (Ti)	2010/09/18		110	%	80 - 120		
		Total Uranium (U)	2010/09/18		97	%	80 - 120		
		Total Vanadium (V)	2010/09/18		107	%	80 - 120		
		Total Zinc (Zn)	2010/09/18		83	%	80 - 120		
Method Blank		Total Aluminum (Al)	2010/09/16	<0.001		mg/L			
		Total Antimony (Sb)	2010/09/16	<0.0002		mg/L			
		Total Arsenic (As)	2010/09/16	<0.0002		mg/L			
		Total Beryllium (Be)	2010/09/16	<0.001		mg/L			
		Total Chromium (Cr)	2010/09/16	<0.001		mg/L			
		Total Cobalt (Co)	2010/09/16	<0.0003		mg/L			
		Total Copper (Cu)	2010/09/16	<0.0002		mg/L			
		Total Lead (Pb)	2010/09/16	<0.0002		mg/L			
		Total Molybdenum (Mo)	2010/09/16	<0.0002		mg/L			
		Total Nickel (Ni)	2010/09/16	<0.0005		mg/L			
		Total Selenium (Se)	2010/09/16	<0.0002		mg/L			
		Total Silver (Ag)	2010/09/16	<0.0001		mg/L			
		Total Thallium (Tl)	2010/09/16	<0.0002		mg/L			
		Total Tin (Sn)	2010/09/16	<0.001		mg/L			
		Total Titanium (Ti)	2010/09/16	<0.001		mg/L			
		Total Uranium (U)	2010/09/16	<0.0001		mg/L			
		Total Vanadium (V)	2010/09/16	<0.001		mg/L			
		Total Zinc (Zn)	2010/09/16	<0.003		mg/L			
		RPD		Total Aluminum (Al)	2010/09/16	0.3		%	20
				Total Antimony (Sb)	2010/09/16	NC		%	20
Total Arsenic (As)	2010/09/16			NC		%	20		
Total Beryllium (Be)	2010/09/16			NC		%	20		
Total Chromium (Cr)	2010/09/16			NC		%	20		
Total Cobalt (Co)	2010/09/16			NC		%	20		
Total Copper (Cu)	2010/09/16			NC		%	20		
Total Lead (Pb)	2010/09/16			2.1		%	20		
Total Molybdenum (Mo)	2010/09/16			NC		%	20		
Total Nickel (Ni)	2010/09/16			1.8		%	20		
Total Selenium (Se)	2010/09/16			NC		%	20		
Total Silver (Ag)	2010/09/16			NC		%	20		
Total Thallium (Tl)	2010/09/16			NC		%	20		
Total Tin (Sn)	2010/09/16			NC		%	20		
Total Titanium (Ti)	2010/09/16			NC		%	20		
Total Uranium (U)	2010/09/16			NC		%	20		
Total Vanadium (V)	2010/09/16	NC		%	20				
Total Zinc (Zn)	2010/09/16	NC		%	20				

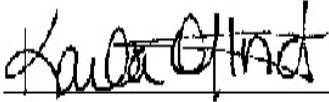
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.  
 Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.  
 Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.  
 Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.  
 Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.  
 NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.  
 NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

**Validation Signature Page**

**Maxxam Job #: B084221**

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The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



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KARLA OFFORD, Senior Analyst



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RON VENZI, Scientific Specialist

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



09/445

# Maxxam

Company: 403-243-8833 Fax: 403-243-8833  
 800-368-7824 Fax: 800-477-7100  
 www.maxxaminc.com

Chain of Custody **A020342**

B084221 / PKY/JMS / B084243

Page 1 of 1

Invoice To:  CO Report Address

Company: **Shell Canada**

Contact: **Fordall Warren**

Address: **Lock Box 548, Station H Calgary**

Phone: **AB** Fax: **T2P-2H5**

Contact Fax: **AB** Cell: **AB**

Report To:  Same as Invoice

**IEG Consultants**

**5600, 2618 Hopewell Pl. NE**

**Calgary**

Phone: **AB** Fax: **T1Y 7J9**

Cell: **403 990 1882**

Report Distribution (E-Mail):

**flennie@kloha.com**

**sbild@kloha.com**

REGULATORY GUIDELINES:

AT1

CCME

Regulated Drinking Water

Other:

PO #:

Project # / Name: **A04012A03**

Site Location: **Camp Fairwell**

Quote #:

Shipped By: **RL**

SERVICE REQUESTED:  RUSH (Contact lab to reserve)  
 REGULAR (5 to 7 Days)

Sample ID	Depth (m)	Matrix (SW/VSW/SL)	Date/Time Sampled (YYMMDD 24:00)	SOIL					WATER					Other Analysis		HOLD - Do not Analyze	# of Containers Submitted			
				BTX F1-F4	Sieve (75 micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Clean H. Lead/Hg	TOX F1-F4	TOX F1-F2	ROUTINE WATER (TURBIDITY)	TOC	THP	THP			THP	THP	
1 SW001	X	SW	10/09/09																	
2 SW002																				
3 SW003																				
4 SW004																				
5 SS10-01		0-0.5 Soil		X	X	X							X	X	X			3		
6 SS10-02																				
7 SS10-03																				
8 SS10-04																				
9 SS10-05																				

Please indicate Filtered, Preserved or Both (F, P, F/P)

Retransmitted By (Signature/Print): **Ryan Bennie** Date (YY/MM/DD): **10/09/10** Time (24:00): **10:30 am**

Retransmitted By (Signature/Print): **Ryan Bennie** Date (YY/MM/DD): **10/09/10** Time (24:00): **10:30 am**

Special Instructions: \_\_\_\_\_ # of Jars Used & Not Submitted: \_\_\_\_\_

LAB USE ONLY

Received By: **Ash Hopkinson** Date: **2010/09/11** Time: **11:20**

Miscellaneous Job #: **B084221**

Category: **5014245**

Lab Comments: **YES 4.5, 4 YES**



Your Project #: A04012A03  
 Site: CAMP FAREWELL  
 Your C.O.C. #: A020342

**Attention: SAM BIRD**  
 IEG ENVIRONMENTAL  
 500-2618 HOPEWELL PLACE NE  
 CALGARY, AB  
 CANADA T1Y 7J7

**Report Date: 2010/09/20**

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B084243**  
**Received: 2010/09/11, 11:20**

Sample Matrix: Soil  
 # Samples Received: 5

Analyses	Quantity	Date		Laboratory Method	Analytical Method
		Extracted	Analyzed		
Boron (Hot Water Soluble)	5	2010/09/17	2010/09/18	AB SOP-00042	EPA 200.7
BTEX/F1 by HS GC/MS (MeOH extract)	5	2010/09/13	2010/09/16	EENVSOP-00005 EENVSOP-00002	EPA 8260C/CCME
Chloride (soluble)	5	2010/09/15	2010/09/16	AB SOP-00020	SM 4110-B
Hexavalent Chromium	5	2010/09/15	2010/09/16	EENVSOP-00131	SM 3500-Cr B
Conductivity (Soluble)	5	2010/09/15	2010/09/16	AB SOP-00004	SSMA 15.3
CCME Hydrocarbons (F2-F4 in soil)	5	2010/09/13	2010/09/16	EENVSOP-00007 AB WI-00016	CCME PHC-CWS
Elements by ICP -Soils	5	2010/09/16	2010/09/19	AB SOP-00042	EPA 200.7
Elements by ICPMS - Soils	5	2010/09/16	2010/09/17	AB SOP-00043	EPA 200.8
Ion Balance	5	N/A	2010/09/20	CAL WI-00053	SM 1030E
Sum of Cations, Anions	5	N/A	2010/09/20	Calc	
Moisture	5	N/A	2010/09/14	EENVSOP-00139	Carter SSMA 51.2
pH (1:2 Calcium Chloride Extract)	5	2010/09/15	2010/09/15	AB SOP-00005	Method 4500-H+B
Sodium Adsorption Ratio	5	N/A	2010/09/20	Calc	
Ca,Mg,Na,K,SO4 (Soluble)	5	2010/09/15	2010/09/16	AB SOP-00042	EPA 200.7
Soluble Paste	5	2010/09/15	2010/09/15	AB SOP-00033	SSMA 15.2
Theoretical Gypsum Requirement	5	N/A	2010/09/20	CAL WI-00087	SSMA 18.4.4

**Encryption Key**

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

ABDULKADIR DAKANE, B.Sc., Project Manager  
 Email: [abdulkadir.dakane@maxxamanalytics.com](mailto:abdulkadir.dakane@maxxamanalytics.com)  
 Phone# (780) 577-7100

