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**Minroc Management Ltd.**  
**Thierry Mine Monitoring**

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Prepared by:

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Project Number:

2017-03

Date:

December 31<sup>st</sup>, 2017

December 31<sup>st</sup> , 2017

Mr. Brian Newton  
Minroc Management Ltd

██████████  
████████████████████

Dear Mr. Newton

**Re: Thierry Mine Monitoring Program – 2017**

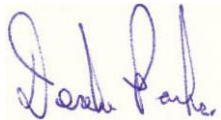
Parks Environmental Inc. (PEI) is pleased to provide you with our results from the 2017 Monitoring Program as outlined in the Ministry of Environment and Climate Change (MOECC) Work Order #2287-AHRRVA for the Thierry Mine. Items specifically discussed pertain to Items No. 3, 5, and 6 of the Order.

As with any program, issues that arose were communicated to Minroc and direction was sought to ensure compliance with the Order.

We believe the information in this letter report will be utilized to initiate annual water quality monitoring required for the site and appreciate the opportunity to work and compile the data outlined in the Order. Should you find that further details or clarifications are required, please do not hesitate to contact myself, directly at ██████████

Sincerely,

**Parks Environmental Inc.**



Derek Parks, M.Sc.  
Director/Senior Aquatic Specialist

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# 1. Introduction

## 1.1 Background

Parks Environmental Inc (PEI) was retained by Minroc Management Inc. to complete monitoring requirements outline in a Provincial Order # Order #2287-AHRRVA issued by the Ministry of Environment and Climate Change (MOECC) for the Thierry Mine site that has hard timelines that must be met to stay compliant with the intent of the Order. Parks Environmental Inc. was to specifically focus on Items No 3, and No. 5. Item No 6 is also discussed to identify the primary path forward on-site remediation for surface water management.

# 2. Scope of Work

## 2.1 MOECC Provincial Work Order

The MOECC has issued Provincial Work Order Order #2287-AHRRVA, within the Order, requirements are outlined to bring the site back into compliance. The Ministry wants, surface water sampling, groundwater monitoring, establishing a flow station and the installation of addition groundwater monitoring wells (to be determined). These identified Station are list in Table 1. Water quality parameters were sent to the ALS Laboratory in Thunder Bay for analysis. Field parameters were collected with a YSI 650, that is annually calibrated by Hoskin Scientific of Burlington.

Notes to assist in defining that required scope of work included:

1. General Chemistry includes, pH, conductivity, TDS, TSS, DOC, hardness, alkalinity, sulphate, chloride, calcium, magnesium, sodium, potassium, and ion balance.
2. Metals mean total recoverable concentrations of a minimum of Arsenic, Copper, Cobalt, Iron, Lead, Nickel, and Zinc. Method detection limits will be at least to Provincial Water Quality Objectives
3. Field measurements means temperature, dissolved oxygen, specific conductance and pH
4. Acute toxicity means testing acute lethality testing for both Rainbow Trout and *Daphnia magna* in a manner consistent with methods reference in Ontario Regulation 560/90
5. Spring means (April 1<sup>st</sup>, to June 15<sup>th</sup>), Summer means (July 1<sup>st</sup> to September 15<sup>th</sup>) and Fall means (October 1<sup>st</sup> to December 15<sup>th</sup>).

**Table 1 Required Sampling Location for the Thierry Mine Site, as per MOECC Provincial Order**

Sample Location	Sample Location Number	Sample Location (UTM E) (Zone 15N, NAD83)	Sample Location (UTM N) (Zone 15N, NAD83)	Samples/Parameters	Individual Sample Required Per Season
Surface run-off from mine shaft	1	684019	5708454	Surface water - general chemistry, metals, field measurements	Spring, Summer, Fall (if flow)
Surface run-off from waste rock pile - south drainage	2	683849	5709713	Surface water - general chemistry, metals, field measurements	Spring, Summer, Fall (if flow)
Groundwater monitoring well	2MW	683935	5708708	Groundwater - elevations and general chemistry	Spring, Summer, Fall
Surface run-off from waste rock pile - north drainage	3	683739	5709027	Surface water - general chemistry, metals, field measurements	Spring, Summer, Fall (if flow)
Surface run-off from low grade ore stockpile	4	683803	5708148	Surface water - general chemistry, metals, field measurements	Spring, Summer, Fall (if flow)
Groundwater monitoring well	4MW	683822	5708146	Groundwater - elevations and general chemistry	Spring, Summer, Fall
East pit (surface, mid-depth, bottom)	5	684279	5708547	Surface water - general chemistry, metals, field measurements	Summer
West-pit (surface, mid-depth, bottom)	6	683789	5708547	Surface water - general chemistry, metals, field measurements	Summer
Culvert discharge by old lagoon site	7a	684227	5708247	Surface water - general chemistry, metals, field measurements	Spring, Summer, Fall (if flow)
Culvert discharge by old lagoon site	7b	684227	5708247	Acute toxicity	Summer
Reclaim pond outlet (culvert)	8a	683353	5709182	Surface water - general chemistry, metals, field measurements	Spring, Summer, Fall (if flow)
Reclaim pond outlet (culvert)	8b	683353	5709182	Acute toxicity	Summer
Reclaim pond outlet (culvert)	8c	683353	5709182	Flow-level logger and measure flows	Spring, Summer, Fall
Ponsford Lake (mid lake, mid depth)	9	684337	5709470	Surface water - general chemistry, metals, field measurements	Spring, Summer, Fall
Ponsford Creek (downstream, midstream)	10	689994	5712818	Surface water - general chemistry, metals, field measurements	Spring, Summer, Fall
Kapkichi Lake (surface, mid-depth, bottom)	11	683028	5707003	Surface water - general chemistry, metals, field measurements	Spring, Summer, Fall
Upgradient of any potential mine contaminant sources	To be determined			Groundwater - groundwater elevations, water quality, general chemistry, metals	Spring, Summer, Fall

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## 3. Results

Footnotes for Order Item No. 3 included the following response:

1. General Chemistry includes, pH, conductivity, TDS, TSS, DOC, hardness, alkalinity, sulphate, chloride, calcium, magnesium, sodium, potassium, and ion balance.
  - These parameters are reported by Site in Appendix A, with Certificate of Analysis provided in Appendix B.
2. Metals mean total recoverable concentrations of a minimum of Arsenic, Copper, Cobalt, Iron, Lead, Nickel, and Zinc. Method detection limits will be at least to Provincial Water Quality Objectives (PWQO)
  - These parameters are reported by Site in Appendix A, placed in contrast with PWQO's and with Certificate of Analysis provided in Appendix B.
3. Field measurements means temperature, dissolved oxygen, specific conductance and pH
  - These parameters are reported by Site in Appendix A,
4. Acute toxicity means testing acute lethality testing for both Rainbow Trout and *Daphnia magna* in a manner consistent with methods reference in Ontario Regulation 560/90
  - Analysis was completed by the Aquatic Toxicology Research Centre at Lakehead University with C.of A. included in Appendix B
5. Spring means (April 1<sup>st</sup>, to June 15<sup>th</sup>), Summer means (July 1<sup>st</sup> to September 15<sup>th</sup>) and Fall means (October 1<sup>st</sup> to December 15<sup>th</sup>).
  - Samples completed by: Spring sampling (June 13-14), Summer sampling (August 30-31); Fall sampling (October 28)

### 3.1 Surface Water

#### 3.1.1 SW-1

No flow was noted at this locations during the 3 visits completed to assess surface water quality.

#### 3.1.2 SW-2

No flow was noted at this location during the 3 visits completed to assess surface water quality.

#### 3.1.3 SW-3

No flow was present, but stand water was noted during the initial visit in June and water sampling was completed. Zinc just exceeded the PQWO, Cobalt and Nickle exceeded the PWQO by a factor of 10. And copper exceeded the PWQO by a factor of 100 (Table A-1). There was no flow noted, or standing water in the summer and fall visits, indicating that this area is most likely by the spring freshette as the source of water for this local.

#### 3.1.4 SW-4

No flow was noted at this location during the 3 visits completed to assess surface water quality.

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### 3.1.5 SW-5 East Pit

Water was collected at surface, middle and bottom of the East Pit as outlined in the Order. Surface water (0.5 m) exceeded the PWQO's for Cobalt and Nickel, with Copper exceeding the PWQO by a factor of 30 (Table A-2). Middle depth (22 m) had Cobalt and Nickel slightly exceed the PWQO and Iron exceeding the PWQO by a factor greater than 10. (Table A-2). Bottom depth (45 m) exhibited a slight exceedance of the copper PWQO and iron again, exceeded the PWQO by a factor of 10. A strong chemocline appears to exist within the East Pit, as field Dissolved oxygen results are less than 2.5 mg/l, high conductivity and an increase in TSS noted for both the middle and bottom was samples collected (Table A-2).

### 3.1.6 SW-6 West Pit

Surface water sample (0.5 m) and middle water sample (35 m) exhibit slight exceedance of copper and nickel values related to the PWQO's (Table A-3). Bottom depth sampled of 51 m, which exhibited anoxic conditions.

### 3.1.7 SW-7

Minimal flow was observed during the spring sampling program. Nickel and zinc slightly exceeded the PWQO's values, with cobalt exceeding the PWQO by a factor greater than 10 (Table A-4). Copper exceeded the PWQO by a factor greater than 100 at this location (Table A-4).

It should be noted that there was no flow during the summer and fall visit. There was no standing water present during the summer visit, with pockets of standing water (<0.1m in depth) noted during the fall visit.

### 3.1.8 SW-8

Nickel slightly exceeded the PWQO's for the spring, summer, and fall (Table A-5). Copper exhibit a slight exceedance to the PWQO for both the spring and summer sampling program (Table A-5). Cobalt value for the spring also slightly exceeded the PWQO (Table A-5).

### 3.1.9 SW-9 Pondford Lake

Slight exceedance of PWQO for Nickel was observed for the spring, summer, and fall sampling of Pondford Lake (Table A-6).

### 3.1.10 SW-10 Pondford Creek

The trend of slight nickel exceedance of PWQO were observed during the spring, summer, and fall sampling of Pondford Lake (Table A-7).

### 3.1.11 SW-11 Kapkichi Lake

No exceedance to PWQO were noted during the 3 sampling programs completed during 2017. (Table A-8)



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## 3.2 Groundwater

A number of groundwater monitoring wells were identified (MW 2 and MW4) in the Order to be sampled (Table 1). It should be noted that during the initial visit to the site by PEI staff, with the client, the listed wells were not located.

Wells were installed November 14th and 15th 2017 by Paddock Drilling Ltd. The wells were named MW-02, MW-04 and MW-12, with co-ordinates from the Order and provided by the client. Due to accessibility, monitoring wells were installed within 30 meters of the coordinates provided by the client. All three wells were drilled to bedrock and installed above bedrock.

All the wells were developed by using a process called the start and stop cycle method. MW-02 was purged for a total time of one hour, because recharge was slower the well had to be visited several times during the days spent completing the program. 40 Liters were pumped (discharged) from the well. After development was complete the well was sampled and field parameters were taken. Well MW-04 was purged for one hour. Well was purged dry every 5 minutes over the course of one hour. 50 liters of water was purged (discharged) from the well. After development was completed well was sampled and field parameters were taken.

Well MW-12 was purged for one hour, well did not go dry during the development process. 150 liters were pumped (discharged) from the well. After development was completed well was sampled and field parameters were taken.

The attempt to develop this wells under 72 hours has result in groundwater chemistry that is the result of the bentonite utilized to install the well was dominating the water chemistry noted in the well (Table A-9), with extremely high TSS and Calcium values noted.

These groundwater monitoring wells be established and included in the 2018 monitoring program, as direct by the Order.

## 3.3 Acute Toxicity

Acute toxicity for both Rainbow Trout and *Daphnia magna* could only be completed on SW-8, as no flow (or water) was present at SW-7. Both test were a pass and lab results can be found in Appendix B, with the Certificate of Analysis provided by the Aquatic Toxicology Research Centre from Lakehead University.

## 3.4 Flow Monitoring Station

Flow Monitoring Station to be installed in spring 2018 as once the site visit was completed in June, and an understanding of the site specific details, the equipment required to install the station were on back order from the supplier in September. The technology to be utilized is similar to storm water management ponds, as, flow

volume were noted to be so low, that a weir type structure will need to be installed after the on-site remediation is completed in an attempt to collect all surface water leaving the settling pond.

Due to the early onset of winter conditions, the establishment of the interception ditch to capture leaked flows from the tailings facility and consolidate into one discharge location was not completed in 2017, and thus no mass loading calculation could be derived.

## **4. Rehabilitation Plan**

In review of the limited 2017 data collected and historic data provided, it appears that the immediate rehabilitation must focus on ensuring that the majority of water flowing from the tailings pond needs to be concentrated into a central flow to allow for flow and volume calculations to be completed.

Sampling in June included SW-8 and also approximately 50 m downstream, where seepage through the dam was flowing long the base of the roadway. Chemistry seemed to be similar (Appendix B), and thus collected and volume calculations of this tailings water needs to be collected into a single flow for a flow monitoring station to be established and to facilitate the required mass loading calculation required.

The plan includes creating an interception ditch to collect seepages from the east side of the tailings pond and concentrating them into a single location that include flows from SW-8 and will facilitate the construction of the required flow monitoring station.

This plan was initiated in the fall of 2017, with complications of flow monitoring equipment being back ordered (3 weeks) and the early onset of winter at the beginning of November. PEI discussions with a site Contractor outlined the work to be completed, but cold weather and snow settled in before the earth works could have been initiated.

# Appendix A

## Surface and Groundwater Monitoring Data, by Station

Theirry Mine Water Quality – 2017, by Station

Table A-1				SW-3	
Date Sampled	13-Jun-2017			Aug 2017	Oct 2017
ALS Sample ID	L1942553-1				
Parameter	Lowest Detection Limit	Units	Water	No Flow	No Flow
<b>Field Parameters (Water)</b>					
Temperature (C)	0.1	C	23.7		
Dissolved Oxygen	0.01	mg/L	7.7		
Conductivity (EC)	3.00	uS/cm	236		
pH	0.1	pH	4.8		
<b>Physical Tests (Water)</b>					
Conductivity (EC)	3.0	uS/cm	234		
Hardness (as CaCO3)	0.50	mg/L	80.5		
pH	0.10	pH	4.64		
Total Suspended Solids	2.0	mg/L	<2.0		
Total Dissolved Solids	10	mg/L	145		
<b>Anions and Nutrients (Water)</b>					
Alkalinity, Total (as CaCO3)	2.0	mg/L	<2.0		
Chloride (Cl)	0.10	mg/L	0.19		
Sulfate (SO4)	0.30	mg/L	105		
Anion Sum		meq/L	2.19		
Cation Sum		meq/L	2.09		
Cation - Anion Balance		%	-2.2		
<b>Organic / Inorganic Carbon (Water)</b>					
Dissolved Carbon Filtration Location		-	LAB		
Dissolved Organic Carbon	1.0	mg/L	4.1		
<b>Total Metals (Water)</b>					
Arsenic (As)-Total	0.00010	mg/L	0.00020		
Calcium (Ca)-Total	0.050	mg/L	17.9		
Cobalt (Co)-Total	0.00010	mg/L	0.0946		
Copper (Cu)-Total	0.00050	mg/L	4.65		
Iron (Fe)-Total	0.010	mg/L	0.399		
Lead (Pb)-Total	0.000050	mg/L	0.000155		
Magnesium (Mg)-Total	0.0050	mg/L	8.16		
Nickel (Ni)-Total	0.00050	mg/L	1.45		
Potassium (K)-Total	0.050	mg/L	2.02		
Sodium (Na)-Total	0.050	mg/L	0.674		
Zinc (Zn)-Total	0.0030	mg/L	0.0968		
<b>Dissolved Metals (Water)</b>					
Dissolved Metals Filtration Location		-	FIELD		
Calcium (Ca)-Dissolved	0.050	mg/L	18.5		
Magnesium (Mg)-Dissolved	0.0050	mg/L	8.31		
	Exceeds PWQO				
	Exceeds PWQO by a factor of >10				
	Exceeds PWQO by a factor of >100				

Theirry Mine Water Quality – 2017, by Station

Table A-2			SW-5 East Pit		
ALS Sample ID			Surface	Middle	Bottom
			L1984659-5	L1984659-6	L1984659-7
Location	Lowest Detection Limit	Units			
Depth		m	0.5	22	45
<b>Field Parameters (Water)</b>					
Temperature (C)	0.1	C	18.2	5.7	5.1
Dissolved Oxygen	0.01	mg/L	10.76	2.43	1.86
Conductivity (EC)	3.00	uS/cm	9	1516	1550
pH	0.1	pH	582.0	7.8	7.8
<b>Physical Tests (Water)</b>					
Conductivity (EC)	3.0	uS/cm	572	1360	1430
Hardness (as CaCO3)	0.50	mg/L	300	815	846
pH	0.10	pH	8.32	7.08	6.95
Total Suspended Solids	2.0	mg/L	2.5	15.8	12.8
Total Dissolved Solids	10	mg/L	420	1150	1220
<b>Anions and Nutrients (Water)</b>					
Alkalinity, Total (as CaCO3)	2.0	mg/L	140	331	341
Chloride (Cl)	0.10	mg/L	0.57	6.27	7.09
Sulfate (SO4)	0.30	mg/L	191	573	627
Anion Sum		meq/L	6.81	18.7	20.1
Cation Sum		meq/L	6.21	17.7	18.6
Cation - Anion Balance		%	-4.6	-2.8	-3.8
<b>Organic / Inorganic Carbon (Water)</b>					
Dissolved Carbon Filtration Location		-	LAB	LAB	LAB
Dissolved Organic Carbon	1.0	mg/L	6.6	4.7	5.3
<b>Total Metals (Water)</b>					
Arsenic (As)-Total	0.00010	mg/L	0.00018	0.00020	0.00015
Calcium (Ca)-Total	0.050	mg/L	93.2	249	257
Cobalt (Co)-Total	0.00010	mg/L	0.00663	0.00260	0.00068
Copper (Cu)-Total	0.00050	mg/L	0.150	0.00492	0.00543
Iron (Fe)-Total	0.010	mg/L	0.190	13.0	17.4
Lead (Pb)-Total	0.000050	mg/L	<0.000050	<0.000050	<0.000050
Magnesium (Mg)-Total	0.0050	mg/L	18.9	57.4	58.0
Nickel (Ni)-Total	0.00050	mg/L	0.165	0.0623	0.0161
Potassium (K)-Total	0.050	mg/L	4.70	6.76	8.38
Sodium (Na)-Total	0.050	mg/L	2.27	13.8	14.2
Zinc (Zn)-Total	0.0030	mg/L	0.0104	0.0037	<0.0030
<b>Dissolved Metals (Water)</b>					
Dissolved Metals Filtration Location		-	FIELD	FIELD	FIELD
Calcium (Ca)-Dissolved	0.050	mg/L	90.7	238	249
Magnesium (Mg)-Dissolved	0.0050	mg/L	18.0	53.7	54.4
	Exceeds PWQO				
	Exceeds PWQO by a factor of >10				
	Exceeds PWQO by a factor of >100				

Theirry Mine Water Quality – 2017, by Station

Table A-3			SW-6 West Pit		
			Surface	Middle	Bottom
ALS Sample ID			L1984659-8	L1984659-9	L1984659-10
Parameter	Lowest Detection Limit	Units			
Depth		m	0.5	35	51
<b>Field Parameters (Water)</b>					
Temperature (C)	0.1	C	18.4	12.1	6.2
Dissolved Oxygen	0.01	mg/L	10.93	12.1	1.2
Conductivity (EC)	3.00	uS/cm	535	570	941
pH	0.1	pH	8.9	8.6	7.8
<b>Physical Tests (Water)</b>					
Conductivity (EC)	3.0	uS/cm	535	561	917
Hardness (as CaCO3)	0.50	mg/L	265	284	496
pH	0.10	pH	8.30	8.09	7.24
Total Suspended Solids	2.0	mg/L	<2.0	<2.0	2.2
Total Dissolved Solids	10	mg/L	374	395	696
<b>Anions and Nutrients (Water)</b>					
Alkalinity, Total (as CaCO3)	2.0	mg/L	113	116	268
Chloride (Cl)	0.10	mg/L	1.85	2.01	2.98
Sulfate (SO4)	0.30	mg/L	178	190	317
Anion Sum		meq/L	6.02	6.34	12
Cation Sum		meq/L	5.53	5.92	10.3
Cation - Anion Balance		%	-4.3	-3.4	-7.8
<b>Organic / Inorganic Carbon (Water)</b>					
Dissolved Carbon Filtration Location		-	LAB	LAB	LAB
Dissolved Organic Carbon	1.0	mg/L	4.2	3.0	3.7
<b>Total Metals (Water)</b>					
Arsenic (As)-Total	0.00010	mg/L	0.00018	0.00018	0.00015
Calcium (Ca)-Total	0.050	mg/L	80.2	88.2	159
Cobalt (Co)-Total	0.00010	mg/L	0.00062	0.00064	0.00062
Copper (Cu)-Total	0.00050	mg/L	0.0213	0.0212	0.00181
Iron (Fe)-Total	0.010	mg/L	0.048	0.055	0.766
Lead (Pb)-Total	0.000050	mg/L	<0.000050	<0.000050	<0.000050
Magnesium (Mg)-Total	0.0050	mg/L	18.7	19.8	33.5
Nickel (Ni)-Total	0.00050	mg/L	0.128	0.144	0.0172
Potassium (K)-Total	0.050	mg/L	3.85	4.00	5.06
Sodium (Na)-Total	0.050	mg/L	3.53	3.88	6.16
Zinc (Zn)-Total	0.0030	mg/L	0.0033	0.0051	<0.0030
<b>Dissolved Metals (Water)</b>					
Dissolved Metals Filtration Location		-	FIELD	FIELD	FIELD
Calcium (Ca)-Dissolved	0.050	mg/L	77.7	83.0	147
Magnesium (Mg)-Dissolved	0.0050	mg/L	17.3	18.7	31.5
	Exceeds PWQO				
	Exceeds PWQO by a factor of >10				
	Exceeds PWQO by a factor of >100				

Theirry Mine Water Quality – 2017, by Station

Table A-4				SW-7	
Date Sampled	13-Jun-2017			Aug 2017	Oct 2017
ALS Sample ID	L1942553-2				
Parameter	Lowest Detection Limit	Units	Water		
<b>Field Parameters (Water)</b>					
Temperature (C)	0.1	C	21.9		
Dissolved Oxygen	0.01	mg/L	11		
Conductivity (EC)	3.00	uS/cm	9		
pH	0.1	pH	7.1		
<b>Physical Tests (Water)</b>					
Conductivity (EC)	3.0	uS/cm	839		
Hardness (as CaCO3)	0.50	mg/L	471		
pH	0.10	pH	7.71		
Total Suspended Solids	2.0	mg/L	<2.0		
Total Dissolved Solids	10	mg/L	622		
<b>Anions and Nutrients (Water)</b>					
Alkalinity, Total (as CaCO3)	2.0	mg/L	222		
Chloride (Cl)	0.10	mg/L	2.77		
Sulfate (SO4)	0.30	mg/L	270		
Anion Sum		meq/L	10.1		
Cation Sum		meq/L	9.95		
Cation - Anion Balance		%	-0.9		
<b>Organic / Inorganic Carbon (Water)</b>					
Dissolved Carbon Filtration Location		-	LAB		
Dissolved Organic Carbon	1.0	mg/L	6.9		
<b>Total Metals (Water)</b>					
Arsenic (As)-Total	0.00010	mg/L	0.00018		
Calcium (Ca)-Total	0.050	mg/L	140		
Cobalt (Co)-Total	0.00010	mg/L	0.0166		
Copper (Cu)-Total	0.00050	mg/L	0.613		
Iron (Fe)-Total	0.010	mg/L	0.086		
Lead (Pb)-Total	0.000050	mg/L	<0.000050		
Magnesium (Mg)-Total	0.0050	mg/L	26.3		
Nickel (Ni)-Total	0.00050	mg/L	0.174		
Potassium (K)-Total	0.050	mg/L	6.83		
Sodium (Na)-Total	0.050	mg/L	6.60		
Zinc (Zn)-Total	0.0030	mg/L	0.0171		
<b>Dissolved Metals (Water)</b>					
Dissolved Metals Filtration Location		-	FIELD		
Calcium (Ca)-Dissolved	0.050	mg/L	146		
Magnesium (Mg)-Dissolved	0.0050	mg/L	25.5		
				No Flow	No Flow
	Exceeds PWQO				
	Exceeds PWQO by a factor of >10				
	Exceeds PWQO by a factor of >100				

Theirry Mine Water Quality – 2017, by Station

Table A-5		SW-8			
		Date Sampled	13-Jun-2017	31-Aug-2017	28-Oct-2017
ALS Sample ID		L1942553-3	L1984659-1	L2014939-1	
Parameter	Lowest Detection Limit	Units	Water	Water	Water
<b>Field Parameters (Water)</b>					
Temperature (C)	0.1	C	16.4	8.3	2.98
Dissolved Oxygen	0.01	mg/L	8.67	9.66	12.34
Conductivity (EC)	3.00	uS/cm	228	17	267
pH	0.1	pH	7.4	466.0	7.74
<b>Physical Tests (Water)</b>					
Conductivity (EC)	3.0	uS/cm	445	465	440
Hardness (as CaCO <sub>3</sub> )	0.50	mg/L	224	250	261
pH	0.10	pH	7.68	7.67	7.75
Total Suspended Solids	2.0	mg/L	<2.0	<2.0	<5.0
Total Dissolved Solids	10	mg/L	236	302	347
<b>Anions and Nutrients (Water)</b>					
Alkalinity, Total (as CaCO <sub>3</sub> )	2.0	mg/L	93.8	79.2	79.9
Chloride (Cl)	0.10	mg/L	0.19	0.26	0.28
Sulfate (SO <sub>4</sub> )	0.30	mg/L	143	169	169
Anion Sum		meq/L	4.86	5.1	3.53
Cation Sum		meq/L	4.65	5.2	5.42
Cation - Anion Balance		%	-2.1	0.9	21.2
<b>Organic / Inorganic Carbon (Water)</b>					
Dissolved Carbon Filtration Location		-	LAB	LAB	LAB
Dissolved Organic Carbon	1.0	mg/L	2.7	2.4	2.32
<b>Total Metals (Water)</b>					
Arsenic (As)-Total	0.00010	mg/L	0.00010	0.00012	<0.00010
Calcium (Ca)-Total	0.050	mg/L	61.3	65.8	65.9
Cobalt (Co)-Total	0.00010	mg/L	0.00098	0.00038	0.00027
Copper (Cu)-Total	0.00050	mg/L	0.0207	0.00616	0.00468
Iron (Fe)-Total	0.010	mg/L	0.041	0.011	0.036
Lead (Pb)-Total	0.000050	mg/L	<0.000050	<0.000050	<0.000050
Magnesium (Mg)-Total	0.0050	mg/L	16.0	20.4	19.9
Nickel (Ni)-Total	0.00050	mg/L	0.116	0.105	0.120
Potassium (K)-Total	0.050	mg/L	3.72	4.46	4.60
Sodium (Na)-Total	0.050	mg/L	1.81	2.13	1.88
Zinc (Zn)-Total	0.0030	mg/L	<0.0030	<0.0030	<0.0030
<b>Dissolved Metals (Water)</b>					
Dissolved Metals Filtration Location		-	FIELD	FIELD	FIELD
Calcium (Ca)-Dissolved	0.050	mg/L	63.1	66.9	70.9
Magnesium (Mg)-Dissolved	0.0050	mg/L	16.1	20.0	20.3
<b>Bioassays (Effluent)</b>					
Daphnia Magna - Pass/Fail		-		Pass	
Trout Bioassay - Pass/Fail		-		Pass	
		Exceeds PWQO			
		Exceeds PWQO by a factor of >10			
		Exceeds PWQO by a factor of >100			



