



BLACK STURGEON LAKES WATER QUALITY MONITORING 2016 REPORT

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1.0 BACKGROUND

In the fall of 2007, the City of Kenora was presented with the results of the *Lake Capacity and Management Study for Black Sturgeon Lake*. One of the recommendations of this study was to conduct a water quality assessment on Lower Black Sturgeon Lake for two consecutive years to establish baseline data and then once every five years to monitor changes to the water quality in the lake. Based on the results of the 2009, 2010, and 2015 sampling seasons, it was recommended by the consultant (Kenora Resource Consultants Inc.) that annual sampling focussing on one spring sampling session and one late summer sampling session would provide a more effective monitoring program than the original project design of 10 sampling sessions conducted every five years.

In 2009 and 2010, the City of Kenora awarded the contract to conduct the baseline data work for the first two-years of water quality monitoring on Black Sturgeon Lakes to Ryan Haines Consulting. In 2015 and 2016, the water quality assessment contract was awarded to Kenora Resource Consultants Inc. (note – Ryan Haines Consulting was incorporated into Kenora Resource Consultants Inc. in 2012).

2.0 METHODOLOGY

Two sampling sessions were conducted during the 2016 season, a spring session on May 8th and a late summer session on August 28th. Water samples were taken at two locations on Lower Black Sturgeon Lake and one location at Upper Black Sturgeon during each sampling session. Sample locations on Lower Black Sturgeon correspond to sites identified in the *Lake Capacity and Management Study for Black Sturgeon Lake*. The site on Upper Black Sturgeon was added during the 2010 sampling season to help to better understand potential sources of the higher nutrient levels found at the upstream site on Lower Black Sturgeon during the 2009 sampling season.

The selection of the site locations has been designed to determine the impacts of development on the water quality of Black Sturgeon Lakes. Site 2 is located at the outlet of Black Sturgeon Lakes into the Winnipeg River, Site 3 is located at inlet of Black Sturgeon Creek into Lower Black Sturgeon Lake, and Site 4 is located at the outlet of Upper Black Sturgeon Lake (Site 4) into Black Sturgeon Creek. Site 2 is the main sampling location used to assess the impacts of development on water quality because the new and proposed developments on Lower Black Sturgeon Lake are occurring upstream of this site.

All field work was conducted from a small motorboat with a sonar unit mounted to the stern. At each sampling site, an anchor was used to keep the boat in one location.

Temperature/oxygen profiles were obtained at Sites#1, #2, #3, and #4 (Figure 1) during the August 28th sampling session using a YSI 55 Dissolved Oxygen Meter.