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 1

**AT1 BTEX AND F1-F4 IN SOIL (SOIL)**

Maxxam ID		W90776	W90785	W90789	W90793	W90794		
Sampling Date		2010/09/09	2010/09/09	2010/09/09	2010/09/09	2010/09/09		
COC Number		A020342	A020342	A020342	A020342	A020342		
	<b>Units</b>	<b>SS10-01</b>	<b>SS10-02</b>	<b>SS10-03</b>	<b>SS10-04</b>	<b>SS10-05</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Physical Properties</b>								
Moisture	%	7.4	20	10	21	3.5	0.3	4258948
<b>Ext. Pet. Hydrocarbon</b>								
F2 (C10-C16 Hydrocarbons)	mg/kg	810	380	<10	<10	<10	10	4256818
F3 (C16-C34 Hydrocarbons)	mg/kg	960	680	110	56	320	10	4256818
F4 (C34-C50 Hydrocarbons)	mg/kg	20	14	<10	<10	37	10	4256818
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes	N/A	4256818
<b>Volatiles</b>								
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	4256915
Toluene	mg/kg	<0.020	<0.020	<0.020	0.046	<0.020	0.020	4256915
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	4256915
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	4256915
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	4256915
o-Xylene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	4256915
F1 (C6-C10) - BTEX	mg/kg	<12	<12	<12	<12	<12	12	4256915
(C6-C10)	mg/kg	<12	<12	<12	<12	<12	12	4256915
<b>Surrogate Recovery (%)</b>								
4-BROMOFLUOROBENZENE (sur.)	%	108	110	107	109	106	N/A	4256915
D10-ETHYLBENZENE (sur.)	%	116	117	116	124	116	N/A	4256915
D4-1,2-DICHLOROETHANE (sur.)	%	99	96	100	98	96	N/A	4256915
D8-TOLUENE (sur.)	%	100	102	101	100	100	N/A	4256915
O-TERPHENYL (sur.)	%	100	95	86	88	93	N/A	4256818
N/A = Not Applicable RDL = Reportable Detection Limit								

**ASSESSMENT ICP METALS (SOIL)**

Maxxam ID		W90776	W90785	W90789	W90793		W90794		
Sampling Date		2010/09/09	2010/09/09	2010/09/09	2010/09/09		2010/09/09		
COC Number		A020342	A020342	A020342	A020342		A020342		
	<b>Units</b>	<b>SS10-01</b>	<b>SS10-02</b>	<b>SS10-03</b>	<b>SS10-04</b>	<b>RDL</b>	<b>SS10-05</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Elements</b>									
Total Aluminum (Al)	mg/kg	2600	2900	2000	2700	10	2800	10	4267317
Total Boron (B)	mg/kg	2	3	<2	<2	2	2	2	4267317
Total Calcium (Ca)	mg/kg	4800	71000	1300	1800	50	2200	50	4267317
Total Iron (Fe)	mg/kg	8000	8000	6700	6800	10	11000 (1)	100	4267317
Total Lithium (Li)	mg/kg	<10	<10	<10	<10	10	<10	10	4267317
Total Magnesium (Mg)	mg/kg	1600	2200	490	730	20	990	20	4267317
Total Manganese (Mn)	mg/kg	500	180	170	210	10	370	10	4267317
Total Phosphorus (P)	mg/kg	380	290	270	260	20	380	20	4267317
Total Potassium (K)	mg/kg	390	320	270	300	30	440	30	4267317
Total Sodium (Na)	mg/kg	2100	220	<50	190	50	<50	50	4267317
Total Strontium (Sr)	mg/kg	36	220	25	23	10	34	10	4267317
Total Sulphur (S)	mg/kg	630	19000	220	310	20	530	20	4267317

RDL = Reportable Detection Limit

( 1 ) Detection limits raised due to dilution to bring analyte within the calibrated range.

**REGULATED METALS (CCME/AT1)**

Maxxam ID		W90776		W90785	W90789	W90793	W90794		
Sampling Date		2010/09/09		2010/09/09	2010/09/09	2010/09/09	2010/09/09		
COC Number		A020342		A020342	A020342	A020342	A020342		
	<b>Units</b>	<b>SS10-01</b>	<b>RDL</b>	<b>SS10-02</b>	<b>SS10-03</b>	<b>SS10-04</b>	<b>SS10-05</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Elements</b>									
Soluble (Hot water) Boron (B)	mg/kg	0.7	0.1	0.3	<0.1	0.1	0.4	0.1	4271560
Hex. Chromium (Cr 6+)	mg/kg	<0.15	0.15	<0.15	<0.15	<0.15	<0.15	0.15	4260332
Total Antimony (Sb)	mg/kg	<1	1	<1	<1	<1	<1	1	4267797
Total Arsenic (As)	mg/kg	4	1	6	5	5	7	1	4267797
Total Barium (Ba)	mg/kg	1600 (1)	20	180	250	260	1200	10	4267797
Total Beryllium (Be)	mg/kg	<0.4	0.4	<0.4	<0.4	<0.4	<0.4	0.4	4267797
Total Cadmium (Cd)	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1	0.2	0.1	4267797
Total Chromium (Cr)	mg/kg	52	1	14	160	35	24	1	4267797
Total Cobalt (Co)	mg/kg	3	1	3	3	3	3	1	4267797
Total Copper (Cu)	mg/kg	6	5	5	7	5	8	5	4267797
Total Lead (Pb)	mg/kg	8	1	8	7	8	28	1	4267797
Total Mercury (Hg)	mg/kg	<0.05	0.05	<0.05	<0.05	<0.05	0.06	0.05	4267797
Total Molybdenum (Mo)	mg/kg	1.5	0.4	0.8	4.1	1.2	1.4	0.4	4267797
Total Nickel (Ni)	mg/kg	27	1	10	77	18	15	1	4267797
Total Selenium (Se)	mg/kg	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	0.5	4267797
Total Silver (Ag)	mg/kg	<1	1	<1	<1	<1	<1	1	4267797
Total Thallium (Tl)	mg/kg	<0.3	0.3	<0.3	<0.3	<0.3	<0.3	0.3	4267797
Total Tin (Sn)	mg/kg	<1	1	<1	<1	1	<1	1	4267797
Total Uranium (U)	mg/kg	<1	1	<1	<1	<1	<1	1	4267797
Total Vanadium (V)	mg/kg	11	1	12	12	12	14	1	4267797
Total Zinc (Zn)	mg/kg	21	10	27	16	17	50	10	4267797

RDL = Reportable Detection Limit  
( 1 ) Detection limits raised due to dilution to bring analyte within the calibrated range.

**SOIL SALINITY 4 (SOIL)**

Maxxam ID		W90776	W90785	W90789	W90793		W90794		
Sampling Date		2010/09/09	2010/09/09	2010/09/09	2010/09/09		2010/09/09		
COC Number		A020342	A020342	A020342	A020342		A020342		
	<b>Units</b>	<b>SS10-01</b>	<b>SS10-02</b>	<b>SS10-03</b>	<b>SS10-04</b>	<b>QC Batch</b>	<b>SS10-05</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Calculated Parameters</b>									
Anion Sum	meq/L	14	39	12	36	4256096	1.1	N/A	4256096
Cation Sum	meq/L	82	42	15	39	4256096	2.7	N/A	4256096
Ion Balance	N/A	5.9	1.1	1.3	1.1	4256094	2.5	0.01	4256094
<b>Soluble Parameters</b>									
Soluble Chloride (Cl)	mg/L	25	120	7	16	4266312	<5	5	4266312
Soluble Conductivity	dS/m	5.2	2.9	1.2	2.9	4262625	0.30	0.02	4262625
Soluble (CaCl2) pH	N/A	8.29	7.79	7.28	7.32	4261535	7.12	N/A	4261814
Sodium Adsorption Ratio	N/A	41	0.9	0.4	3.5	4256100	0.4	0.1	4256100
Soluble Calcium (Ca)	mg/L	91	700	210	370	4266565	33	1.5	4266565
Soluble Magnesium (Mg)	mg/L	28	40	37	97	4266565	5.7	1.0	4266565
Soluble Sodium (Na)	mg/L	1700	89	27	300	4266565	9.3	2.5	4266565
Soluble Potassium (K)	mg/L	5.5	6.0	3.5	7.3	4266565	5.1	1.3	4266565
Saturation %	%	31.1	40.9	31.8	29.8	4262563	30.2	N/A	4262563
Soluble Sulphate (SO4)	mg/L	630	1700	550	1700	4266565	51	5.0	4266565
Theoretical Gypsum Requirement	tons/ac	25	<0.1	<0.1	<0.1	4256102	<0.1	0.1	4256102

RDL = Reportable Detection Limit

Package 1	4.3°C
-----------	-------

Each temperature is the average of up to three cooler temperatures taken at receipt

**General Comments**

Sample W90776-01: Cation anion balance impacted due to matrix interference.