Theirry Mine Water Quality – 2017, by Station

Table A-6			SW-9		
Date Sampled			13-Jun-2017	30-Aug-2017	28-Oct-2017
ALS Sample ID			L1942553-4	L1984659-2	L2014939-2
Parameter	Lowest Detection Limit	Units	Water	Water	Water
<b>Field Parameters (Water)</b>					
Temperature (C)	0.1	C	18.4	18.1	1.43
Dissolved Oxygen	0.01	mg/L	80.7	13.33	13.99
Conductivity (EC)	3.00	uS/cm	356	336	408
pH	0.1	pH	8.2	9.3	8.3
<b>Physical Tests (Water)</b>					
Conductivity (EC)	3.0	uS/cm	345	330	368
Hardness (as CaCO3)	0.50	mg/L	179	162	195
pH	0.10	pH	7.97	8.57	8.05
Total Suspended Solids	2.0	mg/L	<2.0	<2.0	<5.0
Total Dissolved Solids	10	mg/L	245	221	268
<b>Anions and Nutrients (Water)</b>					
Alkalinity, Total (as CaCO3)	2.0	mg/L	99.1	69.9	84.2
Chloride (Cl)	0.10	mg/L	0.49	0.22	0.40
Sulfate (SO4)	0.30	mg/L	90.4	107	107
Anion Sum		meq/L	3.88	3.63	2.24
Cation Sum		meq/L	3.71	3.37	4.05
Cation - Anion Balance		%	-2.2	-3.8	28.8
<b>Organic / Inorganic Carbon (Water)</b>					
Dissolved Carbon Filtration Location		-	LAB	LAB	LAB
Dissolved Organic Carbon	1.0	mg/L	5.1	6.4	5.13
<b>Total Metals (Water)</b>					
Arsenic (As)-Total	0.00010	mg/L	0.00023	0.00027	0.00020
Calcium (Ca)-Total	0.050	mg/L	53.6	45.5	51.0
Cobalt (Co)-Total	0.00010	mg/L	0.00048	0.00019	0.00015
Copper (Cu)-Total	0.00050	mg/L	0.00376	0.00187	0.00159
Iron (Fe)-Total	0.010	mg/L	0.048	0.024	0.036
Lead (Pb)-Total	0.000050	mg/L	<0.000050	<0.000050	<0.000050
Magnesium (Mg)-Total	0.0050	mg/L	11.8	13.4	14.4
Nickel (Ni)-Total	0.00050	mg/L	0.0402	0.0257	0.0411
Potassium (K)-Total	0.050	mg/L	2.42	2.44	2.61
Sodium (Na)-Total	0.050	mg/L	1.62	1.92	1.86
Zinc (Zn)-Total	0.0030	mg/L	<0.0030	<0.0030	0.0033
<b>Dissolved Metals (Water)</b>					
Dissolved Metals Filtration Location		-	FIELD	FIELD	FIELD
Calcium (Ca)-Dissolved	0.050	mg/L	52.4	42.9	54.6
Magnesium (Mg)-Dissolved	0.0050	mg/L	11.7	13.3	14.2
		Exceeds PWQO			
		Exceeds PWQO by a factor of >10			
		Exceeds PWQO by a factor of >100			

Theirry Mine Water Quality – 2017, by Station

<b>Table A-7</b>		<b>SW-10</b>			
<b>Date Sampled</b>		<b>14-Jun-2017</b>	<b>31-Aug-2017</b>	<b>28-Oct-2017</b>	
<b>ALS Sample ID</b>		<b>L1942553-5</b>	<b>L1984659-3</b>	<b>L2014939-3</b>	
<b>Parameter</b>	<b>Lowest Detection Limit</b>	<b>Units</b>			
<b>Field Parameters (Water)</b>					
Temperature (C)	0.1	C	26.3	10.0	1.83
Dissolved Oxygen	0.01	mg/L	7.35	8.89	12.11
Conductivity (EC)	3.00	uS/cm	715	358	412
pH	0.1	pH	6.1	8.3	8.3
<b>Physical Tests (Water)</b>					
Conductivity (EC)	3.0	uS/cm	340	348	352
Hardness (as CaCO3)	0.50	mg/L	174	178	198
pH	0.10	pH	7.76	7.50	7.69
Total Suspended Solids	2.0	mg/L	<2.0	4.4	<5.0
Total Dissolved Solids	10	mg/L	220	225	262
<b>Anions and Nutrients (Water)</b>					
Alkalinity, Total (as CaCO3)	2.0	mg/L	96.0	85.5	83.5
Chloride (Cl)	0.10	mg/L	0.43	0.17	0.52
Sulfate (SO4)	0.30	mg/L	87.5	104	105
Anion Sum		meq/L	3.75	3.87	2.2
Cation Sum		meq/L	3.61	3.67	4.11
Cation - Anion Balance		%	-1.9	-2.7	30.2
<b>Organic / Inorganic Carbon (Water)</b>					
Dissolved Carbon Filtration Location		-	LAB	LAB	LAB
Dissolved Organic Carbon	1.0	mg/L	5.9	7.6	5.67
<b>Total Metals (Water)</b>					
Arsenic (As)-Total	0.00010	mg/L	0.00021	0.00025	0.00017
Calcium (Ca)-Total	0.050	mg/L	51.7	50.8	51.0
Cobalt (Co)-Total	0.00010	mg/L	0.00015	0.00015	0.00011
Copper (Cu)-Total	0.00050	mg/L	0.00237	0.00118	0.00138
Iron (Fe)-Total	0.010	mg/L	0.035	0.047	0.049
Lead (Pb)-Total	0.000050	mg/L	<0.000050	<0.000050	<0.000050
Magnesium (Mg)-Total	0.0050	mg/L	11.6	13.5	14.2
Nickel (Ni)-Total	0.00050	mg/L	0.0297	0.0280	0.0366
Potassium (K)-Total	0.050	mg/L	2.22	2.01	2.64
Sodium (Na)-Total	0.050	mg/L	1.57	1.78	1.82
Zinc (Zn)-Total	0.0030	mg/L	<0.0030	<0.0030	<0.0030
<b>Dissolved Metals (Water)</b>					
Dissolved Metals Filtration Location		-	FIELD	FIELD	FIELD
Calcium (Ca)-Dissolved	0.050	mg/L	51.3	49.4	55.6
Magnesium (Mg)-Dissolved	0.0050	mg/L	11.2	13.2	14.3
Exceeds PWQO					
Exceeds PWQO by a factor of >10					
Exceeds PWQO by a factor of >100					

Theirry Mine Water Quality – 2017, by Station

Table A-8			SW-11		
Date Sampled			13-Jun-2017	30-Aug-2017	28-Oct-2017
ALS Sample ID			L1942553-6	L1984659-4	L2014939-4
Parameter	Lowest Detection Limit	Units			
<b>Field Parameters (Water)</b>					
Temperature (C)	0.1	C	18.6	18.7	4.04
Dissolved Oxygen	0.01	mg/L	8.44	10.29	12.8
Conductivity (EC)	3.00	uS/cm	67	82	97
pH	0.1	pH	7.0	8.5	8.11
<b>Physical Tests (Water)</b>					
Conductivity (EC)	3.0	uS/cm	66.4	82.1	90.0
Hardness (as CaCO3)	0.50	mg/L	37.5	44.2	51.7
pH	0.10	pH	7.47	7.64	7.80
Total Suspended Solids	2.0	mg/L	<2.0	2.8	<5.0
Total Dissolved Solids	10	mg/L	63	66	79
<b>Anions and Nutrients (Water)</b>					
Alkalinity, Total (as CaCO3)	2.0	mg/L	35.4	43.5	49.4
Chloride (Cl)	0.10	mg/L	0.13	0.13	0.16
Sulfate (SO4)	0.30	mg/L	0.41	0.84	0.39
Anion Sum		meq/L	0.72	0.89	<0.10
Cation Sum		meq/L	0.78	0.92	1.07
Cation - Anion Balance		%	4.2	1.4	Low EC
<b>Organic / Inorganic Carbon (Water)</b>					
Dissolved Carbon Filtration Location		-	LAB	LAB	LAB
Dissolved Organic Carbon	1.0	mg/L	11.6	11.6	9.41
<b>Total Metals (Water)</b>					
Arsenic (As)-Total	0.00010	mg/L	0.00048	0.00047	0.00037
Calcium (Ca)-Total	0.050	mg/L	11.2	13.9	15.3
Cobalt (Co)-Total	0.00010	mg/L	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total	0.00050	mg/L	<0.00050	<0.00050	<0.00050
Iron (Fe)-Total	0.010	mg/L	0.118	0.108	0.104
Lead (Pb)-Total	0.000050	mg/L	<0.000050	<0.000050	<0.000050
Magnesium (Mg)-Total	0.0050	mg/L	2.24	2.73	2.90
Nickel (Ni)-Total	0.00050	mg/L	<0.00050	<0.00050	<0.00050
Potassium (K)-Total	0.050	mg/L	0.337	0.372	0.427
Sodium (Na)-Total	0.050	mg/L	0.447	0.524	0.511
Zinc (Zn)-Total	0.0030	mg/L	<0.0030	<0.0030	<0.0030
<b>Dissolved Metals (Water)</b>					
Dissolved Metals Filtration Location		-	FIELD	FIELD	FIELD
Calcium (Ca)-Dissolved	0.050	mg/L	11.5	13.4	15.9
Magnesium (Mg)-Dissolved	0.0050	mg/L	2.14	2.63	2.91
		Exceeds PWQO			
		Exceeds PWQO by a factor of >10			
		Exceeds PWQO by a factor of >100			

Theirry Mine Water Quality – 2017, by Station

Table A-9. Monitoring Well pre development data

Station			MW-02	MW-04	MW-12
Date Sampled			15-Nov-2017	15-Nov-2017	14-Nov-2017
ALS Sample ID			L2023676-1	L2023676-2	L2023676-3
Parameter	Lowest Detection Limit	Units	Water	Water	Water
<b>Physical Tests (Water)</b>					
Conductivity (EC)	3.0	uS/cm	944	1260	558
Hardness (as CaCO3)	0.50	mg/L	514	730	300
pH	0.10	pH	7.51	7.16	7.49
Total Suspended Solids	6.0	mg/L	10500	11000	1970
Total Dissolved Solids	20	mg/L	607	946	346
<b>Anions and Nutrients (Water)</b>					
Acceptable % Difference		-	PASS	PASS	PASS
Alkalinity, Total (as CaCO3)	2.0	mg/L	470	308	305
Chloride (Cl)	0.10	mg/L	4.34	3.96	1.17
Sulfate (SO4)	0.30	mg/L	68.6	424	7.87
Anion Sum		meq/L	11	15.1	6.28
Cation Sum		meq/L	11.4	15.9	6.85
Cation - Anion Balance		%	2.1	2.7	4.3
<b>Organic / Inorganic Carbon (Water)</b>					
Dissolved Carbon Filtration Location		-	LAB	LAB	LAB
Dissolved Organic Carbon	1.0	mg/L	3.5	39.4	5.7
<b>Total Metals (Water)</b>					
Arsenic (As)-Total	0.00010	mg/L	0.0079	0.0214	0.00360
Calcium (Ca)-Total	0.050	mg/L	562	1080	229
Cobalt (Co)-Total	0.00010	mg/L	0.0200	0.0533	0.00961
Copper (Cu)-Total	0.00050	mg/L	0.314	0.209	0.0666
Iron (Fe)-Total	0.010	mg/L	34.1	112	25.0
Lead (Pb)-Total	0.000050	mg/L	0.0181	0.0522	0.0224
Magnesium (Mg)-Total	0.0050	mg/L	135	225	28.3
Nickel (Ni)-Total	0.00050	mg/L	0.116	0.146	0.0203
Potassium (K)-Total	0.050	mg/L	9.13	26.3	4.34
Sodium (Na)-Total	0.050	mg/L	22.6	20.0	3.67
Zinc (Zn)-Total	0.0030	mg/L	0.101	0.203	0.0420
<b>Dissolved Metals (Water)</b>					
Dissolved Metals Filtration Location		-	FIELD	FIELD	FIELD
Calcium (Ca)-Dissolved	0.050	mg/L	162	242	102
Magnesium (Mg)-Dissolved	0.0050	mg/L	26.7	30.7	10.9

# Appendix B

## Certificate of Analysis for Water Chemistry and Acute Lethality Testing



PARKS ENVIRONMENTAL INC.

ATTN: Derek Parks



Date Received: 15-JUN-17

Report Date: 29-JUN-17 14:14 (MT)

Version: FINAL

Client Phone:

## Certificate of Analysis

Lab Work Order #: L1942553

Project P.O. #: NOT SUBMITTED

Job Reference:

C of C Numbers:

Legal Site Desc: Thiery

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Christine Paradis  
Project Manager

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## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1942553-1 SW-3 Sampled By: Client on 13-JUN-17 @ 14:00 Matrix: Surface Water							
<b>Physical Tests</b>							
Conductivity (EC)	234		3.0	uS/cm		16-JUN-17	R3749839
Hardness (as CaCO3)	80.5		0.50	mg/L		29-JUN-17	
pH	4.64		0.10	pH		16-JUN-17	R3749839
Total Suspended Solids	<2.0		2.0	mg/L		20-JUN-17	R3752622
Total Dissolved Solids	145		13	mg/L		20-JUN-17	R3752139
<b>Anions and Nutrients</b>							
Acceptable % Difference	PASS					29-JUN-17	
Alkalinity, Total (as CaCO3)	<2.0		2.0	mg/L		16-JUN-17	R3749839
Chloride (Cl)	0.19		0.10	mg/L		17-JUN-17	R3750153
Sulfate (SO4)	105		0.30	mg/L		17-JUN-17	R3750153
Anion Sum	2.19			meq/L		29-JUN-17	
Cation Sum	2.09			meq/L		29-JUN-17	
Cation - Anion Balance	-2.2			%		29-JUN-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	LAB					15-JUN-17	R3748495
Dissolved Organic Carbon	4.1		1.0	mg/L	15-JUN-17	21-JUN-17	R3754885
<b>Total Metals</b>							
Arsenic (As)-Total	0.00020		0.00010	mg/L	21-JUN-17	24-JUN-17	R3755649
Calcium (Ca)-Total	17.9		0.050	mg/L	21-JUN-17	24-JUN-17	R3755649
Cobalt (Co)-Total	0.0946		0.00010	mg/L	21-JUN-17	24-JUN-17	R3755649
Copper (Cu)-Total	4.65		0.00050	mg/L	21-JUN-17	24-JUN-17	R3755649
Iron (Fe)-Total	0.399		0.010	mg/L	21-JUN-17	24-JUN-17	R3755649
Lead (Pb)-Total	0.000155		0.000050	mg/L	21-JUN-17	24-JUN-17	R3755649
Magnesium (Mg)-Total	8.16		0.0050	mg/L	21-JUN-17	24-JUN-17	R3755649
Nickel (Ni)-Total	1.45		0.00050	mg/L	21-JUN-17	24-JUN-17	R3755649
Potassium (K)-Total	2.02		0.050	mg/L	21-JUN-17	24-JUN-17	R3755649
Sodium (Na)-Total	0.674		0.050	mg/L	21-JUN-17	24-JUN-17	R3755649
Zinc (Zn)-Total	0.0968		0.0030	mg/L	21-JUN-17	24-JUN-17	R3755649
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					28-JUN-17	R3758588
Calcium (Ca)-Dissolved	18.5		0.050	mg/L	28-JUN-17	28-JUN-17	R3758697
Magnesium (Mg)-Dissolved	8.31		0.0050	mg/L	28-JUN-17	28-JUN-17	R3758697
L1942553-2 SW-7 Sampled By: Client on 13-JUN-17 @ 14:45 Matrix: Surface Water							
<b>Physical Tests</b>							
Conductivity (EC)	839		3.0	uS/cm		16-JUN-17	R3749839
Hardness (as CaCO3)	471		0.50	mg/L		29-JUN-17	
pH	7.71		0.10	pH		16-JUN-17	R3749839
Total Suspended Solids	<2.0		2.0	mg/L		19-JUN-17	R3751166
Total Dissolved Solids	622		20	mg/L		19-JUN-17	R3751639
<b>Anions and Nutrients</b>							

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1942553-2 SW-7 Sampled By: Client on 13-JUN-17 @ 14:45 Matrix: Surface Water							
<b>Anions and Nutrients</b>							
Acceptable % Difference	PASS					29-JUN-17	
Alkalinity, Total (as CaCO3)	222		2.0	mg/L		16-JUN-17	R3749839
Chloride (Cl)	2.77		0.10	mg/L		17-JUN-17	R3750153
Sulfate (SO4)	270		0.30	mg/L		17-JUN-17	R3750153
Anion Sum	10.1			meq/L		29-JUN-17	
Cation Sum	9.95			meq/L		29-JUN-17	
Cation - Anion Balance	-0.9			%		29-JUN-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	LAB					15-JUN-17	R3748495
Dissolved Organic Carbon	6.9		1.0	mg/L	15-JUN-17	21-JUN-17	R3754885
<b>Total Metals</b>							
Arsenic (As)-Total	0.00018		0.00010	mg/L	21-JUN-17	24-JUN-17	R3755649
Calcium (Ca)-Total	140		0.050	mg/L	21-JUN-17	24-JUN-17	R3755649
Cobalt (Co)-Total	0.0166		0.00010	mg/L	21-JUN-17	24-JUN-17	R3755649
Copper (Cu)-Total	0.613		0.00050	mg/L	21-JUN-17	24-JUN-17	R3755649
Iron (Fe)-Total	0.086		0.010	mg/L	21-JUN-17	24-JUN-17	R3755649
Lead (Pb)-Total	<0.000050		0.000050	mg/L	21-JUN-17	24-JUN-17	R3755649
Magnesium (Mg)-Total	26.3		0.0050	mg/L	21-JUN-17	24-JUN-17	R3755649
Nickel (Ni)-Total	0.174		0.00050	mg/L	21-JUN-17	24-JUN-17	R3755649
Potassium (K)-Total	6.83		0.050	mg/L	21-JUN-17	24-JUN-17	R3755649
Sodium (Na)-Total	6.60		0.050	mg/L	21-JUN-17	24-JUN-17	R3755649
Zinc (Zn)-Total	0.0171		0.0030	mg/L	21-JUN-17	24-JUN-17	R3755649
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					28-JUN-17	R3758588
Calcium (Ca)-Dissolved	146		0.050	mg/L	28-JUN-17	28-JUN-17	R3758697
Magnesium (Mg)-Dissolved	25.5		0.0050	mg/L	28-JUN-17	28-JUN-17	R3758697
L1942553-3 SW-8 Sampled By: Client on 13-JUN-17 @ 16:45 Matrix: Surface Water							
<b>Physical Tests</b>							
Conductivity (EC)	445		3.0	uS/cm		16-JUN-17	R3749839
Hardness (as CaCO3)	224		0.50	mg/L		29-JUN-17	
pH	7.68		0.10	pH		16-JUN-17	R3749839
Total Suspended Solids	<2.0		2.0	mg/L		19-JUN-17	R3751166
Total Dissolved Solids	236		20	mg/L		20-JUN-17	R3752139
<b>Anions and Nutrients</b>							
Acceptable % Difference	PASS					29-JUN-17	
Alkalinity, Total (as CaCO3)	93.8		2.0	mg/L		16-JUN-17	R3749839
Chloride (Cl)	0.19		0.10	mg/L		17-JUN-17	R3750153
Sulfate (SO4)	143		0.30	mg/L		17-JUN-17	R3750153
Anion Sum	4.86			meq/L		29-JUN-17	
Cation Sum	4.65			meq/L		29-JUN-17	

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



## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1942553-3 SW-8 Sampled By: Client on 13-JUN-17 @ 16:45 Matrix: Surface Water							
<b>Anions and Nutrients</b>							
Cation - Anion Balance	-2.1			%		29-JUN-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	LAB					15-JUN-17	R3748495
Dissolved Organic Carbon	2.7		1.0	mg/L	15-JUN-17	21-JUN-17	R3754885
<b>Total Metals</b>							
Arsenic (As)-Total	0.00010		0.00010	mg/L	21-JUN-17	24-JUN-17	R3755649
Calcium (Ca)-Total	61.3		0.050	mg/L	21-JUN-17	24-JUN-17	R3755649
Cobalt (Co)-Total	0.00098		0.00010	mg/L	21-JUN-17	24-JUN-17	R3755649
Copper (Cu)-Total	0.0207		0.00050	mg/L	21-JUN-17	24-JUN-17	R3755649
Iron (Fe)-Total	0.041		0.010	mg/L	21-JUN-17	24-JUN-17	R3755649
Lead (Pb)-Total	<0.000050		0.000050	mg/L	21-JUN-17	24-JUN-17	R3755649
Magnesium (Mg)-Total	16.0		0.0050	mg/L	21-JUN-17	24-JUN-17	R3755649
Nickel (Ni)-Total	0.116		0.00050	mg/L	21-JUN-17	24-JUN-17	R3755649
Potassium (K)-Total	3.72		0.050	mg/L	21-JUN-17	24-JUN-17	R3755649
Sodium (Na)-Total	1.81		0.050	mg/L	21-JUN-17	24-JUN-17	R3755649
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	21-JUN-17	24-JUN-17	R3755649
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					28-JUN-17	R3758588
Calcium (Ca)-Dissolved	63.1		0.050	mg/L	28-JUN-17	28-JUN-17	R3758697
Magnesium (Mg)-Dissolved	16.1		0.0050	mg/L	28-JUN-17	28-JUN-17	R3758697
L1942553-4 SW-9 Sampled By: Client on 13-JUN-17 @ 09:30 Matrix: Surface Water							
<b>Physical Tests</b>							
Conductivity (EC)	345		3.0	uS/cm		16-JUN-17	R3749839
Hardness (as CaCO3)	179		0.50	mg/L		29-JUN-17	
pH	7.97		0.10	pH		16-JUN-17	R3749839
Total Suspended Solids	<2.0		2.0	mg/L		18-JUN-17	R3750999
Total Dissolved Solids	245		20	mg/L		19-JUN-17	R3751464
<b>Anions and Nutrients</b>							
Acceptable % Difference	PASS					29-JUN-17	
Alkalinity, Total (as CaCO3)	99.1		2.0	mg/L		16-JUN-17	R3749839
Chloride (Cl)	0.49		0.10	mg/L		17-JUN-17	R3750153
Sulfate (SO4)	90.4		0.30	mg/L		17-JUN-17	R3750153
Anion Sum	3.88			meq/L		29-JUN-17	
Cation Sum	3.71			meq/L		29-JUN-17	
Cation - Anion Balance	-2.2			%		29-JUN-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	LAB					15-JUN-17	R3748495
Dissolved Organic Carbon	5.1		1.0	mg/L	15-JUN-17	19-JUN-17	R3751517
<b>Total Metals</b>							
Arsenic (As)-Total	0.00023		0.00010	mg/L	21-JUN-17	24-JUN-17	R3755649

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1942553-4 SW-9 Sampled By: Client on 13-JUN-17 @ 09:30 Matrix: Surface Water							
<b>Total Metals</b>							
Calcium (Ca)-Total	53.6		0.050	mg/L	21-JUN-17	24-JUN-17	R3755649
Cobalt (Co)-Total	0.00048		0.00010	mg/L	21-JUN-17	24-JUN-17	R3755649
Copper (Cu)-Total	0.00376		0.00050	mg/L	21-JUN-17	24-JUN-17	R3755649
Iron (Fe)-Total	0.048		0.010	mg/L	21-JUN-17	24-JUN-17	R3755649
Lead (Pb)-Total	<0.000050		0.000050	mg/L	21-JUN-17	24-JUN-17	R3755649
Magnesium (Mg)-Total	11.8		0.0050	mg/L	21-JUN-17	24-JUN-17	R3755649
Nickel (Ni)-Total	0.0402		0.00050	mg/L	21-JUN-17	24-JUN-17	R3755649
Potassium (K)-Total	2.42		0.050	mg/L	21-JUN-17	24-JUN-17	R3755649
Sodium (Na)-Total	1.62		0.050	mg/L	21-JUN-17	24-JUN-17	R3755649
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	21-JUN-17	24-JUN-17	R3755649
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					28-JUN-17	R3758588
Calcium (Ca)-Dissolved	52.4		0.050	mg/L	28-JUN-17	28-JUN-17	R3758697
Magnesium (Mg)-Dissolved	11.7		0.0050	mg/L	28-JUN-17	28-JUN-17	R3758697
L1942553-5 SW-10 Sampled By: Client on 14-JUN-17 @ 10:15 Matrix: Surface Water							
<b>Physical Tests</b>							
Conductivity (EC)	340		3.0	uS/cm		16-JUN-17	R3749839
Hardness (as CaCO3)	174		0.50	mg/L		29-JUN-17	
pH	7.76		0.10	pH		16-JUN-17	R3749839
Total Suspended Solids	<2.0		2.0	mg/L		20-JUN-17	R3752622
Total Dissolved Solids	220		20	mg/L		21-JUN-17	R3753474
<b>Anions and Nutrients</b>							
Acceptable % Difference	PASS					29-JUN-17	
Alkalinity, Total (as CaCO3)	96.0		2.0	mg/L		16-JUN-17	R3749839
Chloride (Cl)	0.43		0.10	mg/L		17-JUN-17	R3750153
Sulfate (SO4)	87.5		0.30	mg/L		17-JUN-17	R3750153
Anion Sum	3.75			meq/L		29-JUN-17	
Cation Sum	3.61			meq/L		29-JUN-17	
Cation - Anion Balance	-1.9			%		29-JUN-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	LAB					15-JUN-17	R3748495
Dissolved Organic Carbon	5.9		1.0	mg/L	15-JUN-17	21-JUN-17	R3754885
<b>Total Metals</b>							
Arsenic (As)-Total	0.00021		0.00010	mg/L	21-JUN-17	24-JUN-17	R3755649
Calcium (Ca)-Total	51.7		0.050	mg/L	21-JUN-17	24-JUN-17	R3755649
Cobalt (Co)-Total	0.00015		0.00010	mg/L	21-JUN-17	24-JUN-17	R3755649
Copper (Cu)-Total	0.00237		0.00050	mg/L	21-JUN-17	24-JUN-17	R3755649
Iron (Fe)-Total	0.035		0.010	mg/L	21-JUN-17	24-JUN-17	R3755649
Lead (Pb)-Total	<0.000050		0.000050	mg/L	21-JUN-17	24-JUN-17	R3755649
Magnesium (Mg)-Total	11.6		0.0050	mg/L	21-JUN-17	24-JUN-17	R3755649