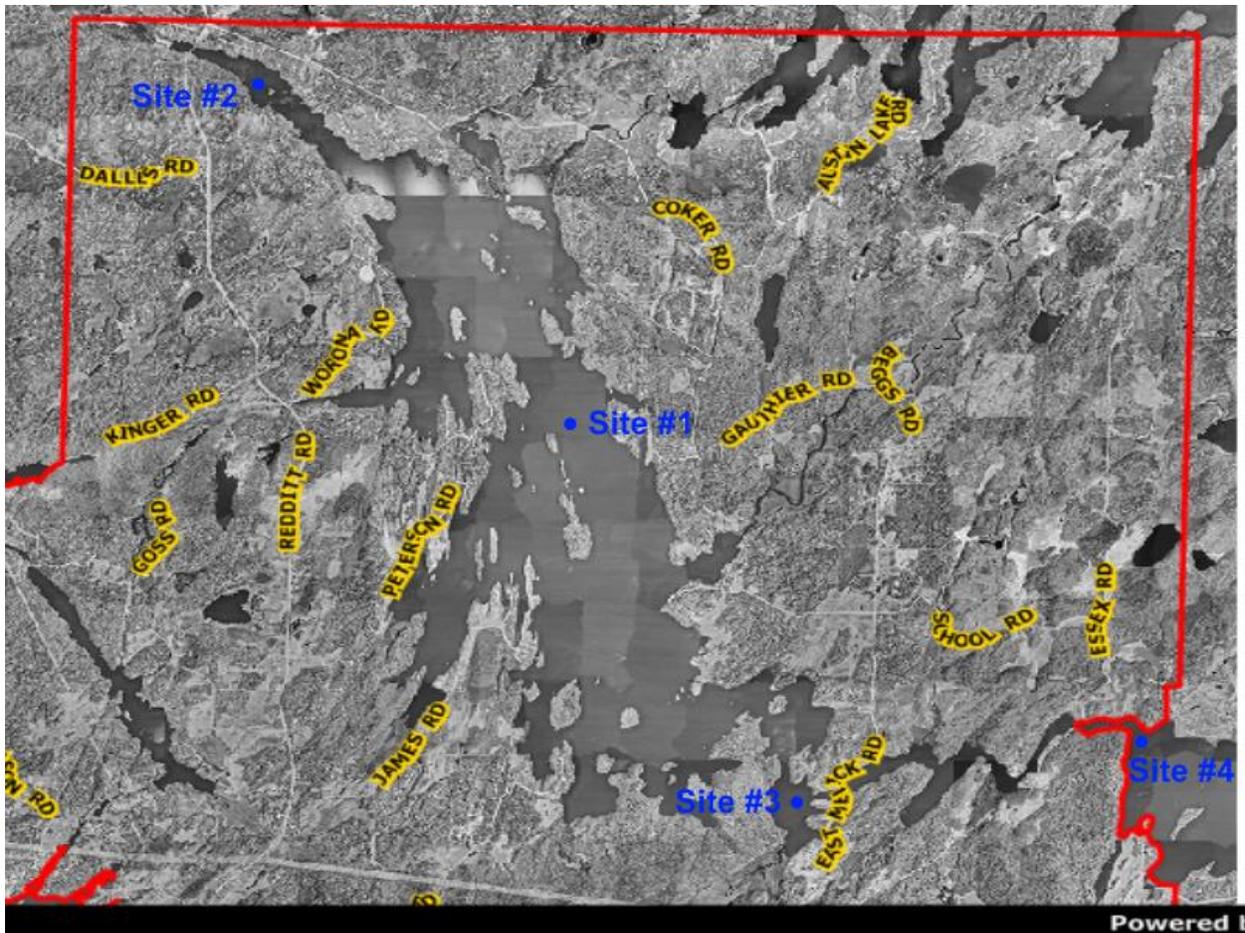


Figure 1 – Sampling Sites for Water Quality Monitoring on Black Sturgeon Lakes for 2015 sampling season

Secchi depth was determined at each site by lowering a Secchi disk (20-cm disk with alternating black and white quadrants) over the shady side of the boat (Figure 2). The disk was lowered until the observer could no longer distinguish between the white and black quadrants and then raised until the disk came back into view. This was repeated three times and then the depths at which the disk disappeared and then reappeared were averaged to give the Secchi depth.



Figure 2 – Lowering of Secchi disk

Lake productivity samples were collected both as a euphotic zone composite and at a depth of 1 m from the bottom. The euphotic zone is the section of the water column where enough light penetrates to facilitate algae growth (measured as 2X the Secchi depth). In order to obtain a water sample containing water from the euphotic zone, a weighted, 500 mL, small neck bottle (Figure 3) was lowered with a rope in the water column to a depth of 2X Secchi depth then quickly brought to the surface before the bottle became completely filled.



Figure 3 – Transferring water sample from euphotic zone composite into lab sample bottle

At each site, an additional water sample was taken approximately one meter from the bottom of the lake using a Beta horizontal water sampler (Figure 4). Both ends of the water sampler were opened prior to lowering it (using a rope) to the desired water depth. At the desired depth, a small weight was sent down through the water column along the length of the rope triggering a release mechanism on the sampler and causing the sampler caps to close.



Figure 4 – Horizontal Beta Sampler prior to deployment

All euphotic zone samples and samples taken one meter from the bottom of the lake were transferred immediately upon collection to sample bottles for analysis at a laboratory. One euphotic zone sample and one bottom sample were taken at each site and analyzed for total phosphorous. All water samples were shipped via Greyhound bus to ALS Laboratory Group in Winnipeg, MB, for analysis.