**Results relate only to the items tested.**





IEG ENVIRONMENTAL  
 Attention: SAM BIRD  
 Client Project #: A04012A03  
 P.O. #:  
 Site Reference: CAMP FAREWELL

Quality Assurance Report  
 Maxxam Job Number: EB084243

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits		
4256818 SW1	Matrix Spike	O-TERPHENYL (sur.)	2010/09/16		88	%	50 - 130		
		F2 (C10-C16 Hydrocarbons)	2010/09/16		82	%	50 - 130		
		F3 (C16-C34 Hydrocarbons)	2010/09/16		79	%	50 - 130		
		F4 (C34-C50 Hydrocarbons)	2010/09/16		80	%	50 - 130		
	Spiked Blank	O-TERPHENYL (sur.)	2010/09/16			78	%	50 - 130	
		F2 (C10-C16 Hydrocarbons)	2010/09/16			84	%	80 - 120	
		F3 (C16-C34 Hydrocarbons)	2010/09/16			80	%	80 - 120	
		F4 (C34-C50 Hydrocarbons)	2010/09/16			80	%	80 - 120	
	Method Blank	O-TERPHENYL (sur.)	2010/09/16			86	%	50 - 130	
		F2 (C10-C16 Hydrocarbons)	2010/09/16		<10		mg/kg		
		F3 (C16-C34 Hydrocarbons)	2010/09/16		<10		mg/kg		
		F4 (C34-C50 Hydrocarbons)	2010/09/16		<10		mg/kg		
	RPD	F2 (C10-C16 Hydrocarbons)	2010/09/16		NC		%	50	
		F3 (C16-C34 Hydrocarbons)	2010/09/16		NC		%	50	
		F4 (C34-C50 Hydrocarbons)	2010/09/16		NC		%	50	
4256915 CL9	Matrix Spike	4-BROMOFLUOROBENZENE (sur.)	2010/09/16		97	%	60 - 140		
		D10-ETHYLBENZENE (sur.)	2010/09/16		124	%	30 - 130		
		D4-1,2-DICHLOROETHANE (sur.)	2010/09/16		96	%	60 - 140		
		D8-TOLUENE (sur.)	2010/09/16		101	%	60 - 140		
		Benzene	2010/09/16		107	%	60 - 140		
		Toluene	2010/09/16		105	%	60 - 140		
		Ethylbenzene	2010/09/16		113	%	60 - 140		
		m & p-Xylene	2010/09/16		112	%	60 - 140		
		o-Xylene	2010/09/16		111	%	60 - 140		
		(C6-C10)	2010/09/16		106	%	60 - 140		
		Spiked Blank	4-BROMOFLUOROBENZENE (sur.)	2010/09/16			98	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2010/09/16			120	%	30 - 130
	D4-1,2-DICHLOROETHANE (sur.)		2010/09/16			98	%	60 - 140	
	D8-TOLUENE (sur.)		2010/09/16			101	%	60 - 140	
	Benzene		2010/09/16			103	%	60 - 140	
	Toluene		2010/09/16			100	%	60 - 140	
	Ethylbenzene		2010/09/16			110	%	60 - 140	
	m & p-Xylene		2010/09/16			108	%	60 - 140	
	o-Xylene		2010/09/16			108	%	60 - 140	
	(C6-C10)		2010/09/16			95	%	60 - 140	
	Method Blank		4-BROMOFLUOROBENZENE (sur.)	2010/09/16			101	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2010/09/16			118	%	30 - 130
		D4-1,2-DICHLOROETHANE (sur.)	2010/09/16			98	%	60 - 140	
		D8-TOLUENE (sur.)	2010/09/16			101	%	60 - 140	
		Benzene	2010/09/16		<0.0050		mg/kg		
		Toluene	2010/09/16		<0.020		mg/kg		
		Ethylbenzene	2010/09/16		<0.010		mg/kg		
		Xylenes (Total)	2010/09/16		<0.040		mg/kg		
		m & p-Xylene	2010/09/16		<0.040		mg/kg		
		o-Xylene	2010/09/16		<0.020		mg/kg		
		F1 (C6-C10) - BTEX	2010/09/16		<12		mg/kg		
		(C6-C10)	2010/09/16		<12		mg/kg		
	RPD	Benzene	2010/09/16		8.2		%	50	
		Toluene	2010/09/16		NC		%	50	
		Ethylbenzene	2010/09/16		12.8		%	50	
		Xylenes (Total)	2010/09/16		NC		%	50	
m & p-Xylene		2010/09/16		NC		%	50		
o-Xylene		2010/09/16		NC		%	50		
F1 (C6-C10) - BTEX		2010/09/16		NC		%	50		
(C6-C10)		2010/09/16		NC		%	50		



IEG ENVIRONMENTAL  
 Attention: SAM BIRD  
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Quality Assurance Report (Continued)  
 Maxxam Job Number: EB084243

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
4258948 JL8	Method Blank	Moisture	2010/09/14	<0.3		%	
	RPD	Moisture	2010/09/14	9.5		%	20
4260332 EC4	Spiked Blank	Hex. Chromium (Cr 6+)	2010/09/16		102	%	80 - 120
	Method Blank	Hex. Chromium (Cr 6+)	2010/09/16	<0.15		mg/kg	
	RPD	Hex. Chromium (Cr 6+)	2010/09/16	NC		%	35
4261535 KW7	QC Standard	Soluble (CaCl2) pH	2010/09/16		98	%	97 - 103
	Spiked Blank	Soluble (CaCl2) pH	2010/09/15		100	%	97 - 103
	RPD	Soluble (CaCl2) pH	2010/09/15	0.8		%	5
4261814 KW7	QC Standard	Soluble (CaCl2) pH	2010/09/16		99	%	97 - 103
	Spiked Blank	Soluble (CaCl2) pH	2010/09/15		100	%	97 - 103
	RPD	Soluble (CaCl2) pH	2010/09/15	1.2		%	5
4262563 UH	QC Standard	Saturation %	2010/09/15		99	%	88 - 112
	RPD	Saturation %	2010/09/15	1.6		%	12
4262625 SA4	QC Standard	Soluble Conductivity	2010/09/16		108	%	75 - 125
	Spiked Blank	Soluble Conductivity	2010/09/16		101	%	95 - 105
	Method Blank	Soluble Conductivity	2010/09/16	<0.02		dS/m	
	RPD	Soluble Conductivity	2010/09/16	0.1		%	35
4266312 DMA	Matrix Spike	Soluble Chloride (Cl)	2010/09/16		102	%	75 - 125
	QC Standard	Soluble Chloride (Cl)	2010/09/16		104	%	75 - 125
	Spiked Blank	Soluble Chloride (Cl)	2010/09/16		100	%	80 - 120
	Method Blank	Soluble Chloride (Cl)	2010/09/16	<5		mg/L	
	RPD	Soluble Chloride (Cl)	2010/09/16	NC		%	35
4266565 AD3	QC Standard	Soluble Calcium (Ca)	2010/09/20		100	%	75 - 125
		Soluble Magnesium (Mg)	2010/09/20		107	%	75 - 125
		Soluble Sodium (Na)	2010/09/20		104	%	75 - 125
		Soluble Potassium (K)	2010/09/20		107	%	75 - 125
		Soluble Sulphate (SO4)	2010/09/20		104	%	75 - 125
	Spiked Blank	Soluble Calcium (Ca)	2010/09/16		104	%	88 - 115
		Soluble Magnesium (Mg)	2010/09/16		105	%	80 - 120
		Soluble Sodium (Na)	2010/09/16		102	%	84 - 118
		Soluble Potassium (K)	2010/09/16		103	%	85 - 117
	Method Blank	Soluble Calcium (Ca)	2010/09/16	<1.5		mg/L	
		Soluble Magnesium (Mg)	2010/09/16	<1.0		mg/L	
		Soluble Sodium (Na)	2010/09/16	<2.5		mg/L	
		Soluble Potassium (K)	2010/09/16	<1.3		mg/L	
		Soluble Sulphate (SO4)	2010/09/16	<5.0		mg/L	
	RPD	Soluble Calcium (Ca)	2010/09/16	11.2		%	35
		Soluble Magnesium (Mg)	2010/09/16	10.3		%	35
		Soluble Sodium (Na)	2010/09/16	NC		%	35
		Soluble Potassium (K)	2010/09/16	NC		%	35
		Soluble Sulphate (SO4)	2010/09/16	NC		%	35
4267317 AD3	Matrix Spike	Total Aluminum (Al)	2010/09/17		112	%	75 - 125
		Total Boron (B)	2010/09/17		91	%	75 - 125
		Total Calcium (Ca)	2010/09/17		89	%	75 - 125
		Total Iron (Fe)	2010/09/17		NC	%	75 - 125
		Total Lithium (Li)	2010/09/17		96	%	75 - 125
		Total Magnesium (Mg)	2010/09/17		103	%	75 - 125
		Total Manganese (Mn)	2010/09/17		76	%	75 - 125
		Total Phosphorus (P)	2010/09/17		99	%	75 - 125
		Total Potassium (K)	2010/09/17		100	%	75 - 125
		Total Sodium (Na)	2010/09/17		96	%	75 - 125
		Total Strontium (Sr)	2010/09/17		91	%	75 - 125
	QC Standard	Total Aluminum (Al)	2010/09/16		100	%	75 - 125
		Total Boron (B)	2010/09/16		0.00000	%	N/A
		Total Calcium (Ca)	2010/09/16		100	%	77 - 123