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1942553-5 SW-10 Sampled By: Client on 14-JUN-17 @ 10:15 Matrix: Surface Water							
<b>Total Metals</b>							
Nickel (Ni)-Total	0.0297		0.00050	mg/L	21-JUN-17	24-JUN-17	R3755649
Potassium (K)-Total	2.22		0.050	mg/L	21-JUN-17	24-JUN-17	R3755649
Sodium (Na)-Total	1.57		0.050	mg/L	21-JUN-17	24-JUN-17	R3755649
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	21-JUN-17	24-JUN-17	R3755649
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					28-JUN-17	R3758588
Calcium (Ca)-Dissolved	51.3		0.050	mg/L	28-JUN-17	28-JUN-17	R3758697
Magnesium (Mg)-Dissolved	11.2		0.0050	mg/L	28-JUN-17	28-JUN-17	R3758697
L1942553-6 SW-11-S Sampled By: Client on 13-JUN-17 @ 11:00 Matrix: Surface Water							
<b>Physical Tests</b>							
Conductivity (EC)	66.4		3.0	uS/cm		16-JUN-17	R3749839
Hardness (as CaCO3)	37.5		0.50	mg/L		29-JUN-17	
pH	7.47		0.10	pH		16-JUN-17	R3749839
Total Suspended Solids	<2.0		2.0	mg/L		18-JUN-17	R3750999
Total Dissolved Solids	63		13	mg/L		19-JUN-17	R3751464
<b>Anions and Nutrients</b>							
Acceptable % Difference	PASS					29-JUN-17	
Alkalinity, Total (as CaCO3)	35.4		2.0	mg/L		16-JUN-17	R3749839
Chloride (Cl)	0.13		0.10	mg/L		17-JUN-17	R3750153
Sulfate (SO4)	0.41		0.30	mg/L		17-JUN-17	R3750153
Anion Sum	0.72			meq/L		29-JUN-17	
Cation Sum	0.78			meq/L		29-JUN-17	
Cation - Anion Balance	4.2			%		29-JUN-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	LAB					15-JUN-17	R3748495
Dissolved Organic Carbon	11.6		1.0	mg/L	15-JUN-17	19-JUN-17	R3751517
<b>Total Metals</b>							
Arsenic (As)-Total	0.00048		0.00010	mg/L	21-JUN-17	24-JUN-17	R3755649
Calcium (Ca)-Total	11.2		0.050	mg/L	21-JUN-17	24-JUN-17	R3755649
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	21-JUN-17	24-JUN-17	R3755649
Copper (Cu)-Total	<0.00050		0.00050	mg/L	21-JUN-17	24-JUN-17	R3755649
Iron (Fe)-Total	0.118		0.010	mg/L	21-JUN-17	24-JUN-17	R3755649
Lead (Pb)-Total	<0.000050		0.000050	mg/L	21-JUN-17	24-JUN-17	R3755649
Magnesium (Mg)-Total	2.24		0.0050	mg/L	21-JUN-17	24-JUN-17	R3755649
Nickel (Ni)-Total	<0.00050		0.00050	mg/L	21-JUN-17	24-JUN-17	R3755649
Potassium (K)-Total	0.337		0.050	mg/L	21-JUN-17	24-JUN-17	R3755649
Sodium (Na)-Total	0.447		0.050	mg/L	21-JUN-17	24-JUN-17	R3755649
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	21-JUN-17	24-JUN-17	R3755649
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					28-JUN-17	R3758588

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1942553-6 SW-11-S Sampled By: Client on 13-JUN-17 @ 11:00 Matrix: Surface Water							
<b>Dissolved Metals</b>							
Calcium (Ca)-Dissolved	11.5		0.050	mg/L	28-JUN-17	28-JUN-17	R3758697
Magnesium (Mg)-Dissolved	2.14		0.0050	mg/L	28-JUN-17	28-JUN-17	R3758697
L1942553-7 SEEPAGE (FLOW) BELOW SW-8 Sampled By: Client on 13-JUN-17 @ 16:45 Matrix: Surface Water							
<b>Physical Tests</b>							
Conductivity (EC)	411		3.0	uS/cm		16-JUN-17	R3749839
Hardness (as CaCO3)	219		0.50	mg/L		29-JUN-17	
pH	7.97		0.10	pH		16-JUN-17	R3749839
Total Suspended Solids	<2.0		2.0	mg/L		19-JUN-17	R3751166
Total Dissolved Solids	258		20	mg/L		20-JUN-17	R3752139
<b>Anions and Nutrients</b>							
Acceptable % Difference	PASS					29-JUN-17	
Alkalinity, Total (as CaCO3)	100		2.0	mg/L		16-JUN-17	R3749839
Chloride (Cl)	0.28		0.10	mg/L		17-JUN-17	R3750153
Sulfate (SO4)	127		0.30	mg/L		17-JUN-17	R3750153
Anion Sum	4.64			meq/L		29-JUN-17	
Cation Sum	4.56			meq/L		29-JUN-17	
Cation - Anion Balance	-0.8			%		29-JUN-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	LAB					15-JUN-17	R3748495
Dissolved Organic Carbon	3.5		1.0	mg/L	15-JUN-17	21-JUN-17	R3754885
<b>Total Metals</b>							
Arsenic (As)-Total	0.00013		0.00010	mg/L	21-JUN-17	24-JUN-17	R3755649
Calcium (Ca)-Total	59.0		0.050	mg/L	21-JUN-17	24-JUN-17	R3755649
Cobalt (Co)-Total	0.00017		0.00010	mg/L	21-JUN-17	24-JUN-17	R3755649
Copper (Cu)-Total	0.0360		0.00050	mg/L	21-JUN-17	24-JUN-17	R3755649
Iron (Fe)-Total	0.054		0.010	mg/L	21-JUN-17	24-JUN-17	R3755649
Lead (Pb)-Total	<0.000050		0.000050	mg/L	21-JUN-17	24-JUN-17	R3755649
Magnesium (Mg)-Total	15.3		0.0050	mg/L	21-JUN-17	24-JUN-17	R3755649
Nickel (Ni)-Total	0.0947		0.00050	mg/L	21-JUN-17	24-JUN-17	R3755649
Potassium (K)-Total	3.65		0.050	mg/L	21-JUN-17	24-JUN-17	R3755649
Sodium (Na)-Total	1.78		0.050	mg/L	21-JUN-17	24-JUN-17	R3755649
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	21-JUN-17	24-JUN-17	R3755649
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					28-JUN-17	R3758588
Calcium (Ca)-Dissolved	62.2		0.050	mg/L	28-JUN-17	28-JUN-17	R3758697
Magnesium (Mg)-Dissolved	15.5		0.0050	mg/L	28-JUN-17	28-JUN-17	R3758697
L1942553-8 SW-DUP-L SAMPLE Sampled By: Client on 14-JUN-17 @ 10:15 Matrix: Surface Water							
<b>Physical Tests</b>							
Conductivity (EC)	339		3.0	uS/cm		16-JUN-17	R3749839

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1942553-8 SW-DUP-L SAMPLE Sampled By: Client on 14-JUN-17 @ 10:15 Matrix: Surface Water							
<b>Physical Tests</b>							
Hardness (as CaCO <sub>3</sub> )	177		0.50	mg/L		29-JUN-17	
pH	7.80		0.10	pH		16-JUN-17	R3749839
Total Suspended Solids	<2.0		2.0	mg/L		20-JUN-17	R3752622
Total Dissolved Solids	219		20	mg/L		21-JUN-17	R3753474
<b>Anions and Nutrients</b>							
Acceptable % Difference	PASS					29-JUN-17	
Alkalinity, Total (as CaCO <sub>3</sub> )	96.1		2.0	mg/L		16-JUN-17	R3749839
Chloride (Cl)	0.41		0.10	mg/L		17-JUN-17	R3750153
Sulfate (SO <sub>4</sub> )	86.4		0.30	mg/L		17-JUN-17	R3750153
Anion Sum	3.73			meq/L		29-JUN-17	
Cation Sum	3.67			meq/L		29-JUN-17	
Cation - Anion Balance	-0.8			%		29-JUN-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	LAB					15-JUN-17	R3748495
Dissolved Organic Carbon	5.9		1.0	mg/L	15-JUN-17	21-JUN-17	R3754885
<b>Total Metals</b>							
Arsenic (As)-Total	0.00016		0.00010	mg/L	21-JUN-17	24-JUN-17	R3755649
Calcium (Ca)-Total	51.8		0.050	mg/L	21-JUN-17	24-JUN-17	R3755649
Cobalt (Co)-Total	0.00014		0.00010	mg/L	21-JUN-17	24-JUN-17	R3755649
Copper (Cu)-Total	0.00221		0.00050	mg/L	21-JUN-17	24-JUN-17	R3755649
Iron (Fe)-Total	0.032		0.010	mg/L	21-JUN-17	24-JUN-17	R3755649
Lead (Pb)-Total	<0.000050		0.000050	mg/L	21-JUN-17	24-JUN-17	R3755649
Magnesium (Mg)-Total	11.2		0.0050	mg/L	21-JUN-17	24-JUN-17	R3755649
Nickel (Ni)-Total	0.0296		0.00050	mg/L	21-JUN-17	24-JUN-17	R3755649
Potassium (K)-Total	2.19		0.050	mg/L	21-JUN-17	24-JUN-17	R3755649
Sodium (Na)-Total	1.53		0.050	mg/L	21-JUN-17	24-JUN-17	R3755649
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	21-JUN-17	24-JUN-17	R3755649
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					28-JUN-17	R3758588
Calcium (Ca)-Dissolved	52.1		0.050	mg/L	28-JUN-17	28-JUN-17	R3758697
Magnesium (Mg)-Dissolved	11.4		0.0050	mg/L	28-JUN-17	28-JUN-17	R3758697
L1942553-9 SW - TRIP BLANK Sampled By: Client on 13-JUN-17 @ 00:01 Matrix: Surface Water							
<b>Physical Tests</b>							
Conductivity (EC)	<3.0		3.0	uS/cm		16-JUN-17	R3749839
Hardness (as CaCO <sub>3</sub> )	<0.50		0.50	mg/L		29-JUN-17	
pH	5.53		0.10	pH		16-JUN-17	R3749839
Total Suspended Solids	<2.0		2.0	mg/L		17-JUN-17	R3750173
Total Dissolved Solids	<10		10	mg/L		18-JUN-17	R3750958
<b>Anions and Nutrients</b>							
Acceptable % Difference	PASS					29-JUN-17	

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1942553-9 SW - TRIP BLANK Sampled By: Client on 13-JUN-17 @ 00:01 Matrix: Surface Water							
<b>Anions and Nutrients</b>							
Alkalinity, Total (as CaCO3)	<2.0		2.0	mg/L		16-JUN-17	R3749839
Chloride (Cl)	<0.10		0.10	mg/L		17-JUN-17	R3750153
Sulfate (SO4)	<0.30		0.30	mg/L		17-JUN-17	R3750153
Anion Sum	<0.10			meq/L		29-JUN-17	
Cation Sum	<0.10			meq/L		29-JUN-17	
Cation - Anion Balance	0.0			%		29-JUN-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	FIELD					19-JUN-17	R3751162
Dissolved Organic Carbon	<1.0		1.0	mg/L	19-JUN-17	19-JUN-17	R3751517
<b>Total Metals</b>							
Arsenic (As)-Total	<0.00010		0.00010	mg/L	21-JUN-17	25-JUN-17	R3755899
Calcium (Ca)-Total	<0.050		0.050	mg/L	21-JUN-17	25-JUN-17	R3755899
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	21-JUN-17	25-JUN-17	R3755899
Copper (Cu)-Total	<0.00050		0.00050	mg/L	21-JUN-17	25-JUN-17	R3755899
Iron (Fe)-Total	<0.010		0.010	mg/L	21-JUN-17	25-JUN-17	R3755899
Lead (Pb)-Total	<0.000050		0.000050	mg/L	21-JUN-17	25-JUN-17	R3755899
Magnesium (Mg)-Total	<0.0050		0.0050	mg/L	21-JUN-17	25-JUN-17	R3755899
Nickel (Ni)-Total	<0.00050		0.00050	mg/L	21-JUN-17	25-JUN-17	R3755899
Potassium (K)-Total	<0.050		0.050	mg/L	21-JUN-17	25-JUN-17	R3755899
Sodium (Na)-Total	<0.050		0.050	mg/L	21-JUN-17	25-JUN-17	R3755899
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	21-JUN-17	25-JUN-17	R3755899
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					25-JUN-17	R3758588
Dissolved Metals Filtration Location	FIELD					28-JUN-17	R3758588
Calcium (Ca)-Dissolved	<0.050		0.050	mg/L	28-JUN-17	28-JUN-17	R3758697
Magnesium (Mg)-Dissolved	<0.0050		0.0050	mg/L	28-JUN-17	28-JUN-17	R3758697

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

## Reference Information

### QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Dissolved Organic Carbon	MS-B	L1942553-9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1942553-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1942553-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1942553-1, -2, -3, -4, -5, -6, -7, -8, -9

### Sample Parameter Qualifier key listed:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

### Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-TB	Water	Alkalinity	APHA 2320B modified This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
CL-L-IC-N-TB	Water	Chloride in Water by IC (Low Level)	EPA 300.1 (mod) Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
DOC-TB	Water	Dissolved Organic Carbon	APHA 5310 B modified Water samples are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis. Analyzed by converting all carbonaceous material to carbon dioxide (CO2) by catalytic combustion at 850°C. The CO2 generated is measured by an infrared detector and is directly proportional to concentration of carbonaceous material in the sample
EC-TITR-TB	Water	Conductivity	APHA 2510 B This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.
HARDNESS-CALC-TB	Water	Hardness (as CaCO3)	CALCULATION
IONBALANCE-TB	Water	Ion Balance Calculation	APHA 1030 E - CALCULATION Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.  Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:  Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]
MET-D-CCMS-TB	Water	Dissolved Metals in Water by CRC	APHA 3030B/6020A (mod) Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
MET-T-CCMS-TB	Water	Total Metals in Water by CRC	EPA 200.2/6020A (mod) Water samples are digested with nitric and perchloric acids, and analyzed by CRC ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
PH-TITR-TB	Water	pH	APHA 4500-H This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode
SO4-IC-N-TB	Water	Sulfate in Water by IC	EPA 300.1 (mod) Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
TDS-TB	Water	Total Dissolved Solids	APHA 2540 C (modified) Aqueous matrices are analyzed using gravimetry and evaporation
TSS-TB	Water	Total Suspended Solids	APHA 2540 D (modified) Aqueous matrices are analyzed using gravimetry

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

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

Laboratory Definition Code	Laboratory Location
TB	ALS ENVIRONMENTAL - THUNDER BAY, ONTARIO, CANADA

## Reference Information

### Chain of Custody Numbers:

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#### **GLOSSARY OF REPORT TERMS**

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

*mg/kg - milligrams per kilogram based on dry weight of sample*

*mg/kg ww - milligrams per kilogram based on wet weight of sample*

*mg/kg lwt - milligrams per kilogram based on lipid weight of sample*

*mg/L - unit of concentration based on volume, parts per million.*

*< - Less than.*

*D.L. - The reporting limit.*

*N/A - Result not available. Refer to qualifier code and definition for explanation.*

*Test results reported relate only to the samples as received by the laboratory.*

*UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.*

*Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.*





## Quality Control Report

Workorder: L1942553

Report Date: 29-JUN-17

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Client: PARKS ENVIRONMENTAL INC.



Contact: Derek Parks

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>ALK-TITR-TB</b>		<b>Water</b>						
<b>Batch</b>	<b>R3749839</b>							
<b>WG2549966-2</b>	<b>LCS</b>							
Alkalinity, Total (as CaCO3)			102.6		%		85-115	16-JUN-17
<b>WG2549966-5</b>	<b>LCS</b>							
Alkalinity, Total (as CaCO3)			100.5		%		85-115	16-JUN-17
<b>WG2549966-8</b>	<b>LCS</b>							
Alkalinity, Total (as CaCO3)			100.7		%		85-115	16-JUN-17
<b>WG2549966-1</b>	<b>MB</b>							
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	16-JUN-17
<b>WG2549966-4</b>	<b>MB</b>							
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	16-JUN-17
<b>WG2549966-7</b>	<b>MB</b>							
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	16-JUN-17
<b>CL-L-IC-N-TB</b>		<b>Water</b>						
<b>Batch</b>	<b>R3750153</b>							
<b>WG2551075-11</b>	<b>DUP</b>	<b>L1942553-8</b>						
Chloride (Cl)		0.41	0.43		mg/L	3.4	20	17-JUN-17
<b>WG2551075-10</b>	<b>LCS</b>							
Chloride (Cl)			97.9		%		90-110	17-JUN-17
<b>WG2551075-14</b>	<b>LCS</b>							
Chloride (Cl)			96.5		%		90-110	17-JUN-17
<b>WG2551075-13</b>	<b>MB</b>							
Chloride (Cl)			<0.10		mg/L		0.1	17-JUN-17
<b>WG2551075-9</b>	<b>MB</b>							
Chloride (Cl)			<0.10		mg/L		0.1	17-JUN-17
<b>WG2551075-12</b>	<b>MS</b>	<b>L1942553-8</b>						
Chloride (Cl)			97.2		%		75-125	17-JUN-17
<b>DOC-TB</b>		<b>Water</b>						
<b>Batch</b>	<b>R3751517</b>							
<b>WG2549286-2</b>	<b>LCS</b>							
Dissolved Organic Carbon			106.7		%		80-120	19-JUN-17
<b>WG2552002-2</b>	<b>LCS</b>							
Dissolved Organic Carbon			104.9		%		80-120	19-JUN-17
<b>WG2549286-1</b>	<b>MB</b>							
Dissolved Organic Carbon			<1.0		mg/L		1	19-JUN-17
<b>WG2552002-1</b>	<b>MB</b>							
Dissolved Organic Carbon			<1.0		mg/L		1	19-JUN-17
<b>EC-TITR-TB</b>		<b>Water</b>						

## Quality Control Report

Workorder: L1942553

Report Date: 29-JUN-17

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>EC-TITR-TB</b>		<b>Water</b>						
<b>Batch</b>	<b>R3749839</b>							
<b>WG2549966-2</b>	<b>LCS</b>							
Conductivity (EC)			97.8		%		90-110	16-JUN-17
<b>WG2549966-5</b>	<b>LCS</b>							
Conductivity (EC)			96.0		%		90-110	16-JUN-17
<b>WG2549966-8</b>	<b>LCS</b>							
Conductivity (EC)			93.5		%		90-110	16-JUN-17
<b>WG2549966-1</b>	<b>MB</b>							
Conductivity (EC)			<3.0		uS/cm		3	16-JUN-17
<b>WG2549966-4</b>	<b>MB</b>							
Conductivity (EC)			<3.0		uS/cm		3	16-JUN-17
<b>WG2549966-7</b>	<b>MB</b>							
Conductivity (EC)			<3.0		uS/cm		3	16-JUN-17
<b>MET-D-CCMS-TB</b>		<b>Water</b>						
<b>Batch</b>	<b>R3758697</b>							
<b>WG2556463-2</b>	<b>LCS</b>							
Calcium (Ca)-Dissolved			101.4		%		80-120	28-JUN-17
Magnesium (Mg)-Dissolved			105.3		%		80-120	28-JUN-17
<b>WG2556463-1</b>	<b>MB</b>							
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	28-JUN-17
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	28-JUN-17
<b>MET-T-CCMS-TB</b>		<b>Water</b>						
<b>Batch</b>	<b>R3755498</b>							
<b>WG2553234-2</b>	<b>LCS</b>							
Arsenic (As)-Total			101.3		%		80-120	23-JUN-17
Calcium (Ca)-Total			98.3		%		80-120	23-JUN-17
Cobalt (Co)-Total			102.6		%		80-120	23-JUN-17
Copper (Cu)-Total			100.0		%		80-120	23-JUN-17
Iron (Fe)-Total			100.1		%		80-120	23-JUN-17
Lead (Pb)-Total			106.7		%		80-120	23-JUN-17
Magnesium (Mg)-Total			103.5		%		80-120	23-JUN-17
Nickel (Ni)-Total			100.9		%		80-120	23-JUN-17
Potassium (K)-Total			100.5		%		80-120	23-JUN-17
Sodium (Na)-Total			103.7		%		80-120	23-JUN-17
Zinc (Zn)-Total			95.3		%		80-120	23-JUN-17
<b>WG2553234-1</b>	<b>MB</b>							
Arsenic (As)-Total			<0.00010		mg/L		0.0001	23-JUN-17
Calcium (Ca)-Total			<0.050		mg/L		0.05	23-JUN-17



## Quality Control Report

Workorder: L1942553

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>MET-T-CCMS-TB</b>		<b>Water</b>						
<b>Batch R3755498</b>								
<b>WG2553234-1 MB</b>								
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	23-JUN-17
Copper (Cu)-Total			<0.00050		mg/L		0.0005	23-JUN-17
Iron (Fe)-Total			<0.010		mg/L		0.01	23-JUN-17
Lead (Pb)-Total			<0.000050		mg/L		0.00005	23-JUN-17
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	23-JUN-17
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	23-JUN-17
Potassium (K)-Total			<0.050		mg/L		0.05	23-JUN-17
Sodium (Na)-Total			<0.050		mg/L		0.05	23-JUN-17
Zinc (Zn)-Total			<0.0030		mg/L		0.003	23-JUN-17
<b>Batch R3755649</b>								
<b>WG2553234-6 LCS</b>								
Arsenic (As)-Total			98.4		%		80-120	24-JUN-17
Calcium (Ca)-Total			98.8		%		80-120	24-JUN-17
Cobalt (Co)-Total			97.4		%		80-120	24-JUN-17
Copper (Cu)-Total			95.4		%		80-120	24-JUN-17
Iron (Fe)-Total			100.1		%		80-120	24-JUN-17
Lead (Pb)-Total			102.4		%		80-120	24-JUN-17
Magnesium (Mg)-Total			104.7		%		80-120	24-JUN-17
Nickel (Ni)-Total			95.8		%		80-120	24-JUN-17
Potassium (K)-Total			102.5		%		80-120	24-JUN-17
Sodium (Na)-Total			102.0		%		80-120	24-JUN-17
Zinc (Zn)-Total			91.2		%		80-120	24-JUN-17
<b>WG2553234-5 MB</b>								
Arsenic (As)-Total			<0.00010		mg/L		0.0001	24-JUN-17
Calcium (Ca)-Total			<0.050		mg/L		0.05	24-JUN-17
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	24-JUN-17
Copper (Cu)-Total			<0.00050		mg/L		0.0005	24-JUN-17
Iron (Fe)-Total			<0.010		mg/L		0.01	24-JUN-17
Lead (Pb)-Total			<0.000050		mg/L		0.00005	24-JUN-17
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	24-JUN-17
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	24-JUN-17
Potassium (K)-Total			<0.050		mg/L		0.05	24-JUN-17
Sodium (Na)-Total			<0.050		mg/L		0.05	24-JUN-17
Zinc (Zn)-Total			<0.0030		mg/L		0.003	24-JUN-17
<b>Water</b>								

## Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>PH-TITR-TB</b>		<b>Water</b>						
<b>Batch</b>	<b>R3749839</b>							
<b>WG2549966-2</b>	<b>LCS</b>							
pH			6.02		pH		5.9-6.1	16-JUN-17
<b>WG2549966-5</b>	<b>LCS</b>							
pH			6.01		pH		5.9-6.1	16-JUN-17
<b>WG2549966-8</b>	<b>LCS</b>							
pH			6.01		pH		5.9-6.1	16-JUN-17
<b>SO4-IC-N-TB</b>		<b>Water</b>						
<b>Batch</b>	<b>R3750153</b>							
<b>WG2551075-11</b>	<b>DUP</b>	<b>L1942553-8</b>						
Sulfate (SO4)		86.4	87.4		mg/L	1.2	20	17-JUN-17
<b>WG2551075-10</b>	<b>LCS</b>							
Sulfate (SO4)			102.4		%		90-110	17-JUN-17
<b>WG2551075-14</b>	<b>LCS</b>							
Sulfate (SO4)			100.5		%		90-110	17-JUN-17
<b>WG2551075-13</b>	<b>MB</b>							
Sulfate (SO4)			<0.30		mg/L		0.3	17-JUN-17
<b>WG2551075-9</b>	<b>MB</b>							
Sulfate (SO4)			<0.30		mg/L		0.3	17-JUN-17
<b>WG2551075-12</b>	<b>MS</b>	<b>L1942553-8</b>						
Sulfate (SO4)			101.2		%		75-125	17-JUN-17
<b>TDS-TB</b>		<b>Water</b>						
<b>Batch</b>	<b>R3750958</b>							
<b>WG2551167-2</b>	<b>LCS</b>							
Total Dissolved Solids			99.9		%		85-115	18-JUN-17
<b>WG2551167-1</b>	<b>MB</b>							
Total Dissolved Solids			<10		mg/L		10	18-JUN-17
<b>Batch</b>	<b>R3751464</b>							
<b>WG2551659-2</b>	<b>LCS</b>							
Total Dissolved Solids			103.9		%		85-115	19-JUN-17
<b>WG2551659-1</b>	<b>MB</b>							
Total Dissolved Solids			<10		mg/L		10	19-JUN-17
<b>Batch</b>	<b>R3751639</b>							
<b>WG2552009-2</b>	<b>LCS</b>							
Total Dissolved Solids			98.8		%		85-115	19-JUN-17
<b>WG2552009-1</b>	<b>MB</b>							
Total Dissolved Solids			<10		mg/L		10	19-JUN-17



## Quality Control Report

Workorder: L1942553

Report Date: 29-JUN-17

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>TDS-TB</b>		<b>Water</b>						
<b>Batch</b>	<b>R3752139</b>							
<b>WG2552533-2</b>	<b>LCS</b>							
Total Dissolved Solids			98.2		%		85-115	20-JUN-17
<b>WG2552533-1</b>	<b>MB</b>							
Total Dissolved Solids			<10		mg/L		10	20-JUN-17
<b>Batch</b>	<b>R3753474</b>							
<b>WG2553632-2</b>	<b>LCS</b>							
Total Dissolved Solids			101.4		%		85-115	21-JUN-17
<b>WG2553632-1</b>	<b>MB</b>							
Total Dissolved Solids			<10		mg/L		10	21-JUN-17
<b>TSS-TB</b>		<b>Water</b>						
<b>Batch</b>	<b>R3750173</b>							
<b>WG2551047-2</b>	<b>LCS</b>							
Total Suspended Solids			98.7		%		85-115	17-JUN-17
<b>WG2551047-1</b>	<b>MB</b>							
Total Suspended Solids			<2.0		mg/L		2	17-JUN-17
<b>Batch</b>	<b>R3750999</b>							
<b>WG2551272-2</b>	<b>LCS</b>							
Total Suspended Solids			99.4		%		85-115	18-JUN-17
<b>WG2551272-1</b>	<b>MB</b>							
Total Suspended Solids			<2.0		mg/L		2	18-JUN-17
<b>Batch</b>	<b>R3751166</b>							
<b>WG2552111-2</b>	<b>LCS</b>							
Total Suspended Solids			93.1		%		85-115	19-JUN-17
<b>WG2552111-1</b>	<b>MB</b>							
Total Suspended Solids			<2.0		mg/L		2	19-JUN-17
<b>Batch</b>	<b>R3752622</b>							
<b>WG2552815-2</b>	<b>LCS</b>							
Total Suspended Solids			96.0		%		85-115	20-JUN-17
<b>WG2552815-1</b>	<b>MB</b>							
Total Suspended Solids			<2.0		mg/L		2	20-JUN-17

# Quality Control Report

Workorder: L1942553

Report Date: 29-JUN-17

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## Legend:

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

## Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

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

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

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



Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878



L1942553-COFC

COC Number: 15 -

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www.alsglobal.com

<b>Report To</b> Contact and company name below will appear on the final report Company: Parks Environmental Inc. Contact: Derek Parks Phone: [Redacted] Company address below will appear on the final report Street: [Redacted] City/Province: [Redacted] Postal Code: [Redacted]		<b>Report Format / Distribution</b> Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL) Quality Control (QC) Report with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX Email 1 or Fax: [Redacted] Email 2: [Redacted] Email 3: [Redacted]		Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply <b>Regular [R]</b> <input type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply <b>PROPERTY (Business Days)</b> 4 day [P4] <input type="checkbox"/> 3 day [P3] <input type="checkbox"/> 2 day [P2] <input type="checkbox"/> <b>EMERGENCY</b> 1 Business day [E1] <input type="checkbox"/> Same Day, Weekend or Statutory holiday [E0] <input type="checkbox"/> Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm For tests that can not be performed according to the service level selected, you will be contacted.																														
<b>Invoice To</b> Same as Report To <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO Copy of Invoice with Report <input type="checkbox"/> YES <input type="checkbox"/> NO Company: [Redacted] Contact: [Redacted]		<b>Invoice Distribution</b> Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX Email 1 or Fax: [Redacted] Email 2: [Redacted]		<b>Analysis Request</b> Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below <table border="1"> <thead> <tr> <th>Parameter</th> <th>F</th> <th>P</th> <th>F/P</th> <th>Number of Containers</th> </tr> </thead> <tbody> <tr> <td>Alkalinity, Cl, DOC, Conductivity</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Hardness, Ion Balance, Dissolved Ca, Mg</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total Metals (As, Ca, Co, Cu, Fe, K, Mg, Na, Ni, Pb, Zn)</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>pH, SO<sub>4</sub>, TDS, TSS</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>						Parameter	F	P	F/P	Number of Containers	Alkalinity, Cl, DOC, Conductivity					Hardness, Ion Balance, Dissolved Ca, Mg					Total Metals (As, Ca, Co, Cu, Fe, K, Mg, Na, Ni, Pb, Zn)					pH, SO <sub>4</sub> , TDS, TSS				
Parameter	F	P	F/P	Number of Containers																														
Alkalinity, Cl, DOC, Conductivity																																		
Hardness, Ion Balance, Dissolved Ca, Mg																																		
Total Metals (As, Ca, Co, Cu, Fe, K, Mg, Na, Ni, Pb, Zn)																																		
pH, SO <sub>4</sub> , TDS, TSS																																		
<b>Project Information</b> ALS Account # / Quote #: Q61921 Job #: [Redacted] PO / AFE: [Redacted] LSD: Thiery		<b>Oil and Gas Required Fields (client use)</b> AFE/Cost Center: [Redacted] PO#: [Redacted] Major/Minor Code: [Redacted] Routing Code: [Redacted] Requisitioner: [Redacted] Location: [Redacted]																																
ALS Lab Work Order # (lab use only) <b>L1942553</b> ALS Contact: [Redacted] Sampler: [Redacted]																																		
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Alkalinity, Cl, DOC, Conductivity	Hardness, Ion Balance, Dissolved Ca, Mg	Total Metals (As, Ca, Co, Cu, Fe, K, Mg, Na, Ni, Pb, Zn)	pH, SO <sub>4</sub> , TDS, TSS	Number of Containers																									
2-MW	No well found	---	---	Ground Water	x	x	x	x																										
4-MW	No well found	---	---	Ground Water	x	x	x	x																										
SW-1	No Flow	---	---	Surface Water	x	x	x	x																										
<del>SW-2</del>		13/June/17	1316hrs	Surface Water	x	x	x	x																										
SW-3		13/June/17	2 pm	Surface Water	x	x	x	x																										
SW-4	No Flow	---	---	Surface Water	x	x	x	x																										
SW-7		13/June/17	1440hrs	Surface Water	x	x	x	x																										
SW-8		13/June/17	1620hrs	Surface Water	x	x	x	x																										
SW-9		13/June/17	0930hrs	Surface Water	x	x	x	x																										
SW-10		14/June/17	1015hrs	Surface Water	x	x	x	x																										
SW-11-S		13/June/17	1009hrs	Surface Water	x	x	x	x																										
<del>SW-12</del>	Seepage (Flow) below SW-8	13/June/17	1645hrs	Surface Water	x	x	x	x																										
<b>Drinking Water (DW) Samples (client use)</b> Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO Are samples for human drinking water use? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)		<b>SAMPLE CONDITION AS RECEIVED (lab use only)</b> Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/> Ice Packs <input checked="" type="checkbox"/> Ice Cubes <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/> Cooling Initiated <input checked="" type="checkbox"/> INITIAL COOLER TEMPERATURES °C: 7.5 FINAL COOLER TEMPERATURES °C:																														
<b>SHIPMENT RELEASE (client use)</b> Released by: [Signature] Date: _____ Time: _____		<b>INITIAL SHIPMENT RECEPTION (lab use only)</b> Received by: [Signature] Date: June 17 Time: 10:50		<b>FINAL SHIPMENT RECEPTION (lab use only)</b> Received by: _____ Date: _____ Time: _____																														

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System please submit using an Authorized DW COC form

JPR



## Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878



L1942553-COFC

COC Number: 15 -

2 of 2

Page 2 of 3

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Report To		Report Format / Distribution		Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply																																																																			
Company:	Parks Environmental Inc.	Select Report Format:	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)	Regular (R) <input type="checkbox"/> Standard TAT If received by 3 pm - business days - no surcharges apply																																																																			
Contact:	Derek Paiks	Quality Control (QC) Report with Report	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	PRIORITY (Business Day) 4 day (P4) <input type="checkbox"/> 3 day (P3) <input type="checkbox"/> 2 day (P2) <input type="checkbox"/>	EMERGENCY 1 Business day (E1) <input type="checkbox"/> Same Day, Weekend or Statutory holiday (E0) <input type="checkbox"/>																																																																		
Phone:	[REDACTED]	<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm																																																																				
Company address below will appear on the final report		Select Distribution:	<input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			For tests that can not be performed according to the service level selected, you will be contacted.																																																																	
Street:	[REDACTED]	Email 1 or Fax:	[REDACTED]	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th colspan="13">Analysis Request</th> <th rowspan="5" style="writing-mode: vertical-rl; transform: rotate(180deg);">Number of Containers</th> </tr> <tr> <th colspan="13">Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below</th> </tr> <tr> <th style="writing-mode: vertical-rl; transform: rotate(180deg);">Alkalinity, Cl, DOC, Conductivity</th> <th style="writing-mode: vertical-rl; transform: rotate(180deg);">Hardness, Ion Balance, Dissolved Ca, Mg</th> <th style="writing-mode: vertical-rl; transform: rotate(180deg);">Total Metals (As, Ca, Co, Cu, Fe, K, Mg, Na, Ni, Pb, Zn)</th> <th style="writing-mode: vertical-rl; transform: rotate(180deg);">pH, SO4, TDS, TSS</th> <th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th> </tr> </thead> <tbody> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> </tbody> </table>		Analysis Request													Number of Containers	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below													Alkalinity, Cl, DOC, Conductivity	Hardness, Ion Balance, Dissolved Ca, Mg	Total Metals (As, Ca, Co, Cu, Fe, K, Mg, Na, Ni, Pb, Zn)	pH, SO4, TDS, TSS																																			
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Postal Code:	[REDACTED]	Email 3:	[REDACTED]																																																																				
Invoice To	Same as Report To <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	Invoice Distribution		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below																																																																			
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	SW-11-B			Surface Water	x	x	x			x																																																													
	SW- DUP - L Sample	14/June/17	1015hrs	Surface Water	x	x	x			x																																																													
	SW - Trip Blank			Surface Water	x	x	x			x																																																													
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PARKS ENVIRONMENTAL INC.  
ATTN: Derek Parks

Date Received: 31-AUG-17  
Report Date: 04-OCT-17 15:27 (MT)  
Version: FINAL

Client Phone: [REDACTED]

## Certificate of Analysis

Lab Work Order #: L1984659  
Project P.O. #: NOT SUBMITTED  
Job Reference:  
C of C Numbers:  
Legal Site Desc: Thiery

Christine Paradis  
Project Manager

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ADDRESS: 1081 Barton Street, Thunder Bay, ON P7B 5N3 Canada | Phone: +1 807 623 6463 | Fax: +1 807 623 7598  
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## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1984659-1 SW-8 Sampled By: CLIENT on 31-AUG-17 @ 09:30 Matrix: Surface Water							
<b>Physical Tests</b>							
Conductivity (EC)	465		3.0	uS/cm		01-SEP-17	R3817080
Hardness (as CaCO3)	250		0.50	mg/L		07-SEP-17	
pH	7.67		0.10	pH		01-SEP-17	R3817080
Total Suspended Solids	<2.0		2.0	mg/L		01-SEP-17	R3817459
Total Dissolved Solids	302		20	mg/L		05-SEP-17	R3820886
<b>Anions and Nutrients</b>							
Alkalinity, Total (as CaCO3)	79.2		2.0	mg/L		01-SEP-17	R3817080
Chloride (Cl)	0.26		0.10	mg/L		01-SEP-17	R3817393
Sulfate (SO4)	169		0.30	mg/L		01-SEP-17	R3817393
Anion Sum	5.10			meq/L		07-SEP-17	
Cation Sum	5.20			meq/L		07-SEP-17	
Cation - Anion Balance	0.9			%		07-SEP-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	LAB					01-SEP-17	R3816796
Dissolved Organic Carbon	2.4		1.0	mg/L	01-SEP-17	01-SEP-17	R3819545
<b>Bioassays</b>							
Daphnia Magna - Pass/Fail	Attachment					02-SEP-17	R3836500
Trout Bioassay - Pass/Fail	Attachment					02-SEP-17	R3836500
<b>Total Metals</b>							
Arsenic (As)-Total	0.00012		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Calcium (Ca)-Total	65.8		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Cobalt (Co)-Total	0.00038		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Copper (Cu)-Total	0.00616		0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Iron (Fe)-Total	0.011		0.010	mg/L	01-SEP-17	01-SEP-17	R3817726
Lead (Pb)-Total	<0.000050		0.000050	mg/L	01-SEP-17	01-SEP-17	R3817726
Magnesium (Mg)-Total	20.4		0.0050	mg/L	01-SEP-17	01-SEP-17	R3817726
Nickel (Ni)-Total	0.105		0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Potassium (K)-Total	4.46		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Sodium (Na)-Total	2.13		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	01-SEP-17	01-SEP-17	R3817726
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					06-SEP-17	R3820759
Calcium (Ca)-Dissolved	66.9		0.050	mg/L	06-SEP-17	06-SEP-17	R3821496
Magnesium (Mg)-Dissolved	20.0		0.0050	mg/L	06-SEP-17	06-SEP-17	R3821496
L1984659-2 SW-9 Sampled By: CLIENT on 30-AUG-17 @ 18:20 Matrix: Surface Water							
<b>Physical Tests</b>							
Conductivity (EC)	330		3.0	uS/cm		01-SEP-17	R3817080
Hardness (as CaCO3)	162		0.50	mg/L		03-SEP-17	
pH	8.57		0.10	pH		01-SEP-17	R3817080
Total Suspended Solids	<2.0		2.0	mg/L		01-SEP-17	R3817459

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1984659-2 SW-9 Sampled By: CLIENT on 30-AUG-17 @ 18:20 Matrix: Surface Water							
<b>Physical Tests</b>							
Total Dissolved Solids	221		13	mg/L		01-SEP-17	R3817513
<b>Anions and Nutrients</b>							
Alkalinity, Total (as CaCO3)	69.9		2.0	mg/L		01-SEP-17	R3817080
Chloride (Cl)	0.22		0.10	mg/L		01-SEP-17	R3817393
Sulfate (SO4)	107		0.30	mg/L		01-SEP-17	R3817393
Anion Sum	3.63			meq/L		03-SEP-17	
Cation Sum	3.37			meq/L		03-SEP-17	
Cation - Anion Balance	-3.8			%		03-SEP-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	LAB					01-SEP-17	R3816796
Dissolved Organic Carbon	6.4		1.0	mg/L	01-SEP-17	01-SEP-17	R3819545
<b>Total Metals</b>							
Arsenic (As)-Total	0.00027		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Calcium (Ca)-Total	45.5		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Cobalt (Co)-Total	0.00019		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Copper (Cu)-Total	0.00187		0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Iron (Fe)-Total	0.024		0.010	mg/L	01-SEP-17	01-SEP-17	R3817726
Lead (Pb)-Total	<0.000050		0.000050	mg/L	01-SEP-17	01-SEP-17	R3817726
Magnesium (Mg)-Total	13.4		0.0050	mg/L	01-SEP-17	01-SEP-17	R3817726
Nickel (Ni)-Total	0.0257		0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Potassium (K)-Total	2.44		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Sodium (Na)-Total	1.92		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	01-SEP-17	01-SEP-17	R3817726
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					01-SEP-17	R3817088
Calcium (Ca)-Dissolved	42.9		0.050	mg/L	01-SEP-17	01-SEP-17	R3817727
Magnesium (Mg)-Dissolved	13.3		0.0050	mg/L	01-SEP-17	01-SEP-17	R3817727
L1984659-3 SW-10 Sampled By: CLIENT on 31-AUG-17 @ 08:30 Matrix: Surface Water							
<b>Physical Tests</b>							
Conductivity (EC)	348		3.0	uS/cm		01-SEP-17	R3817080
Hardness (as CaCO3)	178		0.50	mg/L		03-SEP-17	
pH	7.50		0.10	pH		01-SEP-17	R3817080
Total Suspended Solids	4.4		2.0	mg/L		01-SEP-17	R3817459
Total Dissolved Solids	225		13	mg/L		05-SEP-17	R3820886
<b>Anions and Nutrients</b>							
Alkalinity, Total (as CaCO3)	85.5		2.0	mg/L		01-SEP-17	R3817080
Chloride (Cl)	0.17		0.10	mg/L		01-SEP-17	R3817393
Sulfate (SO4)	104		0.30	mg/L		01-SEP-17	R3817393
Anion Sum	3.87			meq/L		03-SEP-17	
Cation Sum	3.67			meq/L		03-SEP-17	

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1984659-3 SW-10 Sampled By: CLIENT on 31-AUG-17 @ 08:30 Matrix: Surface Water							
<b>Anions and Nutrients</b>							
Cation - Anion Balance	-2.7			%		03-SEP-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	LAB					01-SEP-17	R3816796
Dissolved Organic Carbon	7.6		1.0	mg/L	01-SEP-17	01-SEP-17	R3819545
<b>Total Metals</b>							
Arsenic (As)-Total	0.00025		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Calcium (Ca)-Total	50.8		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Cobalt (Co)-Total	0.00015		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Copper (Cu)-Total	0.00118		0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Iron (Fe)-Total	0.047		0.010	mg/L	01-SEP-17	01-SEP-17	R3817726
Lead (Pb)-Total	<0.000050		0.000050	mg/L	01-SEP-17	01-SEP-17	R3817726
Magnesium (Mg)-Total	13.5		0.0050	mg/L	01-SEP-17	01-SEP-17	R3817726
Nickel (Ni)-Total	0.0280		0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Potassium (K)-Total	2.01		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Sodium (Na)-Total	1.78		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	01-SEP-17	01-SEP-17	R3817726
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					01-SEP-17	R3817088
Calcium (Ca)-Dissolved	49.4		0.050	mg/L	01-SEP-17	01-SEP-17	R3817727
Magnesium (Mg)-Dissolved	13.2		0.0050	mg/L	01-SEP-17	01-SEP-17	R3817727
L1984659-4 SW-11-S Sampled By: CLIENT on 30-AUG-17 @ 17:15 Matrix: Surface Water							
<b>Physical Tests</b>							
Conductivity (EC)	82.1		3.0	uS/cm		01-SEP-17	R3817080
Hardness (as CaCO3)	44.2		0.50	mg/L		03-SEP-17	
pH	7.64		0.10	pH		01-SEP-17	R3817080
Total Suspended Solids	2.8		2.0	mg/L		01-SEP-17	R3817459
Total Dissolved Solids	66		10	mg/L		01-SEP-17	R3817513
<b>Anions and Nutrients</b>							
Alkalinity, Total (as CaCO3)	43.5		2.0	mg/L		01-SEP-17	R3817080
Chloride (Cl)	0.13		0.10	mg/L		01-SEP-17	R3817393
Sulfate (SO4)	0.84		0.30	mg/L		01-SEP-17	R3817393
Anion Sum	0.89			meq/L		03-SEP-17	
Cation Sum	0.92			meq/L		03-SEP-17	
Cation - Anion Balance	1.4			%		03-SEP-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	LAB					01-SEP-17	R3816796
Dissolved Organic Carbon	11.6		1.0	mg/L	01-SEP-17	01-SEP-17	R3819545
<b>Total Metals</b>							
Arsenic (As)-Total	0.00047		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Calcium (Ca)-Total	13.9		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1984659-4 SW-11-S Sampled By: CLIENT on 30-AUG-17 @ 17:15 Matrix: Surface Water							
<b>Total Metals</b>							
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Copper (Cu)-Total	<0.00050		0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Iron (Fe)-Total	0.108		0.010	mg/L	01-SEP-17	01-SEP-17	R3817726
Lead (Pb)-Total	<0.000050		0.000050	mg/L	01-SEP-17	01-SEP-17	R3817726
Magnesium (Mg)-Total	2.73		0.0050	mg/L	01-SEP-17	01-SEP-17	R3817726
Nickel (Ni)-Total	<0.00050		0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Potassium (K)-Total	0.372		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Sodium (Na)-Total	0.524		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	01-SEP-17	01-SEP-17	R3817726
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					01-SEP-17	R3817088
Calcium (Ca)-Dissolved	13.4		0.050	mg/L	01-SEP-17	01-SEP-17	R3817727
Magnesium (Mg)-Dissolved	2.63		0.0050	mg/L	01-SEP-17	01-SEP-17	R3817727
L1984659-5 EAST PIT-S Sampled By: CLIENT on 30-AUG-17 @ 15:58 Matrix: Surface Water							
<b>Physical Tests</b>							
Conductivity (EC)	572		3.0	uS/cm		01-SEP-17	R3817080
Hardness (as CaCO3)	300		0.50	mg/L		03-SEP-17	
pH	8.32		0.10	pH		01-SEP-17	R3817080
Total Suspended Solids	2.5		2.0	mg/L		01-SEP-17	R3817459
Total Dissolved Solids	420		20	mg/L		01-SEP-17	R3817513
<b>Anions and Nutrients</b>							
Alkalinity, Total (as CaCO3)	140		2.0	mg/L		01-SEP-17	R3817080
Chloride (Cl)	0.57		0.10	mg/L		01-SEP-17	R3817393
Sulfate (SO4)	191		0.30	mg/L		01-SEP-17	R3817393
Anion Sum	6.81			meq/L		03-SEP-17	
Cation Sum	6.21			meq/L		03-SEP-17	
Cation - Anion Balance	-4.6			%		03-SEP-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	LAB					01-SEP-17	R3816796
Dissolved Organic Carbon	6.6		1.0	mg/L	01-SEP-17	01-SEP-17	R3819545
<b>Total Metals</b>							
Arsenic (As)-Total	0.00018		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Calcium (Ca)-Total	93.2		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Cobalt (Co)-Total	0.00663		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Copper (Cu)-Total	0.150		0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Iron (Fe)-Total	0.190		0.010	mg/L	01-SEP-17	01-SEP-17	R3817726
Lead (Pb)-Total	<0.000050		0.000050	mg/L	01-SEP-17	01-SEP-17	R3817726
Magnesium (Mg)-Total	18.9		0.0050	mg/L	01-SEP-17	01-SEP-17	R3817726
Nickel (Ni)-Total	0.165		0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Potassium (K)-Total	4.70		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1984659-5 EAST PIT-S Sampled By: CLIENT on 30-AUG-17 @ 15:58 Matrix: Surface Water							
<b>Total Metals</b>							
Sodium (Na)-Total	2.27		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Zinc (Zn)-Total	0.0104		0.0030	mg/L	01-SEP-17	01-SEP-17	R3817726
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					01-SEP-17	R3817088
Calcium (Ca)-Dissolved	90.7		0.050	mg/L	01-SEP-17	01-SEP-17	R3817727
Magnesium (Mg)-Dissolved	18.0		0.0050	mg/L	01-SEP-17	01-SEP-17	R3817727
L1984659-6 EAST PIT-M Sampled By: CLIENT on 30-AUG-17 @ 15:45 Matrix: Surface Water							
<b>Physical Tests</b>							
Conductivity (EC)	1360		3.0	uS/cm		01-SEP-17	R3817080
Hardness (as CaCO3)	815		0.50	mg/L		03-SEP-17	
pH	7.08		0.10	pH		01-SEP-17	R3817080
Total Suspended Solids	15.8		2.0	mg/L		01-SEP-17	R3817459
Total Dissolved Solids	1150		20	mg/L		01-SEP-17	R3817513
<b>Anions and Nutrients</b>							
Alkalinity, Total (as CaCO3)	331		2.0	mg/L		01-SEP-17	R3817080
Chloride (Cl)	6.27		0.10	mg/L		01-SEP-17	R3817393
Sulfate (SO4)	573		0.30	mg/L		01-SEP-17	R3817393
Anion Sum	18.7			meq/L		03-SEP-17	
Cation Sum	17.7			meq/L		03-SEP-17	
Cation - Anion Balance	-2.8			%		03-SEP-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	LAB					01-SEP-17	R3816796
Dissolved Organic Carbon	4.7		1.0	mg/L	01-SEP-17	01-SEP-17	R3819545
<b>Total Metals</b>							
Arsenic (As)-Total	0.00020		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Calcium (Ca)-Total	249		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Cobalt (Co)-Total	0.00260		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Copper (Cu)-Total	0.00492		0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Iron (Fe)-Total	13.0		0.010	mg/L	01-SEP-17	01-SEP-17	R3817726
Lead (Pb)-Total	<0.000050		0.000050	mg/L	01-SEP-17	01-SEP-17	R3817726
Magnesium (Mg)-Total	57.4		0.0050	mg/L	01-SEP-17	01-SEP-17	R3817726
Nickel (Ni)-Total	0.0623		0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Potassium (K)-Total	6.76		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Sodium (Na)-Total	13.8		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Zinc (Zn)-Total	0.0037		0.0030	mg/L	01-SEP-17	01-SEP-17	R3817726
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					01-SEP-17	R3817088
Calcium (Ca)-Dissolved	238		0.050	mg/L	01-SEP-17	01-SEP-17	R3817727
Magnesium (Mg)-Dissolved	53.7		0.0050	mg/L	01-SEP-17	01-SEP-17	R3817727
L1984659-7 EAST PIT-B							

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1984659-7 EAST PIT-B Sampled By: CLIENT on 30-AUG-17 @ 15:55 Matrix: Surface Water							
<b>Physical Tests</b>							
Conductivity (EC)	1430		3.0	uS/cm		01-SEP-17	R3817080
Hardness (as CaCO3)	846		0.50	mg/L		03-SEP-17	
pH	6.95		0.10	pH		01-SEP-17	R3817080
Total Suspended Solids	12.8		2.0	mg/L		01-SEP-17	R3817459
Total Dissolved Solids	1220		20	mg/L		01-SEP-17	R3817513
<b>Anions and Nutrients</b>							
Alkalinity, Total (as CaCO3)	341		2.0	mg/L		01-SEP-17	R3817080
Chloride (Cl)	7.09		0.10	mg/L		01-SEP-17	R3817393
Sulfate (SO4)	627		0.30	mg/L		01-SEP-17	R3817393
Anion Sum	20.1			meq/L		03-SEP-17	
Cation Sum	18.6			meq/L		03-SEP-17	
Cation - Anion Balance	-3.8			%		03-SEP-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	LAB					01-SEP-17	R3816796
Dissolved Organic Carbon	5.3		1.0	mg/L	01-SEP-17	01-SEP-17	R3819545
<b>Total Metals</b>							
Arsenic (As)-Total	0.00015		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Calcium (Ca)-Total	257		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Cobalt (Co)-Total	0.00068		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Copper (Cu)-Total	0.00543		0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Iron (Fe)-Total	17.4		0.010	mg/L	01-SEP-17	01-SEP-17	R3817726
Lead (Pb)-Total	<0.000050		0.000050	mg/L	01-SEP-17	01-SEP-17	R3817726
Magnesium (Mg)-Total	58.0		0.0050	mg/L	01-SEP-17	01-SEP-17	R3817726
Nickel (Ni)-Total	0.0161		0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Potassium (K)-Total	8.38		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Sodium (Na)-Total	14.2		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	01-SEP-17	01-SEP-17	R3817726
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					01-SEP-17	R3817088
Calcium (Ca)-Dissolved	249		0.050	mg/L	01-SEP-17	01-SEP-17	R3817727
Magnesium (Mg)-Dissolved	54.4		0.0050	mg/L	01-SEP-17	01-SEP-17	R3817727
L1984659-8 WEST PIT-S Sampled By: CLIENT on 30-AUG-17 @ 14:45 Matrix: Surface Water							
<b>Physical Tests</b>							
Conductivity (EC)	535		3.0	uS/cm		01-SEP-17	R3817080
Hardness (as CaCO3)	265		0.50	mg/L		03-SEP-17	
pH	8.30		0.10	pH		01-SEP-17	R3817080
Total Suspended Solids	<2.0		2.0	mg/L		01-SEP-17	R3817443
Total Dissolved Solids	374		20	mg/L		01-SEP-17	R3817513
<b>Anions and Nutrients</b>							
Alkalinity, Total (as CaCO3)	113		2.0	mg/L		01-SEP-17	R3817080

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1984659-8 WEST PIT-S Sampled By: CLIENT on 30-AUG-17 @ 14:45 Matrix: Surface Water							
<b>Anions and Nutrients</b>							
Chloride (Cl)	1.85		0.10	mg/L		01-SEP-17	R3817393
Sulfate (SO4)	178		0.30	mg/L		01-SEP-17	R3817393
Anion Sum	6.02			meq/L		03-SEP-17	
Cation Sum	5.53			meq/L		03-SEP-17	
Cation - Anion Balance	-4.3			%		03-SEP-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	LAB					01-SEP-17	R3816796
Dissolved Organic Carbon	4.2		1.0	mg/L	01-SEP-17	01-SEP-17	R3819545
<b>Total Metals</b>							
Arsenic (As)-Total	0.00018		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Calcium (Ca)-Total	80.2		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Cobalt (Co)-Total	0.00062		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Copper (Cu)-Total	0.0213		0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Iron (Fe)-Total	0.048		0.010	mg/L	01-SEP-17	01-SEP-17	R3817726
Lead (Pb)-Total	<0.000050		0.000050	mg/L	01-SEP-17	01-SEP-17	R3817726
Magnesium (Mg)-Total	18.7		0.0050	mg/L	01-SEP-17	01-SEP-17	R3817726
Nickel (Ni)-Total	0.128		0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Potassium (K)-Total	3.85		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Sodium (Na)-Total	3.53		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Zinc (Zn)-Total	0.0033		0.0030	mg/L	01-SEP-17	01-SEP-17	R3817726
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					01-SEP-17	R3817088
Calcium (Ca)-Dissolved	77.7		0.050	mg/L	01-SEP-17	01-SEP-17	R3817727
Magnesium (Mg)-Dissolved	17.3		0.0050	mg/L	01-SEP-17	01-SEP-17	R3817727
L1984659-9 WEST PIT-M Sampled By: CLIENT on 30-AUG-17 @ 14:55 Matrix: Surface Water							
<b>Physical Tests</b>							
Conductivity (EC)	561		3.0	uS/cm		01-SEP-17	R3817080
Hardness (as CaCO3)	284		0.50	mg/L		03-SEP-17	
pH	8.09		0.10	pH		01-SEP-17	R3817080
Total Suspended Solids	<2.0		2.0	mg/L		01-SEP-17	R3817443
Total Dissolved Solids	395		20	mg/L		01-SEP-17	R3817513
<b>Anions and Nutrients</b>							
Alkalinity, Total (as CaCO3)	116		2.0	mg/L		01-SEP-17	R3817080
Chloride (Cl)	2.01		0.10	mg/L		01-SEP-17	R3817393
Sulfate (SO4)	190		0.30	mg/L		01-SEP-17	R3817393
Anion Sum	6.34			meq/L		03-SEP-17	
Cation Sum	5.92			meq/L		03-SEP-17	
Cation - Anion Balance	-3.4			%		03-SEP-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	LAB					01-SEP-17	R3816796