3.0 RESULTS

During the 2016 field season, there were samples collected from all three sites (Site 2, Site 3, Site 4) for a number of different parameters (phosphorous, Secchi depth, dissolved oxygen/temperature profiles, dissolved organic carbon, colour, pH, alkalinity, turbidity and scans for cations/anions and trace metals) as well as a late-summer dissolved oxygen/temperature profile taken at Site 1. All of this information is important to ensure that data is collected to help determine the spatial and/or temporal attributes of any changes to water quality in Black Sturgeon Lakes.

3.1 Sampling Session Dates and Locations

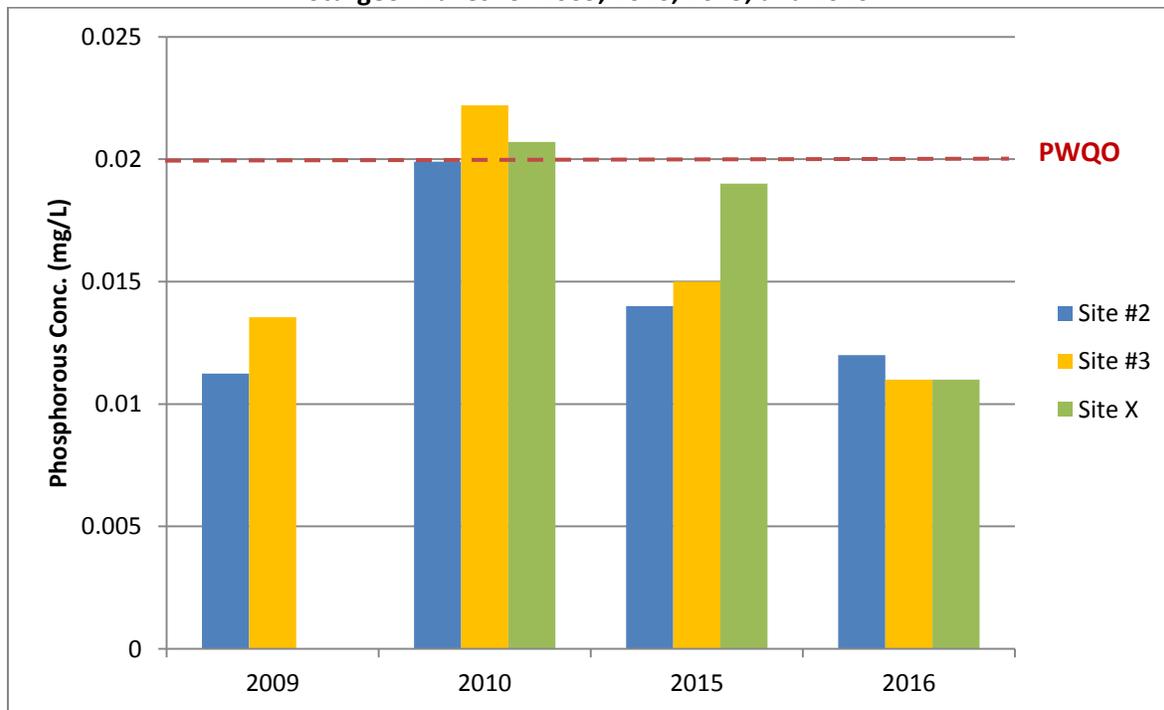
The 2016 sampling sessions were conducted on May 28th and August 8th. The depth of the sampling sites was 29.0 m for Site 1, 14.5 m for Site 2, 9.3 m for Site 3, and 6.6 m for Site 4.

3.2 Total Phosphorous

The 2016 spring sampling results for phosphorous concentrations were below the provincial water quality objective (PWQO) of 0.0200 mg/L for all three sites. During 2016, the spring turnover euphotic zone phosphorous concentrations taken at Site 2 (0.012 mg/L) was slightly above the concentration found in 2009, but below the results found in 2010 and 2015. The 2016 results for Site 3 (0.011 mg/L)

and Site 4 (0.011 mg/L) were the lower than the results from the spring sampling in 2009, 2010, and 2015 (Figure 5).

Figure 5 – Spring Turnover Total Phosphorous Concentrations for Three Sampling Sites on Black Sturgeon Lakes for 2009, 2010, 2015, and 2016.