IEG ENVIRONMENTAL  
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Quality Assurance Report (Continued)  
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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits	
4267317 AD3	QC Standard	Total Iron (Fe)	2010/09/16		109	%	75 - 125	
		Total Lithium (Li)	2010/09/16		100	%	75 - 125	
		Total Magnesium (Mg)	2010/09/16		91	%	75 - 125	
		Total Manganese (Mn)	2010/09/16		89	%	75 - 125	
		Total Phosphorus (P)	2010/09/16		92	%	89 - 117	
		Total Potassium (K)	2010/09/16		95	%	60 - 140	
		Total Sodium (Na)	2010/09/16		92	%	60 - 140	
		Total Strontium (Sr)	2010/09/16		82	%	75 - 125	
		Spiked Blank	Total Aluminum (Al)	2010/09/16		89	%	75 - 125
			Total Boron (B)	2010/09/16		93	%	75 - 125
			Total Calcium (Ca)	2010/09/16		88	%	75 - 125
			Total Iron (Fe)	2010/09/16		102	%	75 - 125
			Total Lithium (Li)	2010/09/16		95	%	75 - 125
			Total Magnesium (Mg)	2010/09/16		95	%	75 - 125
			Total Manganese (Mn)	2010/09/16		92	%	75 - 125
	Total Phosphorus (P)		2010/09/16		98	%	75 - 125	
	Total Potassium (K)		2010/09/16		96	%	75 - 125	
	Total Sodium (Na)		2010/09/16		92	%	75 - 125	
	Method Blank	Total Strontium (Sr)	2010/09/16		92	%	75 - 125	
		Total Aluminum (Al)	2010/09/16	<10		mg/kg		
		Total Boron (B)	2010/09/16	<2		mg/kg		
		Total Calcium (Ca)	2010/09/16	<50		mg/kg		
		Total Iron (Fe)	2010/09/16	<10		mg/kg		
		Total Lithium (Li)	2010/09/16	<10		mg/kg		
		Total Magnesium (Mg)	2010/09/16	<20		mg/kg		
		Total Manganese (Mn)	2010/09/16	<10		mg/kg		
		Total Phosphorus (P)	2010/09/16	<20		mg/kg		
		Total Potassium (K)	2010/09/16	<30		mg/kg		
	RPD	Total Sodium (Na)	2010/09/16	<50		mg/kg		
		Total Strontium (Sr)	2010/09/16	<10		mg/kg		
		Total Sulphur (S)	2010/09/16	<20		mg/kg		
		Total Aluminum (Al)	2010/09/17	NC		%	35	
		Total Boron (B)	2010/09/17	NC		%	35	
		Total Calcium (Ca)	2010/09/17	NC		%	35	
		Total Iron (Fe)	2010/09/17	14.3		%	35	
Total Lithium (Li)		2010/09/17	NC		%	35		
Total Magnesium (Mg)		2010/09/17	NC		%	35		
Total Manganese (Mn)		2010/09/17	NC		%	35		
Total Phosphorus (P)		2010/09/17	NC		%	35		
Total Potassium (K)		2010/09/17	NC		%	35		
Total Sodium (Na)		2010/09/17	NC		%	35		
Total Strontium (Sr)		2010/09/17	NC		%	35		
Total Sulphur (S)		2010/09/17	3.9		%	35		
4267797 SG8	Matrix Spike	Total Antimony (Sb)	2010/09/17		114	%	75 - 125	
		Total Arsenic (As)	2010/09/17		90	%	75 - 125	
		Total Barium (Ba)	2010/09/17		NC	%	75 - 125	
		Total Cadmium (Cd)	2010/09/17		97	%	75 - 125	
		Total Chromium (Cr)	2010/09/17		93	%	75 - 125	
		Total Cobalt (Co)	2010/09/17		88	%	75 - 125	
		Total Copper (Cu)	2010/09/17		82	%	75 - 125	
		Total Lead (Pb)	2010/09/17		90	%	75 - 125	
		Total Mercury (Hg)	2010/09/17		98	%	75 - 125	
		Total Molybdenum (Mo)	2010/09/17		111	%	75 - 125	
		Total Nickel (Ni)	2010/09/17		NC	%	75 - 125	
		Total Selenium (Se)	2010/09/17		88	%	75 - 125	



IEG ENVIRONMENTAL  
 Attention: SAM BIRD  
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 P.O. #:  
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Quality Assurance Report (Continued)  
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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits	
4267797 SG8	Matrix Spike	Total Silver (Ag)	2010/09/17		94	%	75 - 125	
		Total Thallium (Tl)	2010/09/17		90	%	75 - 125	
		Total Tin (Sn)	2010/09/17		104	%	75 - 125	
		Total Uranium (U)	2010/09/17		80	%	75 - 125	
		Total Vanadium (V)	2010/09/17		NC	%	75 - 125	
	QC Standard	Total Zinc (Zn)	2010/09/17		NC	%	75 - 125	
		Total Arsenic (As)	2010/09/17		113	%	50 - 150	
		Total Barium (Ba)	2010/09/17		104	%	69 - 131	
		Total Chromium (Cr)	2010/09/17		104	%	41 - 159	
		Total Cobalt (Co)	2010/09/17		96	%	75 - 125	
		Total Copper (Cu)	2010/09/17		92	%	72 - 127	
		Total Lead (Pb)	2010/09/17		94	%	54 - 146	
		Total Mercury (Hg)	2010/09/17		115	%	75 - 125	
		Total Nickel (Ni)	2010/09/17		101	%	61 - 139	
		Total Vanadium (V)	2010/09/17		116	%	50 - 150	
		Total Zinc (Zn)	2010/09/17		94	%	72 - 128	
		Spiked Blank	Total Antimony (Sb)	2010/09/17		122	%	75 - 125
			Total Arsenic (As)	2010/09/17		100	%	75 - 125
			Total Barium (Ba)	2010/09/17		99	%	75 - 125
			Total Beryllium (Be)	2010/09/17		92	%	75 - 125
	Total Cadmium (Cd)		2010/09/17		104	%	75 - 125	
	Total Chromium (Cr)		2010/09/17		100	%	75 - 125	
	Total Cobalt (Co)		2010/09/17		102	%	75 - 125	
	Total Copper (Cu)		2010/09/17		102	%	75 - 125	
	Total Lead (Pb)		2010/09/17		106	%	75 - 125	
	Total Mercury (Hg)		2010/09/17		106	%	75 - 125	
	Total Molybdenum (Mo)		2010/09/17		112	%	75 - 125	
	Total Nickel (Ni)		2010/09/17		101	%	75 - 125	
	Total Selenium (Se)		2010/09/17		96	%	75 - 125	
	Total Silver (Ag)		2010/09/17		106	%	75 - 125	
	Method Blank		Total Thallium (Tl)	2010/09/17		103	%	75 - 125
		Total Tin (Sn)	2010/09/17		107	%	75 - 125	
		Total Uranium (U)	2010/09/17		106	%	75 - 125	
		Total Vanadium (V)	2010/09/17		102	%	75 - 125	
		Total Zinc (Zn)	2010/09/17		99	%	75 - 125	
		Total Antimony (Sb)	2010/09/17	<1		mg/kg		
		Total Arsenic (As)	2010/09/17	<1		mg/kg		
		Total Barium (Ba)	2010/09/17	<10		mg/kg		
		Total Beryllium (Be)	2010/09/17	<0.4		mg/kg		
		Total Cadmium (Cd)	2010/09/17	<0.1		mg/kg		
		Total Chromium (Cr)	2010/09/17	<1		mg/kg		
		Total Cobalt (Co)	2010/09/17	<1		mg/kg		
		Total Copper (Cu)	2010/09/17	<5		mg/kg		
		Total Lead (Pb)	2010/09/17	<1		mg/kg		
		Total Mercury (Hg)	2010/09/17	<0.05		mg/kg		
		Total Molybdenum (Mo)	2010/09/17	<0.4		mg/kg		
		Total Nickel (Ni)	2010/09/17	<1		mg/kg		
Total Selenium (Se)	2010/09/17	<0.5		mg/kg				
Total Silver (Ag)	2010/09/17	<1		mg/kg				
Total Thallium (Tl)	2010/09/17	<0.3		mg/kg				
Total Tin (Sn)	2010/09/17	<1		mg/kg				
Total Uranium (U)	2010/09/17	<1		mg/kg				
Total Vanadium (V)	2010/09/17	<1		mg/kg				
Total Zinc (Zn)	2010/09/17	<10		mg/kg				
RPD	Total Antimony (Sb)	2010/09/17	NC		%	35		