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



## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1984659-9 WEST PIT-M Sampled By: CLIENT on 30-AUG-17 @ 14:55 Matrix: Surface Water							
<b>Organic / Inorganic Carbon</b>							
Dissolved Organic Carbon	3.0		1.0	mg/L	01-SEP-17	01-SEP-17	R3819545
<b>Total Metals</b>							
Arsenic (As)-Total	0.00018		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Calcium (Ca)-Total	88.2		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Cobalt (Co)-Total	0.00064		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Copper (Cu)-Total	0.0212		0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Iron (Fe)-Total	0.055		0.010	mg/L	01-SEP-17	01-SEP-17	R3817726
Lead (Pb)-Total	<0.000050		0.000050	mg/L	01-SEP-17	01-SEP-17	R3817726
Magnesium (Mg)-Total	19.8		0.0050	mg/L	01-SEP-17	01-SEP-17	R3817726
Nickel (Ni)-Total	0.144		0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Potassium (K)-Total	4.00		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Sodium (Na)-Total	3.88		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Zinc (Zn)-Total	0.0051		0.0030	mg/L	01-SEP-17	01-SEP-17	R3817726
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					01-SEP-17	R3817088
Calcium (Ca)-Dissolved	83.0		0.050	mg/L	01-SEP-17	01-SEP-17	R3817727
Magnesium (Mg)-Dissolved	18.7		0.0050	mg/L	01-SEP-17	01-SEP-17	R3817727
L1984659-10 WEST PIT-B Sampled By: CLIENT on 30-AUG-17 @ 15:00 Matrix: Surface Water							
<b>Physical Tests</b>							
Conductivity (EC)	917		3.0	uS/cm		01-SEP-17	R3817080
Hardness (as CaCO3)	496		0.50	mg/L		03-SEP-17	
pH	7.24		0.10	pH		01-SEP-17	R3817080
Total Suspended Solids	2.2		2.0	mg/L		01-SEP-17	R3817443
Total Dissolved Solids	696		20	mg/L		01-SEP-17	R3817513
<b>Anions and Nutrients</b>							
Alkalinity, Total (as CaCO3)	268		2.0	mg/L		01-SEP-17	R3817080
Chloride (Cl)	2.98		0.10	mg/L		01-SEP-17	R3817393
Sulfate (SO4)	317		0.30	mg/L		01-SEP-17	R3817393
Anion Sum	12.0			meq/L		03-SEP-17	
Cation Sum	10.3			meq/L		03-SEP-17	
Cation - Anion Balance	-7.8			%		03-SEP-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	LAB					01-SEP-17	R3816796
Dissolved Organic Carbon	3.7		1.0	mg/L	01-SEP-17	01-SEP-17	R3819545
<b>Total Metals</b>							
Arsenic (As)-Total	0.00015		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Calcium (Ca)-Total	159		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Cobalt (Co)-Total	0.00062		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Copper (Cu)-Total	0.00181		0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Iron (Fe)-Total	0.766		0.010	mg/L	01-SEP-17	01-SEP-17	R3817726

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1984659-10 WEST PIT-B Sampled By: CLIENT on 30-AUG-17 @ 15:00 Matrix: Surface Water							
<b>Total Metals</b>							
Lead (Pb)-Total	<0.000050		0.000050	mg/L	01-SEP-17	01-SEP-17	R3817726
Magnesium (Mg)-Total	33.5		0.0050	mg/L	01-SEP-17	01-SEP-17	R3817726
Nickel (Ni)-Total	0.0172		0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Potassium (K)-Total	5.06		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Sodium (Na)-Total	6.16		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	01-SEP-17	01-SEP-17	R3817726
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					01-SEP-17	R3817088
Calcium (Ca)-Dissolved	147		0.050	mg/L	01-SEP-17	01-SEP-17	R3817727
Magnesium (Mg)-Dissolved	31.5		0.0050	mg/L	01-SEP-17	01-SEP-17	R3817727
L1984659-11 SW-TRIP BLANK Sampled By: CLIENT on 30-AUG-17 @ 14:00 Matrix: Surface Water							
<b>Physical Tests</b>							
Conductivity (EC)	<3.0		3.0	uS/cm		01-SEP-17	R3817080
Hardness (as CaCO3)	<0.50		0.50	mg/L		03-SEP-17	
pH	5.77		0.10	pH		01-SEP-17	R3817080
Total Suspended Solids	<2.0		2.0	mg/L		01-SEP-17	R3817443
Total Dissolved Solids	<10		10	mg/L		01-SEP-17	R3817513
<b>Anions and Nutrients</b>							
Alkalinity, Total (as CaCO3)	<2.0		2.0	mg/L		01-SEP-17	R3817080
Chloride (Cl)	<0.10		0.10	mg/L		01-SEP-17	R3817393
Sulfate (SO4)	<0.30		0.30	mg/L		01-SEP-17	R3817393
Anion Sum	<0.10			meq/L		03-SEP-17	
Cation Sum	<0.10			meq/L		03-SEP-17	
Cation - Anion Balance	0.0			%		03-SEP-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	FIELD					01-SEP-17	R3817053
Dissolved Organic Carbon	<1.0		1.0	mg/L	01-SEP-17	01-SEP-17	R3819545
<b>Total Metals</b>							
Arsenic (As)-Total	<0.00010		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Calcium (Ca)-Total	<0.050		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Copper (Cu)-Total	<0.00050		0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Iron (Fe)-Total	<0.010		0.010	mg/L	01-SEP-17	01-SEP-17	R3817726
Lead (Pb)-Total	<0.000050		0.000050	mg/L	01-SEP-17	01-SEP-17	R3817726
Magnesium (Mg)-Total	<0.0050		0.0050	mg/L	01-SEP-17	01-SEP-17	R3817726
Nickel (Ni)-Total	<0.00050		0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Potassium (K)-Total	<0.050		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Sodium (Na)-Total	<0.050		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	01-SEP-17	01-SEP-17	R3817726
<b>Dissolved Metals</b>							

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1984659-11 SW-TRIP BLANK Sampled By: CLIENT on 30-AUG-17 @ 14:00 Matrix: Surface Water							
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					01-SEP-17	R3817088
Calcium (Ca)-Dissolved	<0.050		0.050	mg/L	01-SEP-17	01-SEP-17	R3817727
Magnesium (Mg)-Dissolved	<0.0050		0.0050	mg/L	01-SEP-17	01-SEP-17	R3817727
L1984659-12 SW-FIELD BLANK Sampled By: CLIENT on 30-AUG-17 @ 14:05 Matrix: Surface Water							
<b>Physical Tests</b>							
Conductivity (EC)	<3.0		3.0	uS/cm		01-SEP-17	R3817080
Hardness (as CaCO3)	<0.50		0.50	mg/L		03-SEP-17	
pH	5.99		0.10	pH		01-SEP-17	R3817080
Total Suspended Solids	<2.0		2.0	mg/L		01-SEP-17	R3817443
Total Dissolved Solids	<10		10	mg/L		01-SEP-17	R3817513
<b>Anions and Nutrients</b>							
Alkalinity, Total (as CaCO3)	<2.0		2.0	mg/L		01-SEP-17	R3817080
Chloride (Cl)	<0.10		0.10	mg/L		01-SEP-17	R3817393
Sulfate (SO4)	<0.30		0.30	mg/L		01-SEP-17	R3817393
Anion Sum	<0.10			meq/L		03-SEP-17	
Cation Sum	<0.10			meq/L		03-SEP-17	
Cation - Anion Balance	0.0			%		03-SEP-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	FIELD					01-SEP-17	R3817053
Dissolved Organic Carbon	<1.0		1.0	mg/L	01-SEP-17	01-SEP-17	R3819545
<b>Total Metals</b>							
Arsenic (As)-Total	<0.00010		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Calcium (Ca)-Total	<0.050		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Copper (Cu)-Total	<0.00050		0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Iron (Fe)-Total	<0.010		0.010	mg/L	01-SEP-17	01-SEP-17	R3817726
Lead (Pb)-Total	<0.000050		0.000050	mg/L	01-SEP-17	01-SEP-17	R3817726
Magnesium (Mg)-Total	<0.0050		0.0050	mg/L	01-SEP-17	01-SEP-17	R3817726
Nickel (Ni)-Total	<0.00050		0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Potassium (K)-Total	<0.050		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Sodium (Na)-Total	<0.050		0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	01-SEP-17	01-SEP-17	R3817726
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					01-SEP-17	R3817088
Calcium (Ca)-Dissolved	<0.050		0.050	mg/L	01-SEP-17	01-SEP-17	R3817727
Magnesium (Mg)-Dissolved	<0.0050		0.0050	mg/L	01-SEP-17	01-SEP-17	R3817727
L1984659-13 SW-EQUIPMENT BLANK Sampled By: CLIENT on 30-AUG-17 @ 14:10 Matrix: Surface Water							
<b>Physical Tests</b>							
Conductivity (EC)	14.3	RRV	3.0	uS/cm		03-SEP-17	R3817784

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1984659-13 SW-EQUIPMENT BLANK							
Sampled By: CLIENT on 30-AUG-17 @ 14:10							
Matrix: Surface Water							
<b>Physical Tests</b>							
Hardness (as CaCO3)	<0.50		0.50	mg/L		03-SEP-17	
pH	6.04		0.10	pH		01-SEP-17	R3817080
Total Suspended Solids	<2.0		2.0	mg/L		01-SEP-17	R3817443
Total Dissolved Solids	<10		10	mg/L		01-SEP-17	R3817513
<b>Anions and Nutrients</b>							
Alkalinity, Total (as CaCO3)	<2.0		2.0	mg/L		01-SEP-17	R3817080
Chloride (Cl)	2.67	RRV	0.10	mg/L		02-SEP-17	R3817715
Sulfate (SO4)	<0.30		0.30	mg/L		01-SEP-17	R3817393
Anion Sum	<0.10			meq/L		03-SEP-17	
Cation Sum	<0.10			meq/L		03-SEP-17	
Cation - Anion Balance	8.6			%		03-SEP-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	FIELD					01-SEP-17	R3817053
Dissolved Organic Carbon	2.2	RRV	1.0	mg/L	01-SEP-17	01-SEP-17	R3819545
<b>Total Metals</b>							
Arsenic (As)-Total	<0.00010		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Calcium (Ca)-Total	0.243	RRV	0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	01-SEP-17	01-SEP-17	R3817726
Copper (Cu)-Total	0.0117	RRV	0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Iron (Fe)-Total	0.037	RRV	0.010	mg/L	01-SEP-17	01-SEP-17	R3817726
Lead (Pb)-Total	0.000158	RRV	0.000050	mg/L	01-SEP-17	01-SEP-17	R3817726
Magnesium (Mg)-Total	0.0431	RRV	0.0050	mg/L	01-SEP-17	01-SEP-17	R3817726
Nickel (Ni)-Total	0.00083	RRV	0.00050	mg/L	01-SEP-17	01-SEP-17	R3817726
Potassium (K)-Total	2.87	RRV	0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Sodium (Na)-Total	0.158	RRV	0.050	mg/L	01-SEP-17	01-SEP-17	R3817726
Zinc (Zn)-Total	0.0322	RRV	0.0030	mg/L	01-SEP-17	01-SEP-17	R3817726
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					01-SEP-17	R3817088
Calcium (Ca)-Dissolved	0.146	RRV	0.050	mg/L	01-SEP-17	01-SEP-17	R3817727
Magnesium (Mg)-Dissolved	0.0235	RRV	0.0050	mg/L	01-SEP-17	01-SEP-17	R3817727

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

## Reference Information

## QC Samples with Qualifiers &amp; Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1984659-10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1984659-1
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1984659-10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1984659-1
Matrix Spike	Calcium (Ca)-Total	MS-B	L1984659-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Total	MS-B	L1984659-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Nickel (Ni)-Total	MS-B	L1984659-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Potassium (K)-Total	MS-B	L1984659-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Total	MS-B	L1984659-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -8, -9

## Sample Parameter Qualifier key listed:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

## Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-TB	Water	Alkalinity	APHA 2320B modified
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
CL-L-IC-N-TB	Water	Chloride in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
DOC-TB	Water	Dissolved Organic Carbon	APHA 5310 B modified
Water samples are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis. Analyzed by converting all carbonaceous material to carbon dioxide (CO2) by catalytic combustion at 850°C. The CO2 generated is measured by an infrared detector and is directly proportional to concentration of carbonaceous material in the sample			
EC-TITR-TB	Water	Conductivity	APHA 2510 B
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
HARDNESS-CALC-TB	Water	Hardness (as CaCO3)	CALCULATION
IONBALANCE-TB	Water	Ion Balance Calculation	APHA 1030 E - CALCULATION
Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.			
Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:			
Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]			
MET-D-CCMS-TB	Water	Dissolved Metals in Water by CRC	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
MET-T-CCMS-TB	Water	Total Metals in Water by CRC	EPA 200.2/6020A (mod)
Water samples are digested with nitric and perchloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
PH-TITR-TB	Water	pH	APHA 4500-H
This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode			
SO4-IC-N-TB	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
TDS-TB	Water	Total Dissolved Solids	APHA 2540 C (modified)
Aqueous matrices are analyzed using gravimetry and evaporation			
TSS-TB	Water	Total Suspended Solids	APHA 2540 D (modified)
Aqueous matrices are analyzed using gravimetry			

## Reference Information

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

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

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Laboratory Definition Code	Laboratory Location
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TB	ALS ENVIRONMENTAL - THUNDER BAY, ONTARIO, CANADA
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### Chain of Custody Numbers:

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#### GLOSSARY OF REPORT TERMS

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

*mg/kg - milligrams per kilogram based on dry weight of sample*

*mg/kg wwt - milligrams per kilogram based on wet weight of sample*

*mg/kg lwt - milligrams per kilogram based on lipid weight of sample*

*mg/L - unit of concentration based on volume, parts per million.*

*< - Less than.*

*D.L. - The reporting limit.*

*N/A - Result not available. Refer to qualifier code and definition for explanation.*

*Test results reported relate only to the samples as received by the laboratory.*

*UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.*

*Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.*



## Quality Control Report

Workorder: L1984659

Report Date: 04-OCT-17

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Client: PARKS ENVIRONMENTAL INC.



Contact: Derek Parks

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>ALK-TITR-TB</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3817080</b>							
<b>WG2606846-3</b>	<b>DUP</b>	<b>L1984659-8</b>						
Alkalinity, Total (as CaCO3)		113	113		mg/L	0.3	20	01-SEP-17
<b>WG2606846-2</b>	<b>LCS</b>							
Alkalinity, Total (as CaCO3)			103.0		%		85-115	01-SEP-17
<b>WG2606846-1</b>	<b>MB</b>							
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	01-SEP-17
<b>CL-L-IC-N-TB</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3817393</b>							
<b>WG2607121-2</b>	<b>LCS</b>							
Chloride (Cl)			101.1		%		90-110	01-SEP-17
<b>WG2607121-6</b>	<b>LCS</b>							
Chloride (Cl)			100.8		%		90-110	01-SEP-17
<b>WG2607121-1</b>	<b>MB</b>							
Chloride (Cl)			<0.10		mg/L		0.1	01-SEP-17
<b>WG2607121-5</b>	<b>MB</b>							
Chloride (Cl)			<0.10		mg/L		0.1	01-SEP-17
<b>Batch</b>	<b>R3817715</b>							
<b>WG2607874-2</b>	<b>LCS</b>							
Chloride (Cl)			100.1		%		90-110	02-SEP-17
<b>WG2607874-1</b>	<b>MB</b>							
Chloride (Cl)			<0.10		mg/L		0.1	02-SEP-17
<b>DOC-TB</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3819545</b>							
<b>WG2607074-2</b>	<b>LCS</b>							
Dissolved Organic Carbon			103.7		%		80-120	01-SEP-17
<b>WG2607399-2</b>	<b>LCS</b>							
Dissolved Organic Carbon			104.4		%		80-120	01-SEP-17
<b>WG2607074-1</b>	<b>MB</b>							
Dissolved Organic Carbon			<1.0		mg/L		1	01-SEP-17
<b>WG2607399-1</b>	<b>MB</b>							
Dissolved Organic Carbon			<1.0		mg/L		1	01-SEP-17
<b>EC-TITR-TB</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3817080</b>							
<b>WG2606846-3</b>	<b>DUP</b>	<b>L1984659-8</b>						
Conductivity (EC)		535	530		uS/cm	0.9	10	01-SEP-17
<b>WG2606846-2</b>	<b>LCS</b>							
Conductivity (EC)			98.0		%		90-110	01-SEP-17
<b>WG2606846-1</b>	<b>MB</b>							



## Quality Control Report

Workorder: L1984659

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>EC-TITR-TB</b>								
<b>Water</b>								
<b>Batch</b>	<b>R3817080</b>							
<b>WG2606846-1</b>	<b>MB</b>							
Conductivity (EC)			<3.0		uS/cm		3	01-SEP-17
<b>Batch</b>	<b>R3817784</b>							
<b>WG2607934-2</b>	<b>LCS</b>							
Conductivity (EC)			100.7		%		90-110	03-SEP-17
<b>WG2607934-1</b>	<b>MB</b>							
Conductivity (EC)			<3.0		uS/cm		3	03-SEP-17
<b>MET-D-CCMS-TB</b>								
<b>Water</b>								
<b>Batch</b>	<b>R3817727</b>							
<b>WG2607350-2</b>	<b>LCS</b>							
Calcium (Ca)-Dissolved			99.6		%		80-120	01-SEP-17
Magnesium (Mg)-Dissolved			103.4		%		80-120	01-SEP-17
<b>WG2607350-1</b>	<b>MB</b>							
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	01-SEP-17
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	01-SEP-17
<b>Batch</b>	<b>R3821496</b>							
<b>WG2609310-6</b>	<b>LCS</b>							
Calcium (Ca)-Dissolved			96.0		%		80-120	06-SEP-17
Magnesium (Mg)-Dissolved			111.3		%		80-120	06-SEP-17
<b>WG2609310-5</b>	<b>MB</b>							
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	06-SEP-17
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	06-SEP-17
<b>MET-T-CCMS-TB</b>								
<b>Water</b>								
<b>Batch</b>	<b>R3817726</b>							
<b>WG2607009-8</b>	<b>DUP</b>	<b>L1984659-1</b>						
Arsenic (As)-Total		0.00012	0.00011		mg/L	9.7	20	01-SEP-17
Calcium (Ca)-Total		65.8	65.1		mg/L	1.0	20	01-SEP-17
Cobalt (Co)-Total		0.00038	0.00038		mg/L	1.8	20	01-SEP-17
Copper (Cu)-Total		0.00616	0.00618		mg/L	0.3	20	01-SEP-17
Iron (Fe)-Total		0.011	0.011		mg/L	4.1	20	01-SEP-17
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	01-SEP-17
Magnesium (Mg)-Total		20.4	20.1		mg/L	1.5	20	01-SEP-17
Nickel (Ni)-Total		0.105	0.105		mg/L	0.7	20	01-SEP-17
Potassium (K)-Total		4.46	4.31		mg/L	3.4	20	01-SEP-17
Sodium (Na)-Total		2.13	2.11		mg/L	0.8	20	01-SEP-17





## Quality Control Report

Workorder: L1984659

Report Date: 04-OCT-17

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>MET-T-CCMS-TB</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3817726</b>							
<b>WG2607009-8</b>	<b>DUP</b>	<b>L1984659-1</b>						
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	01-SEP-17
<b>WG2607009-2</b>	<b>LCS</b>							
Arsenic (As)-Total			102.0		%		80-120	01-SEP-17
Calcium (Ca)-Total			102.6		%		80-120	01-SEP-17
Cobalt (Co)-Total			100.3		%		80-120	01-SEP-17
Copper (Cu)-Total			98.5		%		80-120	01-SEP-17
Iron (Fe)-Total			102.7		%		80-120	01-SEP-17
Lead (Pb)-Total			102.5		%		80-120	01-SEP-17
Magnesium (Mg)-Total			108.0		%		80-120	01-SEP-17
Nickel (Ni)-Total			99.1		%		80-120	01-SEP-17
Potassium (K)-Total			101.2		%		80-120	01-SEP-17
Sodium (Na)-Total			103.8		%		80-120	01-SEP-17
Zinc (Zn)-Total			97.5		%		80-120	01-SEP-17
<b>WG2607009-6</b>	<b>LCS</b>							
Arsenic (As)-Total			98.0		%		80-120	01-SEP-17
Calcium (Ca)-Total			100.5		%		80-120	01-SEP-17
Cobalt (Co)-Total			96.8		%		80-120	01-SEP-17
Copper (Cu)-Total			95.7		%		80-120	01-SEP-17
Iron (Fe)-Total			99.8		%		80-120	01-SEP-17
Lead (Pb)-Total			100.4		%		80-120	01-SEP-17
Magnesium (Mg)-Total			103.3		%		80-120	01-SEP-17
Nickel (Ni)-Total			98.2		%		80-120	01-SEP-17
Potassium (K)-Total			98.4		%		80-120	01-SEP-17
Sodium (Na)-Total			101.8		%		80-120	01-SEP-17
Zinc (Zn)-Total			93.5		%		80-120	01-SEP-17
<b>WG2607009-1</b>	<b>MB</b>							
Arsenic (As)-Total			<0.00010		mg/L		0.0001	01-SEP-17
Calcium (Ca)-Total			<0.050		mg/L		0.05	01-SEP-17
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	01-SEP-17
Copper (Cu)-Total			<0.00050		mg/L		0.0005	01-SEP-17
Iron (Fe)-Total			<0.010		mg/L		0.01	01-SEP-17
Lead (Pb)-Total			<0.000050		mg/L		0.00005	01-SEP-17
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	01-SEP-17
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	01-SEP-17
Potassium (K)-Total			<0.050		mg/L		0.05	01-SEP-17



## Quality Control Report

Workorder: L1984659

Report Date: 04-OCT-17

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>MET-T-CCMS-TB</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3817726</b>							
<b>WG2607009-1</b>	<b>MB</b>							
Sodium (Na)-Total			<0.050		mg/L		0.05	01-SEP-17
Zinc (Zn)-Total			<0.0030		mg/L		0.003	01-SEP-17
<b>WG2607009-5</b>	<b>MB</b>							
Arsenic (As)-Total			<0.00010		mg/L		0.0001	01-SEP-17
Calcium (Ca)-Total			<0.050		mg/L		0.05	01-SEP-17
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	01-SEP-17
Copper (Cu)-Total			<0.00050		mg/L		0.0005	01-SEP-17
Iron (Fe)-Total			<0.010		mg/L		0.01	01-SEP-17
Lead (Pb)-Total			<0.000050		mg/L		0.00005	01-SEP-17
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	01-SEP-17
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	01-SEP-17
Potassium (K)-Total			<0.050		mg/L		0.05	01-SEP-17
Sodium (Na)-Total			<0.050		mg/L		0.05	01-SEP-17
Zinc (Zn)-Total			<0.0030		mg/L		0.003	01-SEP-17
<b>WG2607009-7</b>	<b>MS</b>	<b>L1984659-1</b>						
Arsenic (As)-Total			101.7		%		70-130	01-SEP-17
Calcium (Ca)-Total			N/A	MS-B	%		-	01-SEP-17
Cobalt (Co)-Total			99.3		%		70-130	01-SEP-17
Copper (Cu)-Total			96.0		%		70-130	01-SEP-17
Iron (Fe)-Total			97.5		%		70-130	01-SEP-17
Lead (Pb)-Total			99.4		%		70-130	01-SEP-17
Magnesium (Mg)-Total			N/A	MS-B	%		-	01-SEP-17
Nickel (Ni)-Total			N/A	MS-B	%		-	01-SEP-17
Potassium (K)-Total			N/A	MS-B	%		-	01-SEP-17
Sodium (Na)-Total			N/A	MS-B	%		-	01-SEP-17
Zinc (Zn)-Total			89.4		%		70-130	01-SEP-17
<b>PH-TITR-TB</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3817080</b>							
<b>WG2606846-3</b>	<b>DUP</b>	<b>L1984659-8</b>						
pH		8.30	8.30	J	pH	0.00	0.2	01-SEP-17
<b>WG2606846-2</b>	<b>LCS</b>							
pH			6.05		pH		5.9-6.1	01-SEP-17
<b>SO4-IC-N-TB</b>								
	<b>Water</b>							



## Quality Control Report

Workorder: L1984659

Report Date: 04-OCT-17

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>SO4-IC-N-TB</b>								
<b>Water</b>								
<b>Batch</b>	<b>R3817393</b>							
<b>WG2607121-2</b>	<b>LCS</b>							
Sulfate (SO4)			104.5		%		90-110	01-SEP-17
<b>WG2607121-6</b>	<b>LCS</b>							
Sulfate (SO4)			104.3		%		90-110	01-SEP-17
<b>WG2607121-1</b>	<b>MB</b>							
Sulfate (SO4)			<0.30		mg/L		0.3	01-SEP-17
<b>WG2607121-5</b>	<b>MB</b>							
Sulfate (SO4)			<0.30		mg/L		0.3	01-SEP-17
<b>TDS-TB</b>								
<b>Water</b>								
<b>Batch</b>	<b>R3817513</b>							
<b>WG2607002-2</b>	<b>LCS</b>							
Total Dissolved Solids			97.7		%		85-115	01-SEP-17
<b>WG2607002-1</b>	<b>MB</b>							
Total Dissolved Solids			<10		mg/L		10	01-SEP-17
<b>Batch</b>	<b>R3820886</b>							
<b>WG2608150-2</b>	<b>LCS</b>							
Total Dissolved Solids			97.3		%		85-115	05-SEP-17
<b>WG2608150-1</b>	<b>MB</b>							
Total Dissolved Solids			<10		mg/L		10	05-SEP-17
<b>TSS-TB</b>								
<b>Water</b>								
<b>Batch</b>	<b>R3817443</b>							
<b>WG2607070-2</b>	<b>LCS</b>							
Total Suspended Solids			97.7		%		85-115	01-SEP-17
<b>WG2607070-1</b>	<b>MB</b>							
Total Suspended Solids			<2.0		mg/L		2	01-SEP-17
<b>Batch</b>	<b>R3817459</b>							
<b>WG2607179-3</b>	<b>DUP</b>	<b>L1984659-6</b>						
Total Suspended Solids		15.8	16.2		mg/L	2.1	20	01-SEP-17
<b>WG2607179-2</b>	<b>LCS</b>							
Total Suspended Solids			99.9		%		85-115	01-SEP-17
<b>WG2607179-1</b>	<b>MB</b>							
Total Suspended Solids			<2.0		mg/L		2	01-SEP-17

# Quality Control Report

Workorder: L1984659

Report Date: 04-OCT-17

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## Legend:

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

## Sample Parameter Qualifier Definitions:

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

---

## Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

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

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

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

**Toxicity test report for sample:** 0420170343

**Test code:** 03

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**Sample description**

**Company:** Parks Environmental Inc. (001)  
[REDACTED]  
[REDACTED]

**Control point:** ()

**Laboratory:** Aquatic Toxicology Research Centre

**Sampling method:** Grab **Sampled by:** NA

**Date/time Collected:** 2017/08/31 09:30 **Received:** 2017/09/01 09:45 **Tested:** 2017/09/02 10:40

**Frozen or partially frozen in shipment:** No **Shipment method:** Ground

**Temp. on arrival (C):** 7.0 **Storage:** 2 Days

**Test conducted by:** G. Vahaaho

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**Test parameters**

**Test animal:** *Oncorhynchus mykiss*

**Type of bioassay:** Non-renewable static, single concentration  
Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout. EPS 1/RM/13, Second Edition, December 2000. ATRC test SOP AT001.