3.3 Chemical Analysis - Water Quality Characteristics

The spring turnover water samples were analyzed for 54 parameters encompassing dissolved organic carbon, colour, pH, alkalinity, turbidity and scans for cations/anions and trace metals. The 2016 results were comparable to the results for the 2010 and 2015 analyses and were all within the provincial water quality objectives for the parameters where an objective is provided. The full results can be found in Appendix 1.

4.0 DISCUSSION

4.1 Total Phosphorous

The total phosphorous readings that are of the most interest for water quality analysis are the ones taken during spring turnover. The reason for this is that turnover is when the phosphorous is mixed throughout the water column and it is also when past phosphorous concentrations (i.e. Lake Partner Program) have been measured to enable analysis of trends over time.

The Ontario provincial water quality objective for total phosphorous concentrations is less than 20 µg/L (0.02 mg/L) “to avoid nuisance concentrations of algae in lakes” (MOE 1994). The 2016 spring sampling results for phosphorous concentrations were below the provincial water quality objective (PWQO) of 0.0200 mg/L for all three sites (Site 2, Site 3, and Site 4).

During 2016, the spring turnover euphotic zone phosphorous concentrations taken at Site 2 (0.012 mg/L) was slightly above the concentration found in 2009, but below the results found in 2010 and 2015. The 2016 results for Site 3 (0.011 mg/L) and Site 4 (0.011 mg/L) were lower than the results from the spring sampling in 2009, 2010, and 2015. These value was also within or below the Lake Partner Program range of total phosphorous samples analyzed between 2004 and 2014 on lower Black Sturgeon Lake (0.012 to 0.022 mg/L) and are below the mean of 0.017 mg/L over this same time period (Ministry of Environment 2015a). This indicates that the phosphorous concentrations on Lower Black Sturgeon Lake appear to have been relatively stable (and below the water quality objective) for the past decade.

4.2 Chemical Analysis - Water Quality Characteristics

The 2016 results were comparable to the results for the 2010 and 2015 analyses and were all within the provincial water quality objectives for the parameters where an objective is provided. Once again, this data supports the findings of the phosphorous results indicating that the water quality health of Black Sturgeon Lakes has remained relatively consistent over the past several years.

5.0 SUMMARY AND RECOMMENDATIONS

Lower Black Sturgeon Lake is within the provincial water quality objectives for a healthy lake for all of the parameters measured and analyzed in this study. All results indicate that Black Sturgeon Lakes have all of the characteristics to be expected in a dystrophic lake (i.e. heavily coloured due to presence of humic compounds of plant origin) located in northwestern Ontario. In addition, the 2016 water quality results are consistent with results of previous studies conducted on Lower Black Sturgeon Lake. This indicates that the health of the water body has remained consistent and is not deteriorating over time.

The variation shown during the 2009, 2010, 2015, and 2016 sampling seasons demonstrates the importance of collecting data annually to establish and maintain robust data sets. The summer of 2009 was characterized by relatively cool conditions and therefore the information collected during this season provides a detailed synopsis of Lower Black Sturgeon Lake water quality during a cool summer. The 2010 open water season was exceptionally long and wet which produced a data set that reflects these climatic conditions. However, the results of these varying summer patterns was that despite the fact there were no major changes to land use, the 2009 and 2010 sampling seasons produced different water quality sampling results. The 2015 sampling season produced results from a more *average* or *typical* open water season with results that were often in between the two baseline sampling seasons. The 2016 season phosphorous concentrations were lower than those found in the previous sampling seasons, potentially the result of cool, dry spring conditions and a snow pack that had seen significant melting well before ice-out on Black Sturgeon Lakes.

6.0 REFERENCES

Gartner Lee Ltd. and Kelli Saunders Environmental Management. October 2007. *Lake Capacity and Management Study for Black Sturgeon Lake, City of Kenora.*

Ministry of the Environment. 2015a. Lake Partner Total Phosphorous Data. Found on website at: <http://desc.ca/programs/lpp>

Ministry of the Environment. 2015b. Lake Partner Secchi Depth Data. Found on website at: <http://desc.ca/programs/lpp>

Ministry of Environment and Energy. July 1994. *Water Management: Policies; Guidelines; Provincial Water Quality Objectives of the Ministry of Environment and Energy.* Found on website at: <http://www.ontario.ca/document/water-management-policies-guidelines-provincial-water-quality-objectives>