IEG ENVIRONMENTAL  
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Quality Assurance Report (Continued)  
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QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
4267797 SG8	RPD	Total Arsenic (As)	2010/09/17	2.2		%	35
		Total Barium (Ba)	2010/09/17	3.1		%	35
		Total Beryllium (Be)	2010/09/17	NC		%	35
		Total Cadmium (Cd)	2010/09/17	NC		%	35
		Total Chromium (Cr)	2010/09/17	15.3		%	35
		Total Cobalt (Co)	2010/09/17	1.2		%	35
		Total Copper (Cu)	2010/09/17	NC		%	35
		Total Lead (Pb)	2010/09/17	1.3		%	35
		Total Mercury (Hg)	2010/09/17	NC		%	35
		Total Molybdenum (Mo)	2010/09/17	3.3		%	35
		Total Nickel (Ni)	2010/09/17	3.9		%	35
		Total Selenium (Se)	2010/09/17	NC		%	35
		Total Silver (Ag)	2010/09/17	NC		%	35
		Total Thallium (Tl)	2010/09/17	NC		%	35
		Total Tin (Sn)	2010/09/17	NC		%	35
		Total Uranium (U)	2010/09/17	NC		%	35
		Total Vanadium (V)	2010/09/17	1.4		%	35
		Total Zinc (Zn)	2010/09/17	1.2		%	35
4271560 SV1	Matrix Spike	Soluble (Hot water) Boron (B)	2010/09/18		101	%	75 - 125
	Spiked Blank	Soluble (Hot water) Boron (B)	2010/09/18		106	%	80 - 120
	Method Blank	Soluble (Hot water) Boron (B)	2010/09/18	<0.1		mg/kg	
	RPD	Soluble (Hot water) Boron (B)	2010/09/18	25.6		%	35

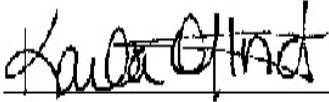
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.  
 Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.  
 QC Standard: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.  
 Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.  
 Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.  
 Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.  
 NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.  
 NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

**Validation Signature Page**

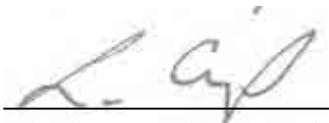
**Maxxam Job #: B084243**

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The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



\_\_\_\_\_  
KARLA OFFORD, Senior Analyst



\_\_\_\_\_  
LISA CUMMINGS, Extractables Supervisor



\_\_\_\_\_  
RON VENZI, Scientific Specialist

=====  
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



09/445

# Maxxam

Company: (905) 709-7676, (416) 709-7676, (416) 709-7676, (416) 709-7676, (416) 709-7676  
Sales: (905) 709-7676, (416) 709-7676, (416) 709-7676, (416) 709-7676, (416) 709-7676  
www.maxxamtesting.com

Chain of Custody **A020342**

Page 1 of 1

B084221 / JNS / B084243

Company: **Shell Canada**

Contact: **Pandall Warren**

Address: **Lock Box 518, station H Calgary**

City: **AB** Prov: **TC** Zip: **T2P-2H5**

Contact Tel: \_\_\_\_\_ Fax: \_\_\_\_\_

Report To: **IEG Consultants**

Address: **5002, 2618 Hopewell Pl NE**

City: **Calgary**

City: **AB** Prov: **TC** Zip: **T1Y 7J9**

Phone: **403 990 1322** Fax: \_\_\_\_\_

Report Distribution (E-Mail):

**plennie@klahn.com**

**stuid@klahn.com**

REGULATORY GUIDELINES:

AT1

CCME

Regulated Drinking Water

Other: \_\_\_\_\_

Project # / Name: **AC4012A03**

Site Location: **Camp Falgout**

Quote #: \_\_\_\_\_

Sampled By: **RL**

SERVICE REQUESTED:  RUSH (Contact lab to reserve)  
Date Required: \_\_\_\_\_  
 REGULAR (5 to 7 Days)

Sample ID	Depth (m)	Media (SW/SB)	Date/Time Sampled (YY/MM/DD)	SOIL			WATER						Other Analysis			HOLD - Do not Analyze	# of Containers Submitted		
				RTX F1-F4	Sieve (75 micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Limitfill	Total ICP metals plus Pb, Al, Mn	Dissolved ICP Plus Fe, Al, Mn	Total Ions Plus Sulphides	Conductivity, PH						
1 SW001	X	SW	10/09/09																
2 SW002		SW																	
3 SW003		SW																	
4 SW004		SW																	
5 SS10-01	0-0.5	Soil		X	X	X													
6 SS10-02																			
7 SS10-03																			
8 SS10-04																			
9 SS10-05																			

Please indicate Filtered, Preserved or Both (F, P, F/P)

Requisitioned By (Signature/Print): **Ryan Dennis B...** Date: **10/09/10** Time: **10:30 am**

Requisitioned By (Signature/Print): \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Special Instructions: \_\_\_\_\_

# of Jars Used & Not Submitted: \_\_\_\_\_

LAB USE ONLY

Received By: **Ash Hopkinson** Date: **2010/09/11** Time: **11:20**

Miscellaneous Job #: **B084221**

Company Seal: **B084243** Temperature: \_\_\_\_\_

Lab Comments: \_\_\_\_\_

Yes **4.5.4** Yes

## Attachment 3 Regen Ox MSDS





## Regen OX – Part A (Oxidizer Complex)

### Material Safety Data Sheet (MSDS)

Last Revised: November 7, 2005

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#### Section 1 – Supplier Information and Material Identification

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**Supplier:**



**REGENESIS**

1011 Calle Sombra  
San Clemente, CA 92673  
Telephone: 949.366.8000  
Fax: 949.366.8090  
E-mail: info@regenesis.com

Chemical Description: A mixture of sodium percarbonate [2Na<sub>2</sub>CO<sub>3</sub>·3H<sub>2</sub>O<sub>2</sub>], sodium carbonate [Na<sub>2</sub>CO<sub>3</sub>], sodium silicate and silica gel.

Chemical Family: Inorganic Chemicals

Trade Name: Regen Ox – Part A (Oxidizer Complex)

Product Use: Used to remediate contaminated soil and groundwater (environmental applications)

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#### Section 2 – Chemical Information/Other Designations

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<u>CAS No.</u>	<u>Chemical</u>
15630-89-4	Sodium Percarbonate
5968-11-6	Sodium Carbonate Monohydrate
1344-09-8	Silicic Acid, Sodium Salt, Sodium Silicate
63231-67-4	Silica Gel

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#### Section 3 – Physical Data

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**Form:** Powder

**Color:** White

**Odor:** Odorless

**Melting Point:** NA

**Boiling Point:** NA

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**Section 3 – Physical Data (cont)**


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<b>Flammability/Flash Point:</b>	NA
<b>Vapor Pressure:</b>	NA
<b>Bulk Density:</b>	0.9 – 1.2 g/cm <sup>3</sup>
<b>Solubility:</b>	Min 14.5g/100g water @ 20 °C
<b>Viscosity:</b>	NA
<b>pH (3% solution):</b>	~ 10.5
<b>Decomposition Temperature:</b>	Self-accelerating decomposition with oxygen release starts at 50 °C.