**Differences from reference test method:** No

**pH adjustment:** No

**Pre-aeration:** Yes **Rate:** 6.5 ± 1.0 mL/min./L **Duration (min):** 30

**Test aeration rate:** 6.5 ± 1.0 mL/min./L

**Test volume:** 25 L **Test animals/vessel:** 10

**Loading density:** ≤ 0.5 g/L (max. mean weight 1.25 g)

**Diluant:** Lake Superior Water

**Time parameters measured:** All concentrations at 0 hrs.; each concentration when mortality equals or exceeds 50%; remaining at 96 hrs.

---

**Test results**

96-hour LC50

Non-lethal

95% confidence limits<sup>1</sup>  
Lower Upper

**Slope of mortality curve:** **LC50 calculated by:**

<sup>1</sup> The confidence interval represents the measurement uncertainties

---

**Toxicity test report for sample:** 0420170343

**Test code:** 03

**Mortality data**

Test Conc.	ELAPSED TIME								Total Mortality %
	00:00	01:00	02:00	04:00	24:00	48:00	72:00	96:00	
Control	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0

**Quality Assurance / Quality Control**

Reference toxicant: ZnSO4

Most recent: 2017/07/21      **LC50:** 0.459      **95% conf. limits<sup>1</sup>** 0.349 - 0.604

Historic: n = 246      **Geometric mean LC50:** 0.560      **Warning limits +/- (+/- 2 SD)** 0.449

Replications: Once per batch

Test animal batch: 2017062101      **7-day Pre-test mortality (%):** 0.00

**Control:**

**Mean weight (g):** 0.81      **Std. dev.:** 0.29      **Minimum:** 0.47      **Maximum:** 1.20  
**Mean length (mm):** 39.18      **Std. dev.:** 4.59      **Minimum:** 32.22      **Maximum:** 44.90

<sup>1</sup> The confidence interval represents the measurement uncertainties

**Comments**

L1984659. Loading rate = 0.32 g / L.

Passing test. No test organism mortality or stressed test organisms observed during this test.

Toxicity test report for sample: 0420170343

Test code: 03

**Physico-chemical parameters**

100% effluent prior to dilution: Temp. 15.9 pH: 7.7 Diss. O2 (mg/L): 8.9 Cond. ( $\mu$ S/cm): 519

Test Conc.		ELAPSED TIME							
		00:00	01:00	02:00	04:00	24:00	48:00	72:00	96:00
Control	pH	7.4							7.8
	O2 ppm	8.9							9.6
	temp.	15.5							14.8
	cond.	125							
	hardness	50							
100	pH	7.8							8.1
	O2 ppm	9.3							9.7
	temp.	15.1							14.7
	cond.	509							
	hardness	248							

Date: 2017-09-19

Report prepared and verified by: O'Niell Tedrow

O'Niell Tedrow, MS, Toxicologist

**The test results and information reported herein pertain only to this sample.**





Toxicity test report for sample: 0420170343

Test code: 04

**Mortality data**

Test Conc.	ELAPSED TIME		Total Mortality
	00:00	48:00	
%			%
Control	0	0	0
100	0	0	0

Mortality per vessel:		Vessels			Mean:	
	Control:	0	0	0	Mean:	0.0
	100% effluent:	0	0	0	Mean:	0.0

**Quality Assurance / Quality Control**

Reference toxicant:	NaCl (g/l)				
Most recent:	2017/09/18	LC50:	4.104	95% conf. limits: <sup>1</sup>	3.619 - 4.655
Historic:	n = 403	Geometric mean LC50:	4.652	Warning limits +/- ( +/- 2 SD )	1.250
Replications:	Once per batch				
Test animal population estimates:	Time to first brood (days):	12	Mean neonates/brood (n):	18	
Test animal batch:	2017081801		7-day Pre-test mortality (%):	0.00	

<sup>1</sup> The confidence interval represents the measurement uncertainties

**Comments**

L1984659.

Passing test. No test organism mortality or immobility observed during this test.

Toxicity test report for sample: 0420170343

Test code: 04

**Physico-chemical parameters**

100% effluent prior to dilution: Temp. 21.9 pH: 7.6 Diss. O2 (mg/L): 9.0 Cond. (µS/cm): 520

Test Conc.		ELAPSED TIME	
		00:00	48:00
Control	pH	8.4	8.3
	O2 ppm	8.5	8.3
	temp.	21.9	21.9
	cond.	515	
	hardness	148	
100	pH	7.6	7.7
	O2 ppm	9.0	7.6
	temp.	21.9	21.7
	cond.	520	
	hardness	248	

Date: 2017-09-19

Report prepared and verified by:

*O'Niell Tedrow*

O'Niell Tedrow, MS, Toxicologist

**The test results and information reported herein pertain only to this sample.**







PARKS ENVIRONMENTAL INC.

ATTN: Derek Parks



Date Received: 30-OCT-17

Report Date: 20-NOV-17 15:25 (MT)

Version: FINAL

Client Phone: 

## Certificate of Analysis

Lab Work Order #: L2014939

Project P.O. #: NOT SUBMITTED

Job Reference:

C of C Numbers:

Legal Site Desc: THIERY

Comments: Fractions -6 and -7: Results for ion balance could not be reported since these are BLANK samples.



Hua Wo  
Chemistry Laboratory Manager

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ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721  
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## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2014939-1 SW-8							
Sampled By: CLIENT on 28-OCT-17 @ 16:00							
Matrix: SURFACE WATER							
<b>Physical Tests</b>							
Conductivity	440		1.0	umhos/cm		31-OCT-17	R3871900
pH	7.75		0.10	pH units		31-OCT-17	R3871900
Total Suspended Solids	<5.0		5.0	mg/L		01-NOV-17	R3872814
Total Dissolved Solids	347		20	mg/L		31-OCT-17	R3872481
<b>Anions and Nutrients</b>							
Acceptable % Difference	FAIL					10-NOV-17	
Alkalinity, Total (as CaCO3)	79.9		1.0	mg/L		31-OCT-17	R3871900
Bicarbonate (HCO3)	97.5		1.2	mg/L		15-NOV-17	
Carbonate (CO3)	<0.60		0.60	mg/L		15-NOV-17	
Chloride (Cl)	0.28		0.10	mg/L		30-OCT-17	R3870475
Computed Conductivity	490			uS/cm		10-NOV-17	
Conductivity % Difference	10.7			%		10-NOV-17	
Hardness (as CaCO3)	261			mg/L		10-NOV-17	
Hydroxide (OH)	<0.34		0.34	mg/L		15-NOV-17	
Ion Balance	154			%		10-NOV-17	
Langelier Index	0.1					10-NOV-17	
Saturation pH	7.68			pH		10-NOV-17	
TDS (Calculated)	315			mg/L		10-NOV-17	
Sulfate (SO4)	169		0.30	mg/L		30-OCT-17	R3870475
Anion Sum	3.53			me/L		10-NOV-17	
Cation Sum	5.42			me/L		10-NOV-17	
Cation - Anion Balance	21.2			%		10-NOV-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Organic Carbon	2.32		0.50	mg/L		31-OCT-17	R3871645
<b>Total Metals</b>							
Arsenic (As)-Total	<0.00010		0.00010	mg/L	31-OCT-17	09-NOV-17	R3880368
Calcium (Ca)-Total	65.9		0.050	mg/L	31-OCT-17	09-NOV-17	R3880368
Cobalt (Co)-Total	0.00027		0.00010	mg/L	31-OCT-17	09-NOV-17	R3880368
Copper (Cu)-Total	0.00468		0.00050	mg/L	31-OCT-17	09-NOV-17	R3880368
Iron (Fe)-Total	0.036		0.010	mg/L	31-OCT-17	09-NOV-17	R3880368
Lead (Pb)-Total	<0.000050		0.000050	mg/L	31-OCT-17	09-NOV-17	R3880368
Magnesium (Mg)-Total	19.9		0.0050	mg/L	31-OCT-17	09-NOV-17	R3880368
Nickel (Ni)-Total	0.120		0.00050	mg/L	31-OCT-17	09-NOV-17	R3880368
Potassium (K)-Total	4.60		0.050	mg/L	31-OCT-17	09-NOV-17	R3880368
Sodium (Na)-Total	1.88		0.050	mg/L	31-OCT-17	09-NOV-17	R3880368
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	31-OCT-17	09-NOV-17	R3880368
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					01-NOV-17	R3871904
Calcium (Ca)-Dissolved	70.9		0.050	mg/L	01-NOV-17	02-NOV-17	R3873386
Magnesium (Mg)-Dissolved	20.3		0.0050	mg/L	01-NOV-17	02-NOV-17	R3873386
Report Remarks : Ion balance verified							
L2014939-2 SW-9							

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2014939-2 SW-9							
Sampled By: CLIENT on 28-OCT-17 @ 14:00							
Matrix: SURFACE WATER							
<b>Physical Tests</b>							
Conductivity	368		1.0	umhos/cm		01-NOV-17	R3872566
pH	8.05		0.10	pH units		01-NOV-17	R3872566
Total Suspended Solids	<5.0		5.0	mg/L		01-NOV-17	R3872814
Total Dissolved Solids	268		20	mg/L		31-OCT-17	R3872481
<b>Anions and Nutrients</b>							
Acceptable % Difference	FAIL					10-NOV-17	
Alkalinity, Total (as CaCO3)	84.2		1.0	mg/L		01-NOV-17	R3872566
Bicarbonate (HCO3)	103		1.2	mg/L		15-NOV-17	
Carbonate (CO3)	<0.60		0.60	mg/L		15-NOV-17	
Chloride (Cl)	0.40		0.10	mg/L		30-OCT-17	R3870475
Computed Conductivity	350			uS/cm		10-NOV-17	
Conductivity % Difference	-5.1			%		10-NOV-17	
Hardness (as CaCO3)	195			mg/L		10-NOV-17	
Hydroxide (OH)	<0.34		0.34	mg/L		15-NOV-17	
Ion Balance	181			%		10-NOV-17	
Langelier Index	0.3					10-NOV-17	
Saturation pH	7.74			pH		10-NOV-17	
TDS (Calculated)	231			mg/L		10-NOV-17	
Sulfate (SO4)	107		0.30	mg/L		30-OCT-17	R3870475
Anion Sum	2.24			me/L		10-NOV-17	
Cation Sum	4.05			me/L		10-NOV-17	
Cation - Anion Balance	28.8			%		10-NOV-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Organic Carbon	5.13		0.50	mg/L		31-OCT-17	R3871645
<b>Total Metals</b>							
Arsenic (As)-Total	0.00020		0.00010	mg/L	31-OCT-17	09-NOV-17	R3880368
Calcium (Ca)-Total	51.0		0.050	mg/L	31-OCT-17	09-NOV-17	R3880368
Cobalt (Co)-Total	0.00015		0.00010	mg/L	31-OCT-17	09-NOV-17	R3880368
Copper (Cu)-Total	0.00159		0.00050	mg/L	31-OCT-17	09-NOV-17	R3880368
Iron (Fe)-Total	0.036		0.010	mg/L	31-OCT-17	09-NOV-17	R3880368
Lead (Pb)-Total	<0.000050		0.000050	mg/L	31-OCT-17	09-NOV-17	R3880368
Magnesium (Mg)-Total	14.4		0.0050	mg/L	31-OCT-17	09-NOV-17	R3880368
Nickel (Ni)-Total	0.0411		0.00050	mg/L	31-OCT-17	09-NOV-17	R3880368
Potassium (K)-Total	2.61		0.050	mg/L	31-OCT-17	09-NOV-17	R3880368
Sodium (Na)-Total	1.86		0.050	mg/L	31-OCT-17	09-NOV-17	R3880368
Zinc (Zn)-Total	0.0033		0.0030	mg/L	31-OCT-17	09-NOV-17	R3880368
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					01-NOV-17	R3871904
Calcium (Ca)-Dissolved	54.6		0.050	mg/L	01-NOV-17	02-NOV-17	R3873386
Magnesium (Mg)-Dissolved	14.2		0.0050	mg/L	01-NOV-17	02-NOV-17	R3873386
Report Remarks : Ion Balance verified							
L2014939-3 SW-10							

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2014939-3 SW-10							
Sampled By: CLIENT on 28-OCT-17 @ 13:00							
Matrix: SURFACE WATER							
<b>Physical Tests</b>							
Conductivity	352		1.0	umhos/cm		31-OCT-17	R3871900
pH	7.69		0.10	pH units		31-OCT-17	R3871900
Total Suspended Solids	<5.0		5.0	mg/L		01-NOV-17	R3872814
Total Dissolved Solids	262		20	mg/L		31-OCT-17	R3872481
<b>Anions and Nutrients</b>							
Acceptable % Difference	FAIL					10-NOV-17	
Alkalinity, Total (as CaCO3)	83.5		1.0	mg/L		31-OCT-17	R3871900
Bicarbonate (HCO3)	102		1.2	mg/L		15-NOV-17	
Carbonate (CO3)	<0.60		0.60	mg/L		15-NOV-17	
Chloride (Cl)	0.52		0.10	mg/L		30-OCT-17	R3870475
Computed Conductivity	350			uS/cm		10-NOV-17	
Conductivity % Difference	-0.6			%		10-NOV-17	
Hardness (as CaCO3)	198			mg/L		10-NOV-17	
Hydroxide (OH)	<0.34		0.34	mg/L		15-NOV-17	
Ion Balance	187			%		10-NOV-17	
Langelier Index	0.0					10-NOV-17	
Saturation pH	7.74			pH		10-NOV-17	
TDS (Calculated)	230			mg/L		10-NOV-17	
Sulfate (SO4)	105		0.30	mg/L		30-OCT-17	R3870475
Anion Sum	2.20			me/L		10-NOV-17	
Cation Sum	4.11			me/L		10-NOV-17	
Cation - Anion Balance	30.2			%		10-NOV-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Organic Carbon	5.67		0.50	mg/L		31-OCT-17	R3871645
<b>Total Metals</b>							
Arsenic (As)-Total	0.00017		0.00010	mg/L	31-OCT-17	09-NOV-17	R3880368
Calcium (Ca)-Total	51.0		0.050	mg/L	31-OCT-17	09-NOV-17	R3880368
Cobalt (Co)-Total	0.00011		0.00010	mg/L	31-OCT-17	09-NOV-17	R3880368
Copper (Cu)-Total	0.00138		0.00050	mg/L	31-OCT-17	09-NOV-17	R3880368
Iron (Fe)-Total	0.049		0.010	mg/L	31-OCT-17	09-NOV-17	R3880368
Lead (Pb)-Total	<0.000050		0.000050	mg/L	31-OCT-17	09-NOV-17	R3880368
Magnesium (Mg)-Total	14.2		0.0050	mg/L	31-OCT-17	09-NOV-17	R3880368
Nickel (Ni)-Total	0.0366		0.00050	mg/L	31-OCT-17	09-NOV-17	R3880368
Potassium (K)-Total	2.64		0.050	mg/L	31-OCT-17	09-NOV-17	R3880368
Sodium (Na)-Total	1.82		0.050	mg/L	31-OCT-17	09-NOV-17	R3880368
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	31-OCT-17	09-NOV-17	R3880368
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					01-NOV-17	R3871904
Calcium (Ca)-Dissolved	55.6		0.050	mg/L	01-NOV-17	02-NOV-17	R3873386
Magnesium (Mg)-Dissolved	14.3		0.0050	mg/L	01-NOV-17	02-NOV-17	R3873386
Report Remarks : Ion Balance Verified							
L2014939-4 SW-11-S							

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



## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2014939-4 SW-11-S							
Sampled By: CLIENT on 28-OCT-17 @ 14:45							
Matrix: SURFACE WATER							
<b>Physical Tests</b>							
Conductivity	90.0		1.0	umhos/cm		31-OCT-17	R3871900
pH	7.80		0.10	pH units		31-OCT-17	R3871900
Total Suspended Solids	<5.0		5.0	mg/L		01-NOV-17	R3872814
Total Dissolved Solids	79		13	mg/L		31-OCT-17	R3872481
<b>Anions and Nutrients</b>							
Acceptable % Difference	FAIL					10-NOV-17	
Alkalinity, Total (as CaCO3)	49.4		1.0	mg/L		31-OCT-17	R3871900
Bicarbonate (HCO3)	60.3		1.2	mg/L		15-NOV-17	
Carbonate (CO3)	<0.60		0.60	mg/L		15-NOV-17	
Chloride (Cl)	0.16		0.10	mg/L		30-OCT-17	R3870475
Computed Conductivity	58.6			uS/cm		10-NOV-17	
Conductivity % Difference	-42.3			%		10-NOV-17	
Hardness (as CaCO3)	51.7			mg/L		10-NOV-17	
Hydroxide (OH)	<0.34		0.34	mg/L		15-NOV-17	
Ion Balance	Low EC			%		10-NOV-17	
Langelier Index	-0.6					10-NOV-17	
Saturation pH	8.41			pH		10-NOV-17	
TDS (Calculated)	50.0			mg/L		10-NOV-17	
Sulfate (SO4)	0.39		0.30	mg/L		30-OCT-17	R3870475
Anion Sum	<0.10			me/L		10-NOV-17	
Cation Sum	1.07			me/L		10-NOV-17	
Cation - Anion Balance	Low EC			%		10-NOV-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Organic Carbon	9.41		0.50	mg/L		31-OCT-17	R3871645
<b>Total Metals</b>							
Arsenic (As)-Total	0.00037		0.00010	mg/L	31-OCT-17	09-NOV-17	R3880368
Calcium (Ca)-Total	15.3		0.050	mg/L	31-OCT-17	09-NOV-17	R3880368
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	31-OCT-17	09-NOV-17	R3880368
Copper (Cu)-Total	<0.00050		0.00050	mg/L	31-OCT-17	09-NOV-17	R3880368
Iron (Fe)-Total	0.104		0.010	mg/L	31-OCT-17	09-NOV-17	R3880368
Lead (Pb)-Total	<0.000050		0.000050	mg/L	31-OCT-17	09-NOV-17	R3880368
Magnesium (Mg)-Total	2.90		0.0050	mg/L	31-OCT-17	09-NOV-17	R3880368
Nickel (Ni)-Total	<0.00050		0.00050	mg/L	31-OCT-17	09-NOV-17	R3880368
Potassium (K)-Total	0.427		0.050	mg/L	31-OCT-17	09-NOV-17	R3880368
Sodium (Na)-Total	0.511		0.050	mg/L	31-OCT-17	09-NOV-17	R3880368
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	31-OCT-17	09-NOV-17	R3880368
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					01-NOV-17	R3871904
Calcium (Ca)-Dissolved	15.9		0.050	mg/L	01-NOV-17	02-NOV-17	R3873386
Magnesium (Mg)-Dissolved	2.91		0.0050	mg/L	01-NOV-17	02-NOV-17	R3873386
Report Remarks : Ion Balance verified							
L2014939-5 SW-TRIP BLANK							

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2014939-5 SW-TRIP BLANK Sampled By: CLIENT Matrix: SURFACE WATER							
<b>Physical Tests</b>							
Conductivity	1.1		1.0	umhos/cm		31-OCT-17	R3871900
pH	5.85		0.10	pH units		31-OCT-17	R3871900
Total Suspended Solids	<5.0		5.0	mg/L		01-NOV-17	R3872814
Total Dissolved Solids	2650		4.0	mg/L		31-OCT-17	R3872481
<b>Anions and Nutrients</b>							
Acceptable % Difference	NOVALUE					10-NOV-17	
Alkalinity, Total (as CaCO3)	1.0		1.0	mg/L		31-OCT-17	R3871900
Bicarbonate (HCO3)	1.2		1.2	mg/L		15-NOV-17	
Carbonate (CO3)	<0.60		0.60	mg/L		15-NOV-17	
Chloride (Cl)	<0.10		0.10	mg/L		30-OCT-17	R3870475
Computed Conductivity	<0.20			uS/cm		10-NOV-17	
Conductivity % Difference	<-100.0			%		10-NOV-17	
Hardness (as CaCO3)	<1.0			mg/L		10-NOV-17	
Hydroxide (OH)	<0.34		0.34	mg/L		15-NOV-17	
Ion Balance	Low TDS			%		10-NOV-17	
Langelier Index	Low Calcium					10-NOV-17	
Saturation pH	Low Calcium			pH		10-NOV-17	
TDS (Calculated)	<1.0			mg/L		10-NOV-17	
Sulfate (SO4)	<0.30		0.30	mg/L		30-OCT-17	R3870475
Anion Sum	<0.10			me/L		10-NOV-17	
Cation Sum	<0.10			me/L		10-NOV-17	
Cation - Anion Balance	Low TDS			%		10-NOV-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Organic Carbon	0.51		0.50	mg/L		31-OCT-17	R3871645
<b>Total Metals</b>							
Arsenic (As)-Total	<0.00010		0.00010	mg/L	31-OCT-17	09-NOV-17	R3880368
Calcium (Ca)-Total	0.058		0.050	mg/L	31-OCT-17	09-NOV-17	R3880368
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	31-OCT-17	09-NOV-17	R3880368
Copper (Cu)-Total	<0.00050		0.00050	mg/L	31-OCT-17	09-NOV-17	R3880368
Iron (Fe)-Total	<0.010		0.010	mg/L	31-OCT-17	09-NOV-17	R3880368
Lead (Pb)-Total	<0.000050		0.000050	mg/L	31-OCT-17	09-NOV-17	R3880368
Magnesium (Mg)-Total	<0.0050		0.0050	mg/L	31-OCT-17	09-NOV-17	R3880368
Nickel (Ni)-Total	<0.00050		0.00050	mg/L	31-OCT-17	09-NOV-17	R3880368
Potassium (K)-Total	<0.050		0.050	mg/L	31-OCT-17	09-NOV-17	R3880368
Sodium (Na)-Total	<0.050		0.050	mg/L	31-OCT-17	09-NOV-17	R3880368
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	31-OCT-17	09-NOV-17	R3880368
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					01-NOV-17	R3871904
Calcium (Ca)-Dissolved	<0.050		0.050	mg/L	01-NOV-17	02-NOV-17	R3873386
Magnesium (Mg)-Dissolved	<0.0050		0.0050	mg/L	01-NOV-17	02-NOV-17	R3873386
L2014939-6 SW-FIELD BLANK Sampled By: CLIENT on 28-OCT-17 @ 13:45							

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2014939-6 SW-FIELD BLANK Sampled By: CLIENT on 28-OCT-17 @ 13:45 Matrix: SURFACE WATER							
<b>Physical Tests</b>							
Conductivity	<1.0		1.0	umhos/cm		31-OCT-17	R3871900
Hardness (as CaCO3)	<0.20		0.20	mg/L		10-NOV-17	
pH	5.61		0.10	pH units		31-OCT-17	R3871900
Total Suspended Solids	<5.0		5.0	mg/L		01-NOV-17	R3872814
Total Dissolved Solids	1640		4.0	mg/L		31-OCT-17	R3872481
<b>Anions and Nutrients</b>							
Alkalinity, Total (as CaCO3)	<1.0		1.0	mg/L		31-OCT-17	R3871900
Bicarbonate (HCO3)	<1.2		1.2	mg/L		15-NOV-17	
Carbonate (CO3)	<0.60		0.60	mg/L		15-NOV-17	
Chloride (Cl)	<0.10		0.10	mg/L		30-OCT-17	R3870475
Hydroxide (OH)	<0.34		0.34	mg/L		15-NOV-17	
Sulfate (SO4)	<0.30		0.30	mg/L		30-OCT-17	R3870475
<b>Organic / Inorganic Carbon</b>							
Dissolved Organic Carbon	<0.50		0.50	mg/L		31-OCT-17	R3871645
<b>Total Metals</b>							
Arsenic (As)-Total	<0.00010		0.00010	mg/L	31-OCT-17	09-NOV-17	R3880368
Calcium (Ca)-Total	0.059		0.050	mg/L	31-OCT-17	09-NOV-17	R3880368
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	31-OCT-17	09-NOV-17	R3880368
Copper (Cu)-Total	<0.00050		0.00050	mg/L	31-OCT-17	09-NOV-17	R3880368
Iron (Fe)-Total	0.476		0.010	mg/L	31-OCT-17	09-NOV-17	R3880368
Lead (Pb)-Total	<0.000050		0.000050	mg/L	31-OCT-17	09-NOV-17	R3880368
Magnesium (Mg)-Total	<0.0050		0.0050	mg/L	31-OCT-17	09-NOV-17	R3880368
Nickel (Ni)-Total	<0.00050		0.00050	mg/L	31-OCT-17	09-NOV-17	R3880368
Potassium (K)-Total	<0.050		0.050	mg/L	31-OCT-17	09-NOV-17	R3880368
Sodium (Na)-Total	<0.050		0.050	mg/L	31-OCT-17	09-NOV-17	R3880368
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	31-OCT-17	09-NOV-17	R3880368
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					01-NOV-17	R3871904
Calcium (Ca)-Dissolved	<0.050		0.050	mg/L	01-NOV-17	02-NOV-17	R3873386
Magnesium (Mg)-Dissolved	<0.0050		0.0050	mg/L	01-NOV-17	02-NOV-17	R3873386
L2014939-7 SW-EQUIPMENT BLANK Sampled By: CLIENT on 28-OCT-17 @ 13:00 Matrix: SURFACE WATER							
<b>Physical Tests</b>							
Conductivity	<1.0		1.0	umhos/cm		31-OCT-17	R3871900
Hardness (as CaCO3)	<0.20		0.20	mg/L		10-NOV-17	
pH	5.81		0.10	pH units		31-OCT-17	R3871900
Total Suspended Solids	<5.0		5.0	mg/L		01-NOV-17	R3872814
Total Dissolved Solids	4.8		4.0	mg/L		31-OCT-17	R3872481
<b>Anions and Nutrients</b>							
Alkalinity, Total (as CaCO3)	<1.0		1.0	mg/L		31-OCT-17	R3871900
Bicarbonate (HCO3)	<1.2		1.2	mg/L		15-NOV-17	