**APPENDIX 1 – DISSOLVED OXYGEN/TEMPERATURE PROFILE RESULTS
AND SECCHI DEPTHS FOR 2016 LATE SUMMER SAMPLING SESSION**

Site 1

Secchi Depth (m) **B.P.**
2.25 **(mmHg)**
753.7 **Time**
09:36:00 **Depth (m)**
29.0

Depth	Temp	DO (%)	DO (mg/L)
0.5	20.6	98.0	8.77
1	20.7	97.8	8.75
2	20.7	96.5	8.68
3	20.7	96.5	8.63
4	20.7	96.0	8.62
5	20.8	95.7	8.54
6	20.8	95.6	8.54
7	20.8	94.6	8.56
8	20.8	95.1	8.47
9	17.5	54.4	5.11
10	14.5	45.7	4.66
11	12.8	45.1	4.80
12	11.5	45.8	5.03
13	10.4	47.2	5.29
14	9.6	46.5	5.30
15	9.0	45.9	5.34
16	8.6	45.4	5.30
17	8.4	44.1	5.18
18	8.2	43.0	5.06
19	8.0	41.2	4.86
20	7.9	40.3	4.79
21	7.9	39.6	4.67
22	7.9	39.1	4.63
23	7.8	37.6	4.41
24	7.7	36.2	4.27
25	7.7	35.3	4.19
26	7.6	34.3	4.07
27	7.6	32.6	3.88
28	7.6	31.1	3.70

Site 2

Secchi Depth (m) **B.P.**
2.25 **(mmHg)**
753.8 **Time**
11:30 **Depth (m)**
14.5

Depth	Temp	DO (%)	DO (mg/L)
0.5	21.1	98.8	8.80
1	21.1	98.4	8.77
2	21.1	98.2	8.75
3	21.1	98.4	8.75
4	21.1	97.7	8.68
5	21.1	96.6	8.60
6	21.1	96.6	8.58
7	21.1	95.1	8.42
8	20.9	85.2	7.65
9	18.1	61.5	5.81
10	13.2	44.7	4.69
11	11.1	40.4	4.45
12	10.3	38.5	4.31
13	9.7	37.6	4.29
14	9.5	37.1	4.20

Site 3

Secchi Depth (m) **B.P. (mmHg)** **Time** **Depth (m)**
2.0 753.6 10:40 9.3

Depth	Temp	DO (%)	DO (mg/L)
0.5	20.5	82.2	7.41
1	20.5	81.8	7.38
2	20.5	81.9	7.40
3	20.5	84.7	7.63
4	20.5	85.8	7.75
5	20.5	85.6	7.70
6	20.4	81.3	7.35
7	20.3	75.1	6.76
8	20.2	77.6	6.98
9	19.9	62.5	5.75

Site 4

Secchi Depth (m) **B.P. (mmHg)** **Time** **Depth (m)**
2.25 753.7 10:15 6.6

Depth	Temp	DO (%)	DO (mg/L)
0.5	20.4	96.4	8.7
1	20.4	96.1	8.64
2	20.5	95.8	8.61
3	20.5	95.5	8.62
4	20.5	95.4	8.58
5	20.6	94.8	8.54
6	20.6	94.2	8.45

**APPENDIX 2 – 2016 LABORATORY RESULTS FOR WATER QUALITY
CHARACTERISTICS**

NOTE – THE LABORATORY RESULTS FOR SITE 4 ARE SHOWN AS SITE X



Kenora Resource Consultants Inc.
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Date Received: 09-MAY-16
Report Date: 26-MAY-16 12:00 (MT)
Version: FINAL

Client Phone: 807-548-8123

Certificate of Analysis

Lab Work Order #: L1765695
Project P.O. #: NOT SUBMITTED
Job Reference: BLACK STURGEON LAKES
C of C Numbers:
Legal Site Desc:

Hua Wo
Chemistry Laboratory Manager

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

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1765695-1 BS-2016-SITE X							
Sampled By: RH on 08-MAY-16 @ 10:40							
Matrix: RAW							
MB Chemistry for PWS							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	18.8		1.2	mg/L		25-MAY-16	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		25-MAY-16	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		25-MAY-16	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	15.4		1.0	mg/L		24-MAY-16	R3464053
Ammonia by colour							
Ammonia, Total (as N)	<0.010		0.010	mg/L		10-MAY-16	R3455381
Bromide in Water by IC							
Bromide (Br)	<0.10		0.10	mg/L		09-MAY-16	R3454296
Chloride in Water by IC (Low Level)							
Chloride (Cl)	4.09		0.10	mg/L		09-MAY-16	R3454296
Colour, True							
Colour, True	28.0		5.0	CU		09-MAY-16	R3454396
Conductivity							
Conductivity	50.7		1.0	umhos/cm		24-MAY-16	R3464053
Dissolved Organic Carbon by Combustion							
Dissolved Organic Carbon	7.88		0.50	mg/L		11-MAY-16	R3456850
Fluoride in Water by IC							
Fluoride (F)	0.041		0.020	mg/L		09-MAY-16	R3454296
Hardness Calculated							
Hardness (as CaCO3)	18.4		0.30	mg/L		12-MAY-16	
Langelier Index 4C							
Langelier Index (4 C)	-2.9					25-MAY-16	
Langelier Index 60C							
Langelier Index (60 C)	-2.1					25-MAY-16	
Nitrate in Water by IC (Low Level)							
Nitrate (as N)	0.0193		0.0050	mg/L		09-MAY-16	R3454296
Nitrite in Water by IC (Low Level)							
Nitrite (as N)	<0.0010		0.0010	mg/L		09-MAY-16	R3454296
Sulfate in Water by IC							
Sulfate (SO4)	2.05		0.30	mg/L		09-MAY-16	R3454296
Total Dissolved Solids (TDS)							
Total Dissolved Solids	58		13	mg/L		10-MAY-16	R3455436
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.0658		0.0050	mg/L	11-MAY-16	11-MAY-16	R3456024
Antimony (Sb)-Total	<0.00020		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Arsenic (As)-Total	0.00027		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Barium (Ba)-Total	0.00834		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Beryllium (Be)-Total	<0.00020		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Bismuth (Bi)-Total	<0.00020		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Boron (B)-Total	<0.010		0.010	mg/L	11-MAY-16	11-MAY-16	R3456024
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	11-MAY-16	11-MAY-16	R3456024
Calcium (Ca)-Total	5.09		0.10	mg/L	11-MAY-16	11-MAY-16	R3456024
Cesium (Cs)-Total	<0.00010		0.00010	mg/L	11-MAY-16	11-MAY-16	R3456024
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	11-MAY-16	11-MAY-16	R3456024
Cobalt (Co)-Total	<0.00020		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Copper (Cu)-Total	0.00061		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Iron (Fe)-Total	0.125		0.010	mg/L	11-MAY-16	11-MAY-16	R3456024
Lead (Pb)-Total	<0.000090		0.000090	mg/L	11-MAY-16	11-MAY-16	R3456024