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**Section 4 – Reactivity Data**


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<b>Stability:</b>	Stable under normal conditions
<b>Conditions to Avoid/Incompatibility:</b>	Acids, bases, salts of heavy metals, reducing agents, and flammable substances
<b>Hazardous Decomposition Products:</b>	Oxygen. Contamination with many substances will cause decomposition. The rate of decomposition increases with increasing temperature and may be very vigorous with rapid generation of oxygen and steam.

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**Section 5 – Regulations**


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<b>TSCA Inventory Listed:</b>	Yes
<b>CERCLA Hazardous Substance (40 CFR Part 302)</b>	
<b>Listed Substance:</b>	<i>No</i>
<b>Unlisted Substance:</b>	<i>Yes</i>
<b>SARA, Title III, Sections 313 (40 CFR Part 372) – Toxic Chemical Release Reporting: Community Right-To-Know</b>	
<b>Extremely Hazardous Substance:</b>	No
<b>WHMIS Classification:</b>	C, D2B
<b>Canadian Domestic Substance List:</b>	Appears

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## Section 6 – Protective Measures, Storage and Handling

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### Technical Protective Measures

- Storage:** Oxidizer. Store in a cool, well ventilated area away from all sources of ignition and out of the direct sunlight. Store in a dry location away from heat and in temperatures less than 40 °C.
- Keep away from incompatible materials and keep lids tightly closed. Do not store in improperly labeled containers.
- Protect from moisture. Do not store near combustible materials. Keep containers well sealed.
- Store separately from reducing materials. Avoid contamination which may lead to decomposition.
- Handling:** Avoid contact with eyes, skin and clothing. Use with adequate ventilation.
- Do not swallow. Avoid breathing vapors, mists or dust. Do not eat, drink or smoke in the work area.
- Label containers and keep them tightly closed when not in use.
- Wash hands thoroughly after handling.

### Personal Protective Equipment (PPE)

- Engineering Controls:** General room ventilation is required if used indoors. Local exhaust ventilation, process enclosures or other engineering controls may be needed to maintain airborne levels below recommended exposure limits. Avoid creating dust or mists. Maintain adequate ventilation at all times. Do not use in confined areas. Keep levels below recommended exposure limits. To determine actual exposure limits, monitoring should be performed on a routine basis.
- Respiratory Protection:** For many conditions, no respiratory protection is necessary; however, in dusty or unknown conditions or when exposures exceed limit values a NIOSH approved respirator should be used.
- Hand Protection:** Wear chemical resistant gloves (neoprene, rubber, or PVC).

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### Section 6 – Protective Measures, Storage and Handling (cont)

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<b>Eye Protection:</b>	Wear chemical safety goggles. A full face shield may be worn in lieu of safety goggles.
<b>Skin Protection:</b>	Try to avoid skin contact with this product. Chemical resistant gloves (neoprene, PVC or rubber) and protective clothing should be worn during use.
<b>Other:</b>	Eye wash station.
<b>Protection Against Fire &amp; Explosion:</b>	Product is non-explosive. In case of fire, evacuate all non-essential personnel, wear protective clothing and a self-contained breathing apparatus, stay upwind of fire, and use water to spray cool fire-exposed containers.

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### Section 7 – Hazards Identification

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#### Potential Health Effects

<b>Inhalation:</b>	Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath, and irritations to mucous membranes, nose and throat.
<b>Eye Contact:</b>	Causes irritation, redness and pain.
<b>Skin Contact:</b>	Causes slight irritation.
<b>Ingestion:</b>	May be harmful if swallowed (vomiting and diarrhea).

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### Section 8 – Measures in Case of Accidents and Fire

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<b>After Spillage/Leakage:</b>	Eliminate all ignition sources. Evacuate unprotected personnel and never exceed any occupational exposure limit. Shovel or sweep spilt material into plastic bags or vented containers for disposal. Do not return spilled or contaminated material to the inventory.
<b>Extinguishing Media:</b>	Water
<b>First Aid</b>	
<b>Eye Contact:</b>	Flush eyes with running water for at least 15 minutes with eyelids held open. Seek a specialist.
<b>Inhalation:</b>	Remove affected person to fresh air. Seek medical attention if the effects persist.
<b>Ingestion:</b>	If the individual is conscious and not convulsing, give two-four cups of water to dilute the chemical and seek medical attention immediately. <b>Do Not</b> induce vomiting.

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**Section 8 – Measures in Case of Accidents and Fire (cont)**

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**Skin Contact:** Wash affected areas with soap and a mild detergent and large amounts of water.

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**Section 9 – Accidental Release Measures**

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**Precautions:**

**Cleanup Methods:** Shovel or sweep spilt material into plastic bags or vented containers for disposal. Do not return spilled or contaminated material to the inventory.

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**Section 10 – Information on Toxicology**

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**Toxicity Data**

**LD50 Oral (rat):** 2,400 mg/kg  
**LD50 Dermal (rabbit):** Min 2,000 mg/kg  
**LD50 Inhalation (rat):** Min 4,580 mg/kg

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**Section 11 – Information on Ecology**

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**Ecology Data**

**Ecotoxicological Information:** NA

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**Section 12 – Disposal Considerations**

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**Waste Disposal Method**

**Waste Treatment:** Dispose of in an approved waste facility operated by an authorized contactor in compliance with local regulations.

**Package (Pail) Treatment:** The empty and clean containers are to be recycled or disposed of in conformity with local regulations.

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### Section 13 – Shipping/Transport Information

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<b>D.O.T. Shipping Name:</b>	Oxidizing Solid, N.O.S. [A mixture of sodium percarbonate [2Na <sub>2</sub> CO <sub>3</sub> ·3H <sub>2</sub> O <sub>2</sub> ], sodium carbonate [Na <sub>2</sub> CO <sub>3</sub> ], sodium silicate and silica gel.]
<b>UN Number:</b>	1479
<b>Hazard Class:</b>	5.1
<b>Labels:</b>	5.1 (Oxidizer)
<b>Packaging Group:</b>	III

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### Section 14 – Other Information

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<b>HMIS<sup>®</sup> Rating</b>	Health – 1 (slight)	Reactivity – 1 (slight)
	Flammability – 0 (none)	Lab PPE – goggles, gloves, and lab coat

HMIS<sup>®</sup> is a registered trademark of the National Painting and Coating Association.

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### Section 15 – Further Information

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**The information contained in this document is the best available to the supplier at the time of writing, but is provided without warranty of any kind. Some possible hazards have been determined by analogy to similar classes of material. The items in this document are subject to change and clarification as more information become available. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person. Individuals receiving this information must exercise their independent judgment in determining its appropriateness for a particular purpose.**

## Appendix 4 Assessment of Foam Insulation





## APPENDIX 4: POTENTIAL BY-PRODUCTS OF INSULATION DEGRADATION

### Introduction

A meeting was held on April 30<sup>th</sup>, 2009 to discuss the Interim Abandonment and Reclamation Plan for Camp Farewell (WorleyParsons 2006) and specifically the dismantling and remediation activities that were planned for 2009. As a result of that meeting a commitment was made to include degradation products of the foam insulation in future groundwater monitoring programs. Given that there are no historical environmental issues associated with the degradation of foam insulation, monitoring of groundwater is considered an appropriate safeguard for this possibility.

The underlying text identifies the potential by-products of the degradation of the foam insulation.

### Foam Insulation Degradation Products

#### Assessment

Polyurethanes (PU) are typically produced by reacting diisocyanates with polyols. The two diisocyanates predominantly used in the manufacture of polyurethanes are methylenediphenyl diisocyanate (MDI) and toluene diisocyanate (TDI) (Allport 2003).

Degradation of PU foam under buried conditions is very slow and short term studies have found no change in PU foams tested at a disposal site and evaluated after 3 and 5 years, with no detectable alteration in leachate water composition. The rate at which degradation occurs is to a large extent dependent on the chemical base of the foam in question. Studies designed to evaluate the degradation of soft PU foams with a polyester versus polyether base have shown that polyurethane-ester foams are susceptible to chemical or microbial degradation, whereas polyurethane-ether foams are more resistant (IPCS 1987).