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2014939-7 SW-EQUIPMENT BLANK Sampled By: CLIENT on 28-OCT-17 @ 13:00 Matrix: SURFACE WATER							
<b>Anions and Nutrients</b>							
Carbonate (CO3)	<0.60		0.60	mg/L		15-NOV-17	
Chloride (Cl)	<0.10		0.10	mg/L		30-OCT-17	R3870475
Hydroxide (OH)	<0.34		0.34	mg/L		15-NOV-17	
Sulfate (SO4)	<0.30		0.30	mg/L		30-OCT-17	R3870475
<b>Organic / Inorganic Carbon</b>							
Dissolved Organic Carbon	<0.50		0.50	mg/L		31-OCT-17	R3871645
<b>Total Metals</b>							
Arsenic (As)-Total	<0.00010		0.00010	mg/L	31-OCT-17	09-NOV-17	R3880368
Calcium (Ca)-Total	0.051		0.050	mg/L	31-OCT-17	09-NOV-17	R3880368
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	31-OCT-17	09-NOV-17	R3880368
Copper (Cu)-Total	<0.00050		0.00050	mg/L	31-OCT-17	09-NOV-17	R3880368
Iron (Fe)-Total	<0.010		0.010	mg/L	31-OCT-17	09-NOV-17	R3880368
Lead (Pb)-Total	<0.000050		0.000050	mg/L	31-OCT-17	09-NOV-17	R3880368
Magnesium (Mg)-Total	<0.0050		0.0050	mg/L	31-OCT-17	09-NOV-17	R3880368
Nickel (Ni)-Total	<0.00050		0.00050	mg/L	31-OCT-17	09-NOV-17	R3880368
Potassium (K)-Total	<0.050		0.050	mg/L	31-OCT-17	09-NOV-17	R3880368
Sodium (Na)-Total	<0.050		0.050	mg/L	31-OCT-17	09-NOV-17	R3880368
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	31-OCT-17	09-NOV-17	R3880368
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					01-NOV-17	R3871904
Calcium (Ca)-Dissolved	<0.050		0.050	mg/L	01-NOV-17	02-NOV-17	R3873386
Magnesium (Mg)-Dissolved	<0.0050		0.0050	mg/L	01-NOV-17	02-NOV-17	R3873386
L2014939-8 DUP Sampled By: CLIENT on 28-OCT-17 @ 16:00 Matrix: SURFACE WATER							
<b>Physical Tests</b>							
Conductivity	484		1.0	umhos/cm		31-OCT-17	R3871900
pH	7.78		0.10	pH units		31-OCT-17	R3871900
Total Suspended Solids	<5.0		5.0	mg/L		01-NOV-17	R3872814
Total Dissolved Solids	350		20	mg/L		31-OCT-17	R3872481
<b>Anions and Nutrients</b>							
Acceptable % Difference	FAIL					10-NOV-17	
Alkalinity, Total (as CaCO3)	79.9		1.0	mg/L		31-OCT-17	R3871900
Bicarbonate (HCO3)	97.5		1.2	mg/L		15-NOV-17	
Carbonate (CO3)	<0.60		0.60	mg/L		15-NOV-17	
Chloride (Cl)	0.29		0.10	mg/L		30-OCT-17	R3870475
Computed Conductivity	483			uS/cm		10-NOV-17	
Conductivity % Difference	-0.3			%		10-NOV-17	
Hardness (as CaCO3)	253			mg/L		10-NOV-17	
Hydroxide (OH)	<0.34		0.34	mg/L		15-NOV-17	
Ion Balance	149			%		10-NOV-17	
Langelier Index	0.1					10-NOV-17	

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2014939-8 DUP							
Sampled By: CLIENT on 28-OCT-17 @ 16:00							
Matrix: SURFACE WATER							
<b>Anions and Nutrients</b>							
Saturation pH	7.70			pH		10-NOV-17	
TDS (Calculated)	312			mg/L		10-NOV-17	
Sulfate (SO4)	169		0.30	mg/L		30-OCT-17	R3870475
Anion Sum	3.53			me/L		10-NOV-17	
Cation Sum	5.26			me/L		10-NOV-17	
Cation - Anion Balance	19.8			%		10-NOV-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Organic Carbon	2.35		0.50	mg/L		31-OCT-17	R3871645
<b>Total Metals</b>							
Arsenic (As)-Total	<0.00010		0.00010	mg/L	31-OCT-17	09-NOV-17	R3880368
Calcium (Ca)-Total	65.9		0.050	mg/L	31-OCT-17	09-NOV-17	R3880368
Cobalt (Co)-Total	0.00029		0.00010	mg/L	31-OCT-17	09-NOV-17	R3880368
Copper (Cu)-Total	0.00482		0.00050	mg/L	31-OCT-17	09-NOV-17	R3880368
Iron (Fe)-Total	0.038		0.010	mg/L	31-OCT-17	09-NOV-17	R3880368
Lead (Pb)-Total	<0.000050		0.000050	mg/L	31-OCT-17	09-NOV-17	R3880368
Magnesium (Mg)-Total	20.4		0.0050	mg/L	31-OCT-17	09-NOV-17	R3880368
Nickel (Ni)-Total	0.122		0.00050	mg/L	31-OCT-17	09-NOV-17	R3880368
Potassium (K)-Total	4.77		0.050	mg/L	31-OCT-17	09-NOV-17	R3880368
Sodium (Na)-Total	1.93		0.050	mg/L	31-OCT-17	09-NOV-17	R3880368
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	31-OCT-17	09-NOV-17	R3880368
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					01-NOV-17	R3871904
Calcium (Ca)-Dissolved	67.4		0.050	mg/L	01-NOV-17	02-NOV-17	R3873386
Magnesium (Mg)-Dissolved	20.5		0.0050	mg/L	01-NOV-17	02-NOV-17	R3873386
Report Remarks : Ion Balance verified							

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

## Reference Information

## QC Samples with Qualifiers &amp; Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2014939-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2014939-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Calcium (Ca)-Total	MS-B	L2014939-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Copper (Cu)-Total	MS-B	L2014939-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2014939-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Potassium (K)-Total	MS-B	L2014939-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Sodium (Na)-Total	MS-B	L2014939-1, -2, -3, -4, -5, -6, -7, -8

## Sample Parameter Qualifier key listed:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

## Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-CO3CO3-CALC-WP	Water	Alkalinity, Carbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by carbonate is calculated and reported as mg CO <sub>3</sub> <sup>2-</sup> /L.			
ALK-HCO3HCO3-CALC-WP	Water	Alkalinity, Bicarbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by bicarbonate is calculated and reported as mg HCO <sub>3</sub> <sup>-</sup> /L.			
ALK-OHOH-CALC-WP	Water	Alkalinity, Hydroxide	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by hydroxide is calculated and reported as mg OH <sup>-</sup> /L.			
ALK-TITR-WP	Water	Alkalinity, Total (as CaCO <sub>3</sub> )	APHA 2320B
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. Total alkalinity is determined by titration with a strong standard mineral acid to the successive HCO <sub>3</sub> <sup>-</sup> and H <sub>2</sub> CO <sub>3</sub> endpoints indicated electrometrically.			
C-DOC-HTC-WP	Water	Dissolved Organic Carbon by Combustion	APHA 5310 B-WP
Filtered (0.45 um) sample is acidified and combusted to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO <sub>2</sub> which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-L-IC-N-WP	Water	Chloride in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
EC-WP	Water	Conductivity	APHA 2510B
Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.			
HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO <sub>3</sub> equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.			
IONBALANCE-CALC-WP	Water	Ion Balance Calculation	APHA 1030E
Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.			
Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance (as % difference) cannot be calculated accurately for waters with very low electrical conductivity (EC), and is reported as "Low EC" where EC < 100 uS/cm (umhos/cm). Ion Balance is calculated as:			
Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]			
MET-D-CCMS-WP	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			

## Reference Information

MET-T-CCMS-WP      Water      Total Metals in Water by CRC      EPA 200.2/6020A (mod.)  
 Water samples are digested with nitric and perchloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

PH-WP      Water      pH      APHA 4500H  
 The pH of a sample is the determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.

SO4-IC-N-WP      Water      Sulfate in Water by IC      EPA 300.1 (mod)  
 Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TOTSUS-WP      Water      Total Suspended Solids      APHA 2540 D (modified)  
 Total suspended solids in aqueous matrices is determined gravimetrically after drying the residue at 103 – 105°C.

TDS-WP      Water      Total Dissolved Solids (TDS)      APHA 2540 SOLIDS C,E  
 A well-mixed sample is filtered through a glass fiber filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2C. The increase in vial weight represents the total dissolved solids.

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

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

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

### Chain of Custody Numbers:

#### GLOSSARY OF REPORT TERMS

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

*mg/kg - milligrams per kilogram based on dry weight of sample*

*mg/kg wwt - milligrams per kilogram based on wet weight of sample*

*mg/kg lwt - milligrams per kilogram based on lipid weight of sample*

*mg/L - unit of concentration based on volume, parts per million.*

*< - Less than.*

*D.L. - The reporting limit.*

*N/A - Result not available. Refer to qualifier code and definition for explanation.*

*Test results reported relate only to the samples as received by the laboratory.*

*UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.*

*Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.*



## Quality Control Report

Workorder: L2014939

Report Date: 20-NOV-17

Page 1 of 6

Client: PARKS ENVIRONMENTAL INC.



Contact: Derek Parks

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>ALK-TITR-WP</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3871900</b>							
<b>WG2653804-5</b>	<b>DUP</b>	<b>L2014939-1</b>						
Alkalinity, Total (as CaCO3)		79.9	79.8		mg/L	0.1	20	31-OCT-17
<b>WG2653804-4</b>	<b>LCS</b>							
Alkalinity, Total (as CaCO3)			102.9		%		85-115	31-OCT-17
<b>WG2653804-1</b>	<b>MB</b>							
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	31-OCT-17
<b>Batch</b>	<b>R3872566</b>							
<b>WG2654832-4</b>	<b>LCS</b>							
Alkalinity, Total (as CaCO3)			103.1		%		85-115	01-NOV-17
<b>WG2654832-1</b>	<b>MB</b>							
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	01-NOV-17
<b>C-DOC-HTC-WP</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3871645</b>							
<b>WG2653762-7</b>	<b>DUP</b>	<b>L2014939-8</b>						
Dissolved Organic Carbon		2.35	2.36		mg/L	0.4	20	31-OCT-17
<b>WG2653762-6</b>	<b>LCS</b>							
Dissolved Organic Carbon			95.8		%		80-120	31-OCT-17
<b>WG2653762-5</b>	<b>MB</b>							
Dissolved Organic Carbon			<0.50		mg/L		0.5	31-OCT-17
<b>WG2653762-8</b>	<b>MS</b>	<b>L2014939-7</b>						
Dissolved Organic Carbon			91.6		%		70-130	31-OCT-17
<b>CL-L-IC-N-WP</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3870475</b>							
<b>WG2652234-2</b>	<b>LCS</b>							
Chloride (Cl)			99.6		%		90-110	30-OCT-17
<b>WG2652234-1</b>	<b>MB</b>							
Chloride (Cl)			<0.10		mg/L		0.1	30-OCT-17
<b>EC-WP</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3871900</b>							
<b>WG2653804-5</b>	<b>DUP</b>	<b>L2014939-1</b>						
Conductivity		440	447		umhos/cm	1.6	10	31-OCT-17
<b>WG2653804-3</b>	<b>LCS</b>							
Conductivity			101.3		%		90-110	31-OCT-17
<b>WG2653804-1</b>	<b>MB</b>							
Conductivity			<1.0		umhos/cm		1	31-OCT-17





## Quality Control Report

Workorder: L2014939

Report Date: 20-NOV-17

Page 2 of 6

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>EC-WP</b>		<b>Water</b>						
<b>Batch</b>	<b>R3872566</b>							
<b>WG2654832-3</b>	<b>LCS</b>							
Conductivity			100.7		%		90-110	01-NOV-17
<b>WG2654832-1</b>	<b>MB</b>							
Conductivity			<1.0		umhos/cm		1	01-NOV-17
<b>MET-D-CCMS-WP</b>		<b>Water</b>						
<b>Batch</b>	<b>R3873386</b>							
<b>WG2654247-2</b>	<b>LCS</b>							
Calcium (Ca)-Dissolved			96.2		%		80-120	02-NOV-17
Magnesium (Mg)-Dissolved			107.7		%		80-120	02-NOV-17
<b>WG2654247-1</b>	<b>MB</b>							
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	02-NOV-17
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	02-NOV-17
<b>MET-T-CCMS-WP</b>		<b>Water</b>						
<b>Batch</b>	<b>R3880368</b>							
<b>WG2652871-2</b>	<b>LCS</b>							
Arsenic (As)-Total			100.1		%		80-120	09-NOV-17
Calcium (Ca)-Total			102.0		%		80-120	09-NOV-17
Cobalt (Co)-Total			99.3		%		80-120	09-NOV-17
Copper (Cu)-Total			87.1		%		80-120	09-NOV-17
Iron (Fe)-Total			101.5		%		80-120	09-NOV-17
Lead (Pb)-Total			101.8		%		80-120	09-NOV-17
Magnesium (Mg)-Total			101.2		%		80-120	09-NOV-17
Nickel (Ni)-Total			99.5		%		80-120	09-NOV-17
Potassium (K)-Total			98.8		%		80-120	09-NOV-17
Sodium (Na)-Total			90.0		%		80-120	09-NOV-17
Zinc (Zn)-Total			95.5		%		80-120	09-NOV-17
<b>WG2652871-1</b>	<b>MB</b>							
Arsenic (As)-Total			<0.00010		mg/L		0.0001	09-NOV-17
Calcium (Ca)-Total			<0.050		mg/L		0.05	09-NOV-17
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	09-NOV-17
Copper (Cu)-Total			<0.00050		mg/L		0.0005	09-NOV-17
Iron (Fe)-Total			<0.010		mg/L		0.01	09-NOV-17
Lead (Pb)-Total			<0.000050		mg/L		0.00005	09-NOV-17
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	09-NOV-17
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	09-NOV-17
Potassium (K)-Total			<0.050		mg/L		0.05	09-NOV-17



## Quality Control Report

Workorder: L2014939

Report Date: 20-NOV-17

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>MET-T-CCMS-WP</b>								
<b>Water</b>								
Batch	R3880368							
<b>WG2652871-1 MB</b>								
Sodium (Na)-Total			<0.050		mg/L		0.05	09-NOV-17
Zinc (Zn)-Total			<0.0030		mg/L		0.003	09-NOV-17
<b>PH-WP</b>								
<b>Water</b>								
Batch	R3871900							
<b>WG2653804-5 DUP</b>		<b>L2014939-1</b>						
pH		7.75	7.77	J	pH units	0.02	0.2	31-OCT-17
<b>WG2653804-2 LCS</b>								
pH			7.39		pH units		7.3-7.5	31-OCT-17
Batch	R3872566							
<b>WG2654832-2 LCS</b>								
pH			7.40		pH units		7.3-7.5	01-NOV-17
<b>SO4-IC-N-WP</b>								
<b>Water</b>								
Batch	R3870475							
<b>WG2652234-2 LCS</b>								
Sulfate (SO4)			100.6		%		90-110	30-OCT-17
<b>WG2652234-1 MB</b>								
Sulfate (SO4)			<0.30		mg/L		0.3	30-OCT-17
<b>SOLIDS-TOTSUS-WP</b>								
<b>Water</b>								
Batch	R3872814							
<b>WG2653771-11 DUP</b>		<b>L2014939-7</b>						
Total Suspended Solids		<5.0	<5.0	RPD-NA	mg/L	N/A	20	01-NOV-17
<b>WG2653771-10 LCS</b>								
Total Suspended Solids			99.3		%		85-115	01-NOV-17
<b>WG2653771-6 LCS</b>								
Total Suspended Solids			98.7		%		85-115	01-NOV-17
<b>WG2653771-5 MB</b>								
Total Suspended Solids			<5.0		mg/L		5	01-NOV-17
<b>WG2653771-9 MB</b>								
Total Suspended Solids			<5.0		mg/L		5	01-NOV-17
<b>TDS-WP</b>								
<b>Water</b>								
Batch	R3872481							
<b>WG2652648-6 LCS</b>								
Total Dissolved Solids			101.7		%		85-115	31-OCT-17
<b>WG2652648-14 MB</b>								
Total Dissolved Solids			<4.0		mg/L		4	31-OCT-17



## Quality Control Report

Workorder: L2014939

Report Date: 20-NOV-17

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>TDS-WP</b>	<b>Water</b>							
Batch	R3872481							
<b>WG2652648-5 MB</b>								
Total Dissolved Solids			<10		mg/L		10	31-OCT-17

# Quality Control Report

Workorder: L2014939

Report Date: 20-NOV-17

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## Legend:

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

## Sample Parameter Qualifier Definitions:

---

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

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# Quality Control Report

Workorder: L2014939

Report Date: 20-NOV-17

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## Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
<b>Physical Tests</b>							
pH							
	1	28-OCT-17 16:00	31-OCT-17 12:00	0.25	68	hours	EHTR-FM
	2	28-OCT-17 14:00	01-NOV-17 12:00	0.25	94	hours	EHTR-FM
	3	28-OCT-17 13:00	31-OCT-17 12:00	0.25	71	hours	EHTR-FM
	4	28-OCT-17 14:45	31-OCT-17 12:00	0.25	69	hours	EHTR-FM
	5	Not provided	31-OCT-17 12:00	0.25	27	hours	EHTR-FM
	6	28-OCT-17 13:45	31-OCT-17 12:00	0.25	70	hours	EHTR-FM
	7	28-OCT-17 13:00	31-OCT-17 12:00	0.25	71	hours	EHTR-FM
	8	28-OCT-17 16:00	31-OCT-17 12:00	0.25	68	hours	EHTR-FM

## Legend & Qualifier Definitions:

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

### Notes\*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.

Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2014939 were received on 30-OCT-17 08:40.

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

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

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



L2014939

<b>Report To</b> Contact and company name below will appear on the final report			Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply																						
Company:	Parks Environmental Inc.	Select:	<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)	Regular [R] <input type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply																					
Contact:	Derek Parks	Quality Control (QC) Report with Report:	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	4 day [P4]	<input type="checkbox"/> 1 Business day [E1]																				
Phone:	[REDACTED]	<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked		3 day [P3]	<input type="checkbox"/> Same Day, Weekend or Statutory holiday [E0]																				
Company address below will appear on the final report			Select Distribution:	<input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX																					
Street:	[REDACTED]	Email 1 or Fax:	[REDACTED]	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm																					
City/Province:	[REDACTED]	Email 2:	[REDACTED]	For tests that can not be performed according to the service level selected, you will be contacted.																					
Postal Code:	[REDACTED]	Email 3:	[REDACTED]	<b>Analysis Request</b>																					
Invoice To:	Same as Report To <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<b>Invoice Distribution</b>		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below																					
	Copy of Invoice with Report <input type="checkbox"/> YES <input type="checkbox"/> NO	Select Invoice Distribution:																							
		<input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX																							
Company:	[REDACTED]	Email 1 or Fax:	[REDACTED]	Number of Containers																					
Contact:	[REDACTED]	Email 2:	[REDACTED]																						
<b>Project Information</b>			<b>Oil and Gas Required Fields (client use)</b>																						
ALS Account # / Quote #:	Q61921	AFE/Cost Center:	PO#:																						
Job #:		Major/Minor Code:	Routing Code:																						
PO / AFE:		Requisitioner:																							
LSD:	Thiery	Location:																							
ALS Lab Work Order # (lab use only)		ALS Contact:	Sampler:																						
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)			Sample Type																			
	SW-7					Surface Water	x x x x																		
	SW-8			Surface Water	x x x x																				
	SW-9	28/10/17 19:00	13:00	Surface Water	x x x x																				
	SW-10	28/10/17	13:00	Surface Water	x x x x																				
	SW-11-S	28/10/17	14:45	Surface Water	x x x x																				
	SW-TRIP BLANK			Surface Water	x x x x																				
	SW-FIELD BLANK	28/10/17	13:45	Surface Water	x x x x																				
	SW-EQUIPMENT BLANK	28/10/17	13:00	Surface Water	x x x x																				
	DUP	28/10/17	16:00	Surface Water	x x x x																				
				Surface Water	x x x x																				
				Surface Water	x x x x																				
<b>Drinking Water (DW) Samples<sup>1</sup> (client use)</b>		<b>Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)</b>																							
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td colspan="2">Frozen <input type="checkbox"/></td> <td colspan="2">SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/></td> </tr> <tr> <td colspan="2">Ice Packs <input type="checkbox"/> Ice Cubes <input type="checkbox"/></td> <td colspan="2">Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/></td> </tr> <tr> <td colspan="4">Cooling Initiated <input type="checkbox"/></td> </tr> <tr> <td colspan="2">INITIAL COOLER TEMPERATURES °C</td> <td colspan="2">FINAL COOLER TEMPERATURES °C</td> </tr> <tr> <td colspan="2"></td> <td colspan="2" style="text-align: center;">-3</td> </tr> </table>				Frozen <input type="checkbox"/>		SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>		Ice Packs <input type="checkbox"/> Ice Cubes <input type="checkbox"/>		Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/>		Cooling Initiated <input type="checkbox"/>				INITIAL COOLER TEMPERATURES °C		FINAL COOLER TEMPERATURES °C				-3	
Frozen <input type="checkbox"/>						SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>																			
Ice Packs <input type="checkbox"/> Ice Cubes <input type="checkbox"/>						Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/>																			
Cooling Initiated <input type="checkbox"/>																									
INITIAL COOLER TEMPERATURES °C		FINAL COOLER TEMPERATURES °C																							
		-3																							
Are samples for human drinking water use? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO																									
<b>SHIPMENT RELEASE (client use)</b>		<b>INITIAL SHIPMENT RECEPTION (lab use only)</b>		<b>FINAL SHIPMENT RECEPTION (lab use only)</b>																					
Released by:	Date:	Time:	Received by:	Date:	Time:																				
Collin McMillan	30/10/2017		AAC	30/10/17	8:40																				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2016 PRINT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.



PARKS ENVIRONMENTAL INC.  
ATTN: Derek Parks

Date Received: 16-NOV-17  
Report Date: 28-NOV-17 14:48 (MT)  
Version: FINAL

Client Phone: [REDACTED]

## Certificate of Analysis

Lab Work Order #: L2023676  
Project P.O. #: NOT SUBMITTED  
Job Reference:  
C of C Numbers:  
Legal Site Desc:

---

Christine Paradis  
Project Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 1081 Barton Street, Thunder Bay, ON P7B 5N3 Canada | Phone: +1 807 623 6463 | Fax: +1 807 623 7598  
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2023676-1 MW-02 Sampled By: MD/CM on 15-NOV-17 @ 15:00 Matrix: Ground Water							
<b>Physical Tests</b>							
Conductivity (EC)	944		3.0	uS/cm		17-NOV-17	R3887501
Hardness (as CaCO3)	514		0.50	mg/L		23-NOV-17	
pH	7.51		0.10	pH		17-NOV-17	R3887501
Total Suspended Solids	10500		6.0	mg/L		17-NOV-17	R3887647
Total Dissolved Solids	607		20	mg/L		18-NOV-17	R3887934
<b>Anions and Nutrients</b>							
Acceptable % Difference	PASS					23-NOV-17	
Alkalinity, Total (as CaCO3)	470		2.0	mg/L		17-NOV-17	R3887501
Chloride (Cl)	4.34		0.10	mg/L		17-NOV-17	R3887616
Sulfate (SO4)	68.6		0.30	mg/L		17-NOV-17	R3887616
Anion Sum	11.0			meq/L		23-NOV-17	
Cation Sum	11.4			meq/L		23-NOV-17	
Cation - Anion Balance	2.1			%		23-NOV-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	LAB					17-NOV-17	R3887422
Dissolved Organic Carbon	3.5		1.0	mg/L	17-NOV-17	19-NOV-17	R3888687
<b>Total Metals</b>							
Arsenic (As)-Total	0.0079		0.0010	mg/L	20-NOV-17	22-NOV-17	R3893466
Calcium (Ca)-Total	562		0.50	mg/L	20-NOV-17	22-NOV-17	R3893466
Cobalt (Co)-Total	0.0200		0.0010	mg/L	20-NOV-17	22-NOV-17	R3893466
Copper (Cu)-Total	0.314		0.0050	mg/L	20-NOV-17	22-NOV-17	R3893466
Iron (Fe)-Total	34.1		0.10	mg/L	20-NOV-17	22-NOV-17	R3893466
Lead (Pb)-Total	0.0181		0.00050	mg/L	20-NOV-17	22-NOV-17	R3893466
Magnesium (Mg)-Total	135		0.050	mg/L	20-NOV-17	22-NOV-17	R3893466
Nickel (Ni)-Total	0.116		0.0050	mg/L	20-NOV-17	22-NOV-17	R3893466
Potassium (K)-Total	9.13		0.50	mg/L	20-NOV-17	22-NOV-17	R3893466
Sodium (Na)-Total	22.6		0.50	mg/L	20-NOV-17	22-NOV-17	R3893466
Zinc (Zn)-Total	0.101		0.030	mg/L	20-NOV-17	22-NOV-17	R3893466
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					20-NOV-17	R3888330
Calcium (Ca)-Dissolved	162		0.050	mg/L	20-NOV-17	20-NOV-17	R3891801
Magnesium (Mg)-Dissolved	26.7		0.0050	mg/L	20-NOV-17	20-NOV-17	R3891801
L2023676-2 MW-04 Sampled By: MD/CM on 15-NOV-17 @ 17:00 Matrix: Ground Water							
<b>Physical Tests</b>							
Conductivity (EC)	1260		3.0	uS/cm		17-NOV-17	R3887501
Hardness (as CaCO3)	730		0.50	mg/L		23-NOV-17	
pH	7.16		0.10	pH		17-NOV-17	R3887501
Total Suspended Solids	11000		12	mg/L		17-NOV-17	R3887647
Total Dissolved Solids	946		20	mg/L		18-NOV-17	R3887934
<b>Anions and Nutrients</b>							