* 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
L1765695-1 BS-2016-SITE X							
Sampled By: RH on 08-MAY-16 @ 10:40							
Matrix: RAW							
Total Metals by ICP-MS							
Lithium (Li)-Total	<0.0020		0.0020	mg/L	11-MAY-16	11-MAY-16	R3456024
Magnesium (Mg)-Total	1.37		0.010	mg/L	11-MAY-16	11-MAY-16	R3456024
Manganese (Mn)-Total	0.0124		0.00030	mg/L	11-MAY-16	11-MAY-16	R3456024
Molybdenum (Mo)-Total	<0.00020		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	11-MAY-16	11-MAY-16	R3456024
Phosphorus (P)-Total	<0.10		0.10	mg/L	11-MAY-16	11-MAY-16	R3456024
Potassium (K)-Total	1.02		0.020	mg/L	11-MAY-16	11-MAY-16	R3456024
Rubidium (Rb)-Total	0.00204		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Selenium (Se)-Total	<0.0010		0.0010	mg/L	11-MAY-16	11-MAY-16	R3456024
Silicon (Si)-Total	1.49		0.10	mg/L	11-MAY-16	11-MAY-16	R3456024
Silver (Ag)-Total	<0.00010		0.00010	mg/L	11-MAY-16	11-MAY-16	R3456024
Sodium (Na)-Total	2.94		0.030	mg/L	11-MAY-16	11-MAY-16	R3456024
Strontium (Sr)-Total	0.0244		0.00010	mg/L	11-MAY-16	11-MAY-16	R3456024
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	11-MAY-16	11-MAY-16	R3456024
Thorium (Th)-Total	<0.00010		0.00010	mg/L	11-MAY-16	11-MAY-16	R3456024
Tin (Sn)-Total	<0.00020		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Titanium (Ti)-Total	0.00130		0.00050	mg/L	11-MAY-16	11-MAY-16	R3456024
Tungsten (W)-Total	<0.00010		0.00010	mg/L	11-MAY-16	11-MAY-16	R3456024
Uranium (U)-Total	<0.00010		0.00010	mg/L	11-MAY-16	11-MAY-16	R3456024
Vanadium (V)-Total	<0.00020		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Zinc (Zn)-Total	<0.0020		0.0020	mg/L	11-MAY-16	11-MAY-16	R3456024
Zirconium (Zr)-Total	<0.00040		0.00040	mg/L	11-MAY-16	11-MAY-16	R3456024
Total Organic Carbon by Combustion							
Total Organic Carbon	7.57		0.50	mg/L		11-MAY-16	R3456833
Turbidity							
Turbidity	2.13		0.10	NTU		09-MAY-16	R3454392
UV Transmittance (Calculated)							
Transmittance, UV (254 nm)	47.4		1.0	% T		10-MAY-16	R3456518
pH							
pH	6.73		0.10	pH units		24-MAY-16	R3464053
Miscellaneous Parameters							
Phosphorus (P)-Total	0.011		0.010	mg/L		11-MAY-16	R3455770
Total Kjeldahl Nitrogen	0.35		0.20	mg/L	17-MAY-16	18-MAY-16	R3460332
L1765695-2 BS-2016-SITE 3							
Sampled By: RH on 08-MAY-16 @ 11:00							
Matrix: RAW							
MB Chemistry for PWS							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	27.9		1.2	mg/L		19-MAY-16	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		19-MAY-16	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		19-MAY-16	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	22.9		1.0	mg/L		17-MAY-16	R3460739
Ammonia by colour							
Ammonia, Total (as N)	<0.010		0.010	mg/L		10-MAY-16	R3455381
Bromide in Water by IC							
Bromide (Br)	<0.10		0.10	mg/L		09-MAY-16	R3454296
Chloride in Water by IC (Low Level)							