Filip (1978) observed that the microbial decomposition of polyurethane followed the following sequence: degradation of free isocyanate groups -> splitting of the urea and amide groups -> breaking off the urethane groups -> cleavage of the rings of the isocyanuric acid units.

Possible products of PU foam degradation in a buried state may include aromatic amines, produced when isocyanates are released from the PU foam. There is evidence that isocyanates used in the production of polyurethane foam can be released into the media (Filip 1979). Isocyanates are highly reactive in water and undergo rapid hydrolysis; toluene diisocyanate has a half life of 0.5 seconds to 3 days dependent on pH and turbidity (IPCS). Hydrolysis of diisocyanates forms amines; these amines then react further with excess isocyanate to create solid, insoluble polyurea (WHO 2000). Both these reactions are rapid.

A 700 day simulated landfill study assaying for aromatic amines using a variety of PU foams (including TDI-based flexible foams and MDI-based rigid foams) did not see the expected aromatic amines released into leachate. It was unclear as to whether the aromatic amines were becoming bound to the substrate, or metabolized (Brown cited by DeGaspari 1999).



According to the work of Filip (1978), cleavage of isocyanuric acid rings is the final stage in the microbial decomposition. Isocyanuric acid (also known as cyanuric acid) is stable in water and not readily biodegradable (OECD 1999). Once dissolved into water, cyanuric acid is not likely to volatilize or to be adsorbed by soil particles (OECD 1999). It is possible to detect and measure isocyanuric acid in water samples using a melamine solution and turbidity test.

## Proposed Monitoring

Based on the above, it is evident that polyurethane foam is not susceptible to degradation and that potential degradation products are not particularly soluble. That said, potential degradation products contain significant proportions of nitrogen. Accordingly, it is proposed to include total nitrogen (as well as nitrate and nitrite) in the routine groundwater monitoring program for the site. If anomalous nitrogen concentrations are noted, then target analysis for cyanuric acid would be completed. It is also recommended that at least one round of groundwater testing include specific analysis of cyanuric acid.

## References

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**Appendix F: Wildlife Protocols**



## **Bear Encounter Response Guidelines**

### **I. PRINCIPLES:**

1. Protection of Life and Property
2. Conservation

### **II. OPERATIONAL GUIDELINES:**

- A. Deterrence
- B. Re-locate, if feasible
- C. Destroy

### **III. OPERATIONAL PROCEDURES:**

#### **Contacts:**

Initial contact during regular hours:

Environment and Natural Resources Inuvik office at (867) 678-6650

Initial contact after regular hours and weekends:

Renewable Resource Officer on call

Cell: (867) 777 -1185

Fax: (867) 678 -6659

#### **Response Personnel:**

The following personnel can be available for responding to problem bear situations:

Tobias Halle	Inuvik	(867) 678-6681
Ian Ellsworth	Inuvik	(867) 678-6680
Kevin Allen	Inuvik	(867) 678-6683
Paul Voudrach	Inuvik	(867) 678-6652
Ian McLeod	Aklavik	(867) 978-2248
Lila Voudrach	Tuktoyaktuk	(867) 977-2350

#### **Initial Contact:**

1. The complainant should complete the attached checklist prior to calling Department of Environment and Natural Resources. It is critical that as much information as possible be provided at this point in order to determine the appropriate response.

## IV. RESPONSE

Wildlife Monitors will be the initial responders to problem bears. It is imperative that they have a sufficient supply of approved deterrents at their disposal. All bear sightings and encounters shall be reported to the ENR office closest to the area of operation.

The potential responses will be considered in the following order:

### a) Camps

1. Wildlife Monitors will employ conventional means of deterring problem bears that threaten public safety or property. This may involve chasing a bear out of the camp with a vehicle or snowmobile, or using noise makers and rubber bullets. If these methods prove ineffective, and where a helicopter is available or can be obtained in the area, the bear may be chased from camp. Pilots must be careful not to over stress the bear during this flight and must back off when the bear is a sufficient distance from the camp and keeps running in the desired location. If circumstances allow, a Renewable Resource Officer (RRO) should be contacted prior to using aircraft to deter bears. Undue harassment is illegal and must be avoided. **All incidents involving any means of deterrence should be reported to a Renewable Resource Officer as soon as possible.**
2. Should for some reason, the Wildlife Monitor be unable to deter a bear, and where the bear does not pose an immediate threat to public safety or property, the Department of Environment and Natural Resources (DENR) may send a deterrent or capture team to the site.

### b) Denning bears

If a bear is located in, at or near a den site, work in the area must halt. All employees should safely retreat from the area and report the occurrence to the Site Supervisor, Wildlife Monitor, and the Renewable Resource Officer in your area as soon as possible. Staff from DENR will be required to assess the site and may implement measures to ensure bears are not unduly disturbed. This may include the establishment of an exclusion zone of 300 meters around the den in which no work will be permitted. Work inside the exclusion zone will remain stalled until after den emergence.

### c) Free ranging bears

Prior to active deterrence of free ranging bears, and where public safety or property is not in immediate danger, the Wildlife monitor will assess the situation. The monitor should determine if the bear has been disturbed from a den or if it is denning in close proximity. Bears in the vicinity of a den should not be deterred and work should cease until DENR has assessed the site. If the Wildlife Monitor has determined that the bear is in fact free ranging, and not lingering around a den site, then active deterrence may commence.

#### **d) Destruction of the bear**

Instructions to destroy the bear will be given when deterrent actions have failed, when additional deterrent actions are not possible, and when it is determined that capture and relocation cannot be conducted or is unlikely to be successful.

The bear can be destroyed if human life or property is in imminent danger.

If a bear is killed, you will be required to:

- 1) Report the kill to Department of Environment and Natural Resources, as soon as possible.
- 2) Skin the bear, leaving the claws and penis (if applicable) attached, and preserve the hide by freezing or salting it and storing it in a cool place. Be generous with the salt.
- 3) Turn in the hide, the skull, and any other biological samples requested to a Department of Environment and Natural Resources Renewable Resource Officer.

**As per the NWT Wildlife Act, no person may retain any part of a bear killed in defence of life or property.**

#### **V. FOLLOW-UP**

After response measures are completed, the situation will be reviewed with the camp operator and corrective actions identified. These may include a wide array of actions aimed at avoiding future bear problems and ensuring that the operator is made aware of legal obligations. The need for conservation and the vulnerability of bear populations to over harvest is to be stressed.



**Bear Complaint Checklist**

**1. Complainant Details:**

Date/Time of Report: \_\_\_\_\_  
 Complainants Name: \_\_\_\_\_  
 Affiliation/Location of Complainant: \_\_\_\_\_  
 Contact Number for Complainant: \_\_\_\_\_  
 Other on Site Contacts: \_\_\_\_\_  
 Wildlife Monitors Name: \_\_\_\_\_

**2. Camp Details:**

**Location of Complaint:** \_\_\_\_\_  
 Latitude/Longitude: \_\_\_\_\_  
 Type of Camp- Permanent/ Mobile: \_\_\_\_\_  
 Number of People in Camp: \_\_\_\_\_  
 How Long has Camp Been Here (if Mobile): \_\_\_\_\_  
 Are there any Aircraft on site? If yes, Type: \_\_\_\_\_

**3. History of the Problem:**

**Date/Time Bear First Sighted:** \_\_\_\_\_  
 Type of Bear: Grizzly \_\_\_\_\_ Polar \_\_\_\_\_ Black \_\_\_\_\_  
 Sex of Bear: Male \_\_\_\_\_ Female \_\_\_\_\_ Unknown \_\_\_\_\_  
 Age of Bear: Cub \_\_\_\_\_ Juvenile \_\_\_\_\_ Adult \_\_\_\_\_  
 Has Bear Been Observed Before: \_\_\_\_\_

**Den site found (description)?**

What was the Bear Attracted To: \_\_\_\_\_  
 Did the Bear Obtain Food: \_\_\_\_\_  
 Behaviour of Bear: Fearful \_\_\_\_\_ Not Fearful \_\_\_\_\_ Aggressive \_\_\_\_\_  
 Damage By Bear: \_\_\_\_\_

**4. Deterrent Action:**

Was the Bear Deterred? Yes \_\_\_\_\_ No \_\_\_\_\_  
 If Yes, Type of Deterrent Used: \_\_\_\_\_  
 Present Status of Bear: \_\_\_\_\_