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



## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2023676-2 MW-04 Sampled By: MD/CM on 15-NOV-17 @ 17:00 Matrix: Ground Water							
<b>Anions and Nutrients</b>							
Acceptable % Difference	PASS					23-NOV-17	
Alkalinity, Total (as CaCO3)	308		2.0	mg/L		17-NOV-17	R3887501
Chloride (Cl)	3.96		0.10	mg/L		17-NOV-17	R3887616
Sulfate (SO4)	424		0.30	mg/L		17-NOV-17	R3887616
Anion Sum	15.1			meq/L		23-NOV-17	
Cation Sum	15.9			meq/L		23-NOV-17	
Cation - Anion Balance	2.7			%		23-NOV-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	LAB					17-NOV-17	R3887422
Dissolved Organic Carbon	39.4		1.0	mg/L	17-NOV-17	19-NOV-17	R3888687
<b>Total Metals</b>							
Arsenic (As)-Total	0.0214		0.0010	mg/L	20-NOV-17	22-NOV-17	R3893466
Calcium (Ca)-Total	1080		0.50	mg/L	20-NOV-17	22-NOV-17	R3893466
Cobalt (Co)-Total	0.0533		0.0010	mg/L	20-NOV-17	22-NOV-17	R3893466
Copper (Cu)-Total	0.209		0.0050	mg/L	20-NOV-17	22-NOV-17	R3893466
Iron (Fe)-Total	112		0.10	mg/L	20-NOV-17	22-NOV-17	R3893466
Lead (Pb)-Total	0.0522		0.00050	mg/L	20-NOV-17	22-NOV-17	R3893466
Magnesium (Mg)-Total	225		0.050	mg/L	20-NOV-17	22-NOV-17	R3893466
Nickel (Ni)-Total	0.146		0.0050	mg/L	20-NOV-17	22-NOV-17	R3893466
Potassium (K)-Total	26.3		0.50	mg/L	20-NOV-17	22-NOV-17	R3893466
Sodium (Na)-Total	20.0		0.50	mg/L	20-NOV-17	22-NOV-17	R3893466
Zinc (Zn)-Total	0.203		0.030	mg/L	20-NOV-17	22-NOV-17	R3893466
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					20-NOV-17	R3888330
Calcium (Ca)-Dissolved	242		0.050	mg/L	20-NOV-17	20-NOV-17	R3891801
Magnesium (Mg)-Dissolved	30.7		0.0050	mg/L	20-NOV-17	20-NOV-17	R3891801
L2023676-3 MW-12 Sampled By: MD/CM on 14-NOV-17 @ 14:45 Matrix: Ground Water							
<b>Physical Tests</b>							
Conductivity (EC)	558		3.0	uS/cm		17-NOV-17	R3887501
Hardness (as CaCO3)	300		0.50	mg/L		22-NOV-17	
pH	7.49		0.10	pH		17-NOV-17	R3887501
Total Suspended Solids	1970		12	mg/L		17-NOV-17	R3887647
Total Dissolved Solids	346		20	mg/L		18-NOV-17	R3887934
<b>Anions and Nutrients</b>							
Acceptable % Difference	PASS					22-NOV-17	
Alkalinity, Total (as CaCO3)	305		2.0	mg/L		17-NOV-17	R3887501
Chloride (Cl)	1.17		0.10	mg/L		17-NOV-17	R3887616
Sulfate (SO4)	7.87		0.30	mg/L		17-NOV-17	R3887616
Anion Sum	6.28			meq/L		22-NOV-17	
Cation Sum	6.85			meq/L		22-NOV-17	

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2023676-3 MW-12 Sampled By: MD/CM on 14-NOV-17 @ 14:45 Matrix: Ground Water							
<b>Anions and Nutrients</b>							
Cation - Anion Balance	4.3			%		22-NOV-17	
<b>Organic / Inorganic Carbon</b>							
Dissolved Carbon Filtration Location	LAB					17-NOV-17	R3887422
Dissolved Organic Carbon	5.7		1.0	mg/L	17-NOV-17	19-NOV-17	R3888687
<b>Total Metals</b>							
Arsenic (As)-Total	0.00360		0.00010	mg/L	19-NOV-17	21-NOV-17	R3892408
Calcium (Ca)-Total	229		0.050	mg/L	19-NOV-17	21-NOV-17	R3892408
Cobalt (Co)-Total	0.00961		0.00010	mg/L	19-NOV-17	21-NOV-17	R3892408
Copper (Cu)-Total	0.0666		0.00050	mg/L	19-NOV-17	21-NOV-17	R3892408
Iron (Fe)-Total	25.0		0.010	mg/L	19-NOV-17	21-NOV-17	R3892408
Lead (Pb)-Total	0.0224		0.000050	mg/L	19-NOV-17	21-NOV-17	R3892408
Magnesium (Mg)-Total	28.3		0.0050	mg/L	19-NOV-17	21-NOV-17	R3892408
Nickel (Ni)-Total	0.0203		0.00050	mg/L	19-NOV-17	21-NOV-17	R3892408
Potassium (K)-Total	4.34		0.050	mg/L	19-NOV-17	21-NOV-17	R3892408
Sodium (Na)-Total	3.67		0.050	mg/L	19-NOV-17	21-NOV-17	R3892408
Zinc (Zn)-Total	0.0420		0.0030	mg/L	19-NOV-17	21-NOV-17	R3892408
<b>Dissolved Metals</b>							
Dissolved Metals Filtration Location	FIELD					20-NOV-17	R3888330
Calcium (Ca)-Dissolved	102		0.050	mg/L	20-NOV-17	20-NOV-17	R3891801
Magnesium (Mg)-Dissolved	10.9		0.0050	mg/L	20-NOV-17	20-NOV-17	R3891801

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

## Reference Information

**QC Samples with Qualifiers & Comments:**

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2023676-1, -2, -3
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2023676-1, -2, -3

**Sample Parameter Qualifier key listed:**

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

**Test Method References:**

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TITR-TB	Water	Alkalinity	APHA 2320B modified This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
CL-L-IC-N-TB	Water	Chloride in Water by IC (Low Level)	EPA 300.1 (mod) Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
DOC-TB	Water	Dissolved Organic Carbon	APHA 5310 B modified Water samples are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis. Analyzed by converting all carbonaceous material to carbon dioxide (CO <sub>2</sub> ) by catalytic combustion at 850°C. The CO <sub>2</sub> generated is measured by an infrared detector and is directly proportional to concentration of carbonaceous material in the sample
EC-TITR-TB	Water	Conductivity	APHA 2510 B This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.
HARDNESS-CALC-TB	Water	Hardness (as CaCO <sub>3</sub> )	CALCULATION
IONBALANCE-TB	Water	Ion Balance Calculation	APHA 1030 E - CALCULATION Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.  Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:  Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]
MET-D-CCMS-TB	Water	Dissolved Metals in Water by CRC	APHA 3030B/6020A (mod) Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
MET-T-CCMS-TB	Water	Total Metals in Water by CRC	EPA 200.2/6020A (mod) Water samples are digested with nitric and perchloric acids, and analyzed by CRC ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
PH-TITR-TB	Water	pH	APHA 4500-H This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode
SO4-IC-N-TB	Water	Sulfate in Water by IC	EPA 300.1 (mod) Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
TDS-TB	Water	Total Dissolved Solids	APHA 2540 C (modified) Aqueous matrices are analyzed using gravimetry and evaporation
TSS-TB	Water	Total Suspended Solids	APHA 2540 D (modified) Aqueous matrices are analyzed using gravimetry

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

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

Laboratory Definition Code	Laboratory Location
TB	ALS ENVIRONMENTAL - THUNDER BAY, ONTARIO, CANADA

**Chain of Custody Numbers:**

## Reference Information

### GLOSSARY OF REPORT TERMS

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

*mg/kg - milligrams per kilogram based on dry weight of sample*

*mg/kg wwt - milligrams per kilogram based on wet weight of sample*

*mg/kg lwt - milligrams per kilogram based on lipid weight of sample*

*mg/L - unit of concentration based on volume, parts per million.*

*< - Less than.*

*D.L. - The reporting limit.*

*N/A - Result not available. Refer to qualifier code and definition for explanation.*

*Test results reported relate only to the samples as received by the laboratory.*

*UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.*

*Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.*



## Quality Control Report

Workorder: L2023676

Report Date: 28-NOV-17

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Client: PARKS ENVIRONMENTAL INC.



Contact: Derek Parks

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>ALK-TITR-TB</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3887501</b>							
<b>WG2666216-5</b>	<b>LCS</b>							
Alkalinity, Total (as CaCO3)			99.6		%		85-115	17-NOV-17
<b>WG2666216-4</b>	<b>MB</b>							
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	17-NOV-17
<b>CL-L-IC-N-TB</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3887616</b>							
<b>WG2666070-8</b>	<b>DUP</b>	<b>L2023676-1</b>						
Chloride (Cl)		4.34	4.24		mg/L	2.4	20	17-NOV-17
<b>WG2666070-6</b>	<b>LCS</b>							
Chloride (Cl)			98.6		%		90-110	17-NOV-17
<b>WG2666070-5</b>	<b>MB</b>							
Chloride (Cl)			<0.10		mg/L		0.1	17-NOV-17
<b>WG2666070-7</b>	<b>MS</b>	<b>L2023676-1</b>						
Chloride (Cl)			89.9		%		75-125	17-NOV-17
<b>DOC-TB</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3888687</b>							
<b>WG2666348-3</b>	<b>DUP</b>	<b>L2023676-1</b>						
Dissolved Organic Carbon		3.5	3.6		mg/L	1.6	20	19-NOV-17
<b>WG2666348-2</b>	<b>LCS</b>							
Dissolved Organic Carbon			97.0		%		80-120	19-NOV-17
<b>WG2666348-1</b>	<b>MB</b>							
Dissolved Organic Carbon			<1.0		mg/L		1	19-NOV-17
<b>WG2666348-4</b>	<b>MS</b>	<b>L2023676-1</b>						
Dissolved Organic Carbon			99.99		%		70-130	19-NOV-17
<b>EC-TITR-TB</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3887501</b>							
<b>WG2666216-5</b>	<b>LCS</b>							
Conductivity (EC)			100.4		%		90-110	17-NOV-17
<b>WG2666216-4</b>	<b>MB</b>							
Conductivity (EC)			<3.0		uS/cm		3	17-NOV-17
<b>MET-D-CCMS-TB</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3891801</b>							
<b>WG2666304-3</b>	<b>DUP</b>	<b>L2023676-3</b>						
Calcium (Ca)-Dissolved		102	104		mg/L	2.3	20	20-NOV-17
Magnesium (Mg)-Dissolved		10.9	11.0		mg/L	0.9	20	20-NOV-17
<b>WG2666304-2</b>	<b>LCS</b>							
Calcium (Ca)-Dissolved			98.2		%		80-120	20-NOV-17



## Quality Control Report

Workorder: L2023676

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>MET-D-CCMS-TB</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3891801</b>							
<b>WG2666304-2</b>	<b>LCS</b>							
Magnesium (Mg)-Dissolved			96.3		%		80-120	20-NOV-17
<b>WG2666304-1</b>	<b>MB</b>							
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	20-NOV-17
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	20-NOV-17
<b>WG2666304-4</b>	<b>MS</b>	<b>L2023676-3</b>						
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	20-NOV-17
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	20-NOV-17
<b>MET-T-CCMS-TB</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3892408</b>							
<b>WG2666833-10</b>	<b>LCS</b>							
Arsenic (As)-Total			105.1		%		80-120	21-NOV-17
Calcium (Ca)-Total			98.1		%		80-120	21-NOV-17
Cobalt (Co)-Total			101.4		%		80-120	21-NOV-17
Copper (Cu)-Total			99.9		%		80-120	21-NOV-17
Iron (Fe)-Total			98.6		%		80-120	21-NOV-17
Lead (Pb)-Total			97.0		%		80-120	21-NOV-17
Magnesium (Mg)-Total			103.5		%		80-120	21-NOV-17
Nickel (Ni)-Total			102.4		%		80-120	21-NOV-17
Potassium (K)-Total			102.2		%		80-120	21-NOV-17
Sodium (Na)-Total			96.8		%		80-120	21-NOV-17
Zinc (Zn)-Total			97.4		%		80-120	21-NOV-17
<b>WG2666833-9</b>	<b>MB</b>							
Arsenic (As)-Total			<0.00010		mg/L		0.0001	21-NOV-17
Calcium (Ca)-Total			<0.050		mg/L		0.05	21-NOV-17
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	21-NOV-17
Copper (Cu)-Total			<0.00050		mg/L		0.0005	21-NOV-17
Iron (Fe)-Total			<0.010		mg/L		0.01	21-NOV-17
Lead (Pb)-Total			<0.000050		mg/L		0.00005	21-NOV-17
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	21-NOV-17
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	21-NOV-17
Potassium (K)-Total			<0.050		mg/L		0.05	21-NOV-17
Sodium (Na)-Total			<0.050		mg/L		0.05	21-NOV-17
Zinc (Zn)-Total			<0.0030		mg/L		0.003	21-NOV-17



## Quality Control Report

Workorder: L2023676

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>MET-T-CCMS-TB</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3893466</b>							
<b>WG2667102-3</b>	<b>DUP</b>	<b>L2023676-2</b>						
Arsenic (As)-Total		0.0214	0.0217		mg/L	1.5	20	22-NOV-17
Calcium (Ca)-Total		1080	1100		mg/L	1.9	20	22-NOV-17
Cobalt (Co)-Total		0.0533	0.0569		mg/L	6.7	20	22-NOV-17
Copper (Cu)-Total		0.209	0.210		mg/L	0.6	20	22-NOV-17
Iron (Fe)-Total		112	114		mg/L	2.1	20	22-NOV-17
Lead (Pb)-Total		0.0522	0.0553		mg/L	5.7	20	22-NOV-17
Magnesium (Mg)-Total		225	233		mg/L	3.6	20	22-NOV-17
Nickel (Ni)-Total		0.146	0.146		mg/L	0.1	20	22-NOV-17
Potassium (K)-Total		26.3	25.9		mg/L	1.3	20	22-NOV-17
Sodium (Na)-Total		20.0	20.0		mg/L	0.1	20	22-NOV-17
Zinc (Zn)-Total		0.203	0.213		mg/L	5.1	20	22-NOV-17
<b>WG2667102-2</b>	<b>LCS</b>							
Arsenic (As)-Total			100.1		%		80-120	22-NOV-17
Calcium (Ca)-Total			99.7		%		80-120	22-NOV-17
Cobalt (Co)-Total			98.0		%		80-120	22-NOV-17
Copper (Cu)-Total			98.3		%		80-120	22-NOV-17
Iron (Fe)-Total			98.7		%		80-120	22-NOV-17
Lead (Pb)-Total			97.6		%		80-120	22-NOV-17
Magnesium (Mg)-Total			103.0		%		80-120	22-NOV-17
Nickel (Ni)-Total			97.8		%		80-120	22-NOV-17
Potassium (K)-Total			95.2		%		80-120	22-NOV-17
Sodium (Na)-Total			96.5		%		80-120	22-NOV-17
Zinc (Zn)-Total			94.5		%		80-120	22-NOV-17
<b>WG2667102-1</b>	<b>MB</b>							
Arsenic (As)-Total			<0.00010		mg/L		0.0001	22-NOV-17
Calcium (Ca)-Total			<0.050		mg/L		0.05	22-NOV-17
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	22-NOV-17
Copper (Cu)-Total			<0.00050		mg/L		0.0005	22-NOV-17
Iron (Fe)-Total			<0.010		mg/L		0.01	22-NOV-17
Lead (Pb)-Total			<0.000050		mg/L		0.00005	22-NOV-17
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	22-NOV-17
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	22-NOV-17
Potassium (K)-Total			<0.050		mg/L		0.05	22-NOV-17
Sodium (Na)-Total			<0.050		mg/L		0.05	22-NOV-17
Zinc (Zn)-Total			<0.0030		mg/L		0.003	22-NOV-17



## Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>PH-TITR-TB</b>								
<b>Water</b>								
Batch	R3887501							
WG2666216-5	LCS							
pH			5.98		pH		5.9-6.1	17-NOV-17
<b>SO4-IC-N-TB</b>								
<b>Water</b>								
Batch	R3887616							
WG2666070-8	DUP	L2023676-1						
Sulfate (SO4)		68.6	68.1		mg/L	0.8	20	17-NOV-17
WG2666070-6	LCS							
Sulfate (SO4)			98.9		%		90-110	17-NOV-17
WG2666070-5	MB							
Sulfate (SO4)			<0.30		mg/L		0.3	17-NOV-17
WG2666070-7	MS	L2023676-1						
Sulfate (SO4)			83.1		%		75-125	17-NOV-17
<b>TDS-TB</b>								
<b>Water</b>								
Batch	R3887934							
WG2666756-2	LCS							
Total Dissolved Solids			98.4		%		85-115	18-NOV-17
WG2666756-1	MB							
Total Dissolved Solids			<10		mg/L		10	18-NOV-17
<b>TSS-TB</b>								
<b>Water</b>								
Batch	R3887647							
WG2666449-3	DUP	L2023676-1						
Total Suspended Solids		10500	9600		mg/L	8.8	20	17-NOV-17
WG2666449-2	LCS							
Total Suspended Solids			93.4		%		85-115	17-NOV-17
WG2666449-1	MB							
Total Suspended Solids			<2.0		mg/L		2	17-NOV-17



# Quality Control Report

Workorder: L2023676

Report Date: 28-NOV-17

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## Legend:

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

## Sample Parameter Qualifier Definitions:

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Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

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## Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

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

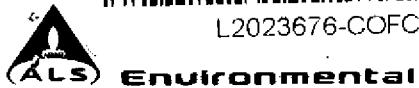
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The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared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

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



L2023676-COFC



Chain of Custody / Analytical Request Form  
Canada Toll Free: 1 800 668 9878  
www.alsglobal.com

10-224043

Report To: <b>DEREK PARKS</b>	Report Format / Distribution	Service Request: (Rush subject to availability - Contact ALS to confirm TAT)
Company: <b>PARKS ENVIRONMENTAL INC</b>	Standard: <input checked="" type="checkbox"/> Other (specify):	<input checked="" type="checkbox"/> Regular (Standard Turnaround Times - Business Days)
Contact: <b>DEREK PARKS</b>	Select: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax	Priority (2-4 Business Days) - 50% surcharge - Contact ALS to confirm TAT
Address: [Redacted]	Email 1: [Redacted]	Emergency (1-2 Business Days) - 100% Surcharge - Contact ALS to confirm TAT
Phone: [Redacted] Fax: [Redacted]	Email 2: [Redacted]	Same Day or Weekend Emergency - Contact ALS to confirm TAT

Invoice: <input checked="" type="checkbox"/> Yes or No (if No, provide details)	Client / Project Information	Analysis Request (Indicate Filtered or Preserved, F/P)			
Copy of Invoice with Report? (circle) <input checked="" type="checkbox"/> Yes or No	Job #:	ROUTIN	TOTAL METALS		
Company:	PO / AFE:			DISOLVED METALS	
Contact:	LSD:				Number of Containers
Address:	Quote #:				
Phone: [Redacted] Fax: [Redacted]	ALS Contact:	Sampler: <b>MICHAEL DUGUAY COLLIN MCMILLAN</b>			

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ROUTIN	TOTAL METALS	DISOLVED METALS	Number of Containers
#1	MW-02	15-Nov-17	15:00	GROUNDWATER	X	X	X	3
#2	MW-04	15-Nov-17	17:00	GROUNDWATER	X	X	X	3
#3	MW-12	14-Nov-17	14:45	GROUNDWATER	X	X	X	3

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

**ROUTIN HAS NOT BEEN PRESERVED, ALL METELS HAVE BEEN PRESERVED, ALL DISOLVED METALS HAVE BEEN FILTERED AND PRESERVED**

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: <b>MICHAEL DUGUAY</b>	Date: <b>Nov 16/2017</b>	Time:	Received by: <b>BP</b>	Date: <b>Nov. 16</b>	Time: <b>4:30</b>	Temperature: <b>5.2 °C</b>	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

- Dam Survey Profiles (Tulloch Eng.)
- Groundwater Sample Locations (Parks Env.)
- Gravel Road Access: Town of Pickle Lake to Thierry Mine

Land Tenure

- Leases and Patents (Cadillac Ventures Holdings 100%)

Note:  
 Water sample 10 is at Ponsford Creek (~7.5km NE of mine site)  
 Water sample 11 is at Kapkichi Lake (~1.8km SW of mine site)

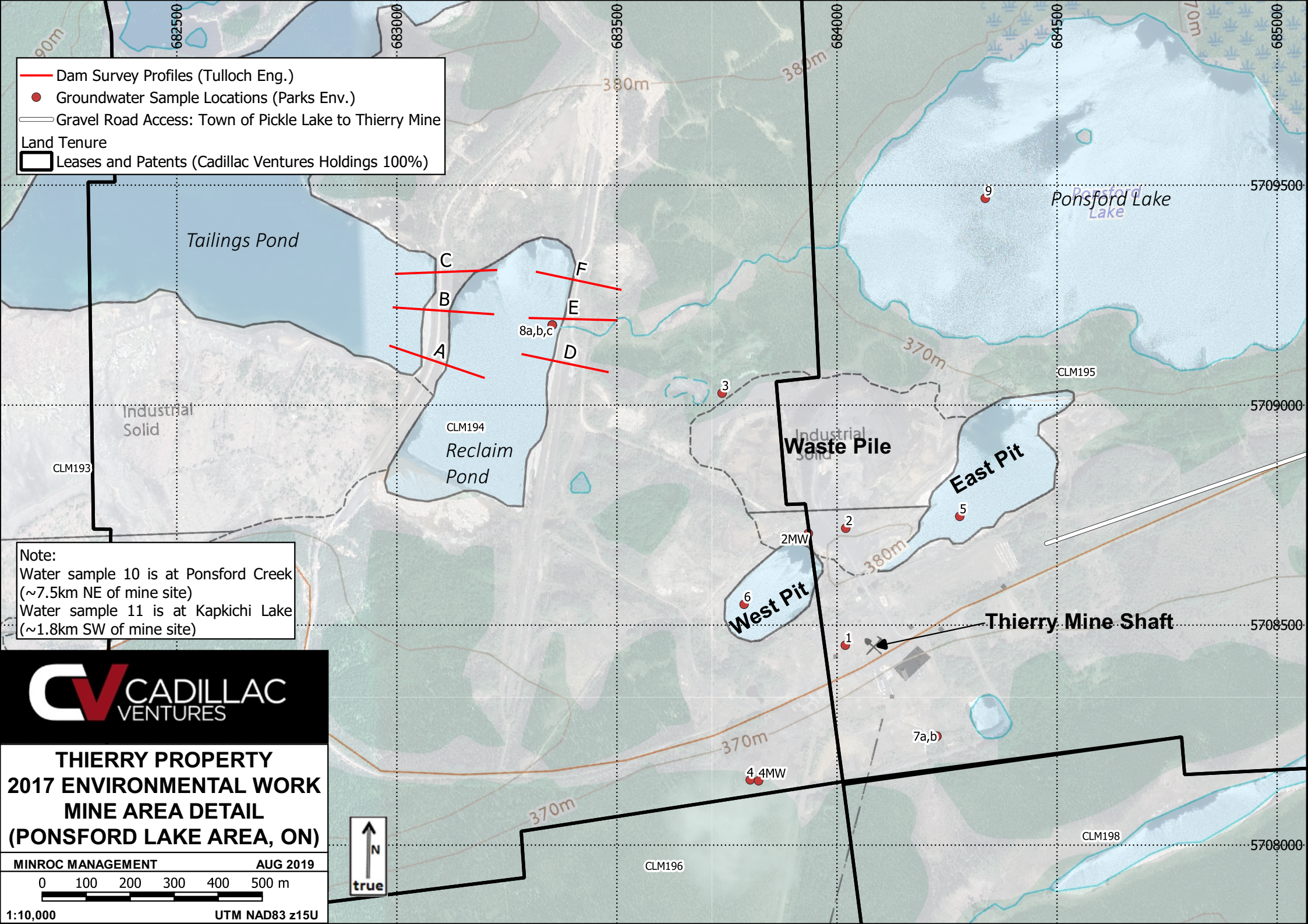
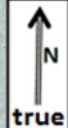


**THIERRY PROPERTY  
 2017 ENVIRONMENTAL WORK  
 MINE AREA DETAIL  
 (PONSFORD LAKE AREA, ON)**

MINROC MANAGEMENT      AUG 2019

0   100   200   300   400   500 m

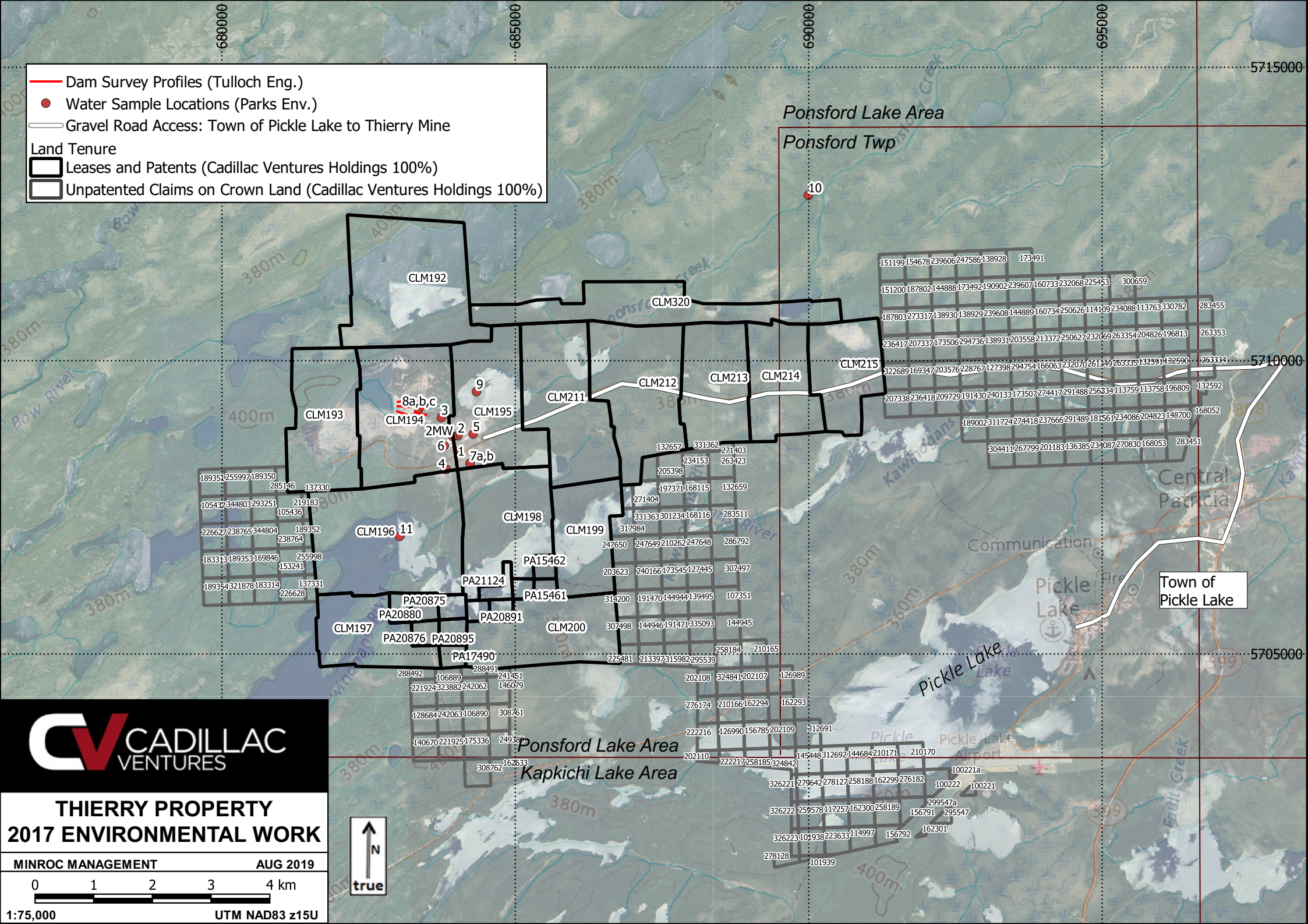
1:10,000      UTM NAD83 z15U



- Dam Survey Profiles (Tulloch Eng.)
- Water Sample Locations (Parks Env.)
- Gravel Road Access: Town of Pickle Lake to Thierry Mine

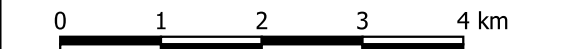
Land Tenure

- Leases and Patents (Cadillac Ventures Holdings 100%)
- Unpatented Claims on Crown Land (Cadillac Ventures Holdings 100%)



## THIERRY PROPERTY 2017 ENVIRONMENTAL WORK

MINROC MANAGEMENT AUG 2019



1:75,000 UTM NAD83 z15U