**5. Other Information:**

**Reporters Name/Title:** \_\_\_\_\_  
 Weather on Site at Time of Report: \_\_\_\_\_  
 Checklist Forwarded to: \_\_\_\_\_



**APPENDIX I**

*Summary of Advice Received by EISC from the Co-management Groups for Recommended Environmentally Acceptable Minimum Flight Altitudes*

Aircraft Type	Species / Situation	Recommended Altitude	Source
Not specified	Over areas likely to have birds	>650 m (2100 ft)	CWS [WMAC(NWT)]
Not specified	Over areas where birds are known to concentrate (Sanctuaries, colonies, moulting areas)	>1100 m (3500 ft)	CWS [WMAC(NWT)]
Subsonic Aircraft	Over large mammals during ferry flights	>300 m (975 ft)	DRWED [WMAC(NWT)]
Subsonic Aircraft	During wildlife surveys	>100 m (325 ft)	DRWED [WMAC(NWT)]
Subsonic Aircraft	Aeromagnetic surveys in areas with large mammals	Timing should be restricted rather than altitude	DRWED [WMAC(NWT)]
Not specified	When flying point to point in vicinity of caribou and other wildlife species	>610 m (2000 ft)	Transport Canada [WMAC(NS)]
Not specified	Over parks, reserves, and refuges	>610 m (2000 ft)	Transport Canada
Not specified	Over areas where there are belugas and bowhead whales	>300 m (975 ft)	FJMC
Not specified	Zone 1	>760 m (2500 ft)	Tourism Guidelines Beluga Management Plan [FJMC]
Not specified	Zone 2	>610 m (2000 ft)	Tourism Guidelines Beluga Management Plan [FJMC]





### General Advice

- Minimize the number of flights whenever possible
- Fly at times when few birds are present (e.g., early spring, late fall, winter)
- Avoid large concentrations of birds (e.g., Migratory Bird Sanctuaries, breeding colonies, moulting areas)
- Avoid especially sensitive areas such as seabird colonies and raptor nesting sites
- Plan routes that minimize flights over habitats likely to have birds
- Use small aircraft rather than large aircraft whenever possible
- Use fixed-wing aircraft rather than helicopters whenever possible
- Inform pilots of these recommendations and areas known to have birds
- Hovering or circling may greatly increase disturbance and must be avoided.
- Caribou calving grounds should be avoided whenever possible.
- Aeromagnetic surveys should be controlled to prevent disturbance to large mammals by restricting the timing of the surveys rather than the elevation. These surveys should not take place near or on calving and post-calving areas during the period of May 25 to July 15. After July 15 they should avoid any areas known to have large aggregations of caribou.
- Animals reactions will depend on a variety of situations including aircraft type, noise levels, speed of travel, overflight frequency, and animal activity (e.g., loafing, feeding, traveling) and its surroundings (water depth and clarity, substrate). The EISC may have to consider the circumstance of the activity on a case by case basis.
- DFO often recommends a minimum altitude of 400 m (1200 ft) for flights over marine mammal habitat in this region. Recommended or required minimum altitudes may be higher in areas of particularly intense aircraft activity, and in cases where flights are over marine mammal concentrations areas, or at particularly sensitive times of their lift cycle.
- Exceptions to these recommendations may be warranted for scientific studies (e.g., wildlife surveys) in which the benefits for conservation clearly outweigh the risks and should be evaluated on a case by case basis.

## Please:

- do not fly below 1,000 feet;
- obey Transport Canada regulations;
- find out where outfitter camps are located and avoid them during hunting season;
- avoid barren-ground caribou calving grounds during calving season;
- do not take-off or land in a calving area during calving season;
- do not chase or harass wildlife by flying too close; and
- respect our wildlife – keep to a safe altitude.

**Remember,  
flying close enough  
to an animal  
so that it runs away  
is too close!**

If geological survey or mineral exploration work is planned at any time, but especially during outfitting or calving seasons, please contact the regional office of Environment and Natural Resources for information before flying.

### **Mackenzie Mountains and Mackenzie Valley:**

Sahtu Region .....(867) 587-3500  
Dehcho Region .....(867) 695-7450  
South Slave Region .....(867) 872-6400

### **Tundra:**

Inuvik Region.....(867) 777-7308  
North Slave Region.....(867) 873-7184  
South Slave Region .....(867) 872-7450



Visit the Wildlife Division web site  
of Environment and Natural Resources  
at <http://wildlife.enr.gov.nt.ca>.



June 2007



GNWT Photo

A variety of wildlife, quality guides and outfitters, spectacular scenery and solitude that only a location away from human habitation can offer...

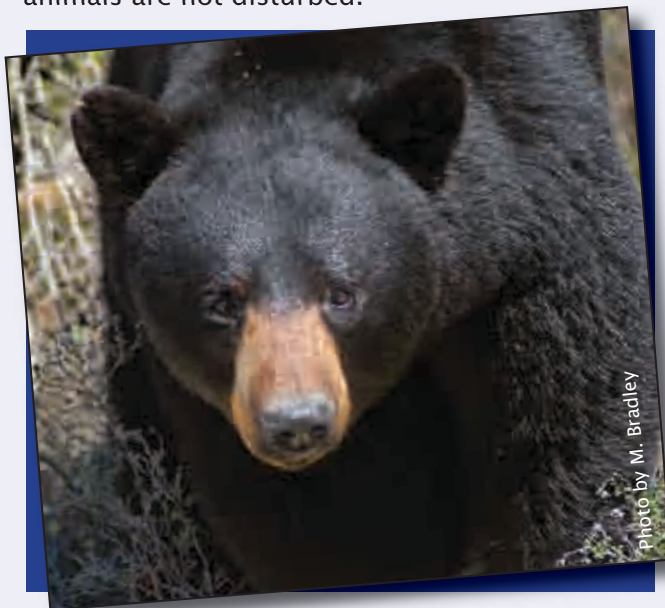
The Northwest Territories is a popular destination for big game hunters and eco-tourists alike. But their experience can be ruined by low-flying aircraft that disturb wildlife.

Increased exploration and development throughout the NWT also means increased air traffic. Pilot encounters with wildlife are becoming more frequent. If you are a fixed wing or rotary pilot, please respect our wildlife and keep to an elevation that does not disturb them.

## Wildlife are Protected Under NWT Law

Section 38 of the NWT *Wildlife Act* protects wildlife by making it illegal to disturb or harass wildlife. Flying close enough to an animal that it runs away is flying too close!

Please keep your aircraft at a safe elevation so animals are not disturbed.



## In the Mackenzie Mountains

Big game hunters pay sizable fees for the chance to take home a trophy animal from the Mackenzie Mountains. Much of the hunting in this area is done on foot or on horseback and it is a time consuming process. Sound is amplified by the mountains and low flyovers can frighten an animal into flight, causing hours, or even days, of stalking to be wasted.

Wildlife that are affected by low level flyovers in the Mackenzie Mountains include Dall's sheep, mountain goat, mountain caribou and moose.

During the mid-July to end of September hunting season, please be cautious and avoid outfitter areas.



## In the Mackenzie Valley

Boreal caribou are a threatened species found throughout the Mackenzie Mountains. Unlike barren-ground caribou, during the May calving period, boreal caribou go into hiding to have their calves. Low flying is especially harmful, stressing the female, which can cause separation from calves and lead to calf death. If electromagnetic surveys are going to be conducted in April or May, please contact the regional ENR office for information.

## On the Tundra

### During Hunting Season

Hunters also pay large fees for a hunting experience on the tundra. In late summer and



early fall, outfitters have active barren-ground caribou sport hunting camps. Aircraft must remain at least 1,000 feet above ground.

During the mid-August to end of October hunting season, please be cautious and avoid outfitter areas.

### During Calving Season

Caribou are a valuable resource to the people of the Northwest Territories. From the end of May to the end of June, female barren-ground caribou come together at herd-specific locations on the tundra to give birth to their calves. Low flyovers, take-offs and landings in these areas are especially harmful as they can stress the cows, which can cause separation from calves and increased calf mortality.

Avoid barren-ground calving grounds from mid-May to early July. This is especially important during times of low barren-ground caribou numbers. Please contact the regional office of Environment and Natural Resources in your area.

## Other Wildlife

Grizzly bears, pelicans, whooping cranes, polar bears, muskoxen, black bears, eagles and other wildlife are also disturbed by low flying aircraft. Please respect our wildlife and keep to a safe altitude.