* 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
L1765695-2 BS-2016-SITE 3							
Sampled By: RH on 08-MAY-16 @ 11:00							
Matrix: RAW							
Chloride in Water by IC (Low Level)							
Chloride (Cl)	4.76		0.10	mg/L		09-MAY-16	R3454296
Colour, True							
Colour, True	29.6		5.0	CU		09-MAY-16	R3454396
Conductivity							
Conductivity	56.5		1.0	umhos/cm		17-MAY-16	R3460739
Dissolved Organic Carbon by Combustion							
Dissolved Organic Carbon	8.18		0.50	mg/L		11-MAY-16	R3456850
Fluoride in Water by IC							
Fluoride (F)	0.038		0.020	mg/L		09-MAY-16	R3454296
Hardness Calculated							
Hardness (as CaCO3)	20.5		0.30	mg/L		12-MAY-16	
Langelier Index 4C							
Langelier Index (4 C)	-2.6					26-MAY-16	
Langelier Index 60C							
Langelier Index (60 C)	-1.8					26-MAY-16	
Nitrate in Water by IC (Low Level)							
Nitrate (as N)	<0.0050		0.0050	mg/L		09-MAY-16	R3454296
Nitrite in Water by IC (Low Level)							
Nitrite (as N)	<0.0010		0.0010	mg/L		09-MAY-16	R3454296
Sulfate in Water by IC							
Sulfate (SO4)	2.09		0.30	mg/L		09-MAY-16	R3454296
Total Dissolved Solids (TDS)							
Total Dissolved Solids	53	HTD	13	mg/L		24-MAY-16	R3465207
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.0525		0.0050	mg/L	11-MAY-16	11-MAY-16	R3456024
Antimony (Sb)-Total	<0.00020		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Arsenic (As)-Total	0.00027		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Barium (Ba)-Total	0.00851		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Beryllium (Be)-Total	<0.00020		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Bismuth (Bi)-Total	<0.00020		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Boron (B)-Total	<0.010		0.010	mg/L	11-MAY-16	11-MAY-16	R3456024
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	11-MAY-16	11-MAY-16	R3456024
Calcium (Ca)-Total	5.84		0.10	mg/L	11-MAY-16	11-MAY-16	R3456024
Cesium (Cs)-Total	<0.00010		0.00010	mg/L	11-MAY-16	11-MAY-16	R3456024
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	11-MAY-16	11-MAY-16	R3456024
Cobalt (Co)-Total	<0.00020		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Copper (Cu)-Total	0.00057		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Iron (Fe)-Total	0.096		0.010	mg/L	11-MAY-16	11-MAY-16	R3456024
Lead (Pb)-Total	<0.000090		0.000090	mg/L	11-MAY-16	11-MAY-16	R3456024
Lithium (Li)-Total	<0.0020		0.0020	mg/L	11-MAY-16	11-MAY-16	R3456024
Magnesium (Mg)-Total	1.43		0.010	mg/L	11-MAY-16	11-MAY-16	R3456024
Manganese (Mn)-Total	0.00608		0.00030	mg/L	11-MAY-16	11-MAY-16	R3456024
Molybdenum (Mo)-Total	<0.00020		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	11-MAY-16	11-MAY-16	R3456024
Phosphorus (P)-Total	<0.10		0.10	mg/L	11-MAY-16	11-MAY-16	R3456024
Potassium (K)-Total	1.03		0.020	mg/L	11-MAY-16	11-MAY-16	R3456024
Rubidium (Rb)-Total	0.00203		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Selenium (Se)-Total	<0.0010		0.0010	mg/L	11-MAY-16	11-MAY-16	R3456024
Silicon (Si)-Total	1.22		0.10	mg/L	11-MAY-16	11-MAY-16	R3456024
Silver (Ag)-Total	<0.00010		0.00010	mg/L	11-MAY-16	11-MAY-16	R3456024
Sodium (Na)-Total	3.40		0.030	mg/L	11-MAY-16	11-MAY-16	R3456024
Strontium (Sr)-Total	0.0263		0.00010	mg/L	11-MAY-16	11-MAY-16	R3456024

* 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
L1765695-2 BS-2016-SITE 3							
Sampled By: RH on 08-MAY-16 @ 11:00							
Matrix: RAW							
Total Metals by ICP-MS							
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	11-MAY-16	11-MAY-16	R3456024
Thorium (Th)-Total	<0.00010		0.00010	mg/L	11-MAY-16	11-MAY-16	R3456024
Tin (Sn)-Total	<0.00020		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Titanium (Ti)-Total	0.00106		0.00050	mg/L	11-MAY-16	11-MAY-16	R3456024
Tungsten (W)-Total	<0.00010		0.00010	mg/L	11-MAY-16	11-MAY-16	R3456024
Uranium (U)-Total	<0.00010		0.00010	mg/L	11-MAY-16	11-MAY-16	R3456024
Vanadium (V)-Total	<0.00020		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Zinc (Zn)-Total	<0.0020		0.0020	mg/L	11-MAY-16	11-MAY-16	R3456024
Zirconium (Zr)-Total	<0.00040		0.00040	mg/L	11-MAY-16	11-MAY-16	R3456024
Total Organic Carbon by Combustion							
Total Organic Carbon	7.83		0.50	mg/L		11-MAY-16	R3456833
Turbidity							
Turbidity	1.38		0.10	NTU		09-MAY-16	R3454392
UV Transmittance (Calculated)							
Transmittance, UV (254 nm)	55.2		1.0	% T		10-MAY-16	R3456518
pH							
pH	6.86		0.10	pH units		17-MAY-16	R3460739
Miscellaneous Parameters							
Phosphorus (P)-Total	0.011		0.010	mg/L		11-MAY-16	R3455770
Total Kjeldahl Nitrogen	0.33		0.20	mg/L	17-MAY-16	18-MAY-16	R3460332
L1765695-3 BS-2016-SITE 2							
Sampled By: RH on 08-MAY-16 @ 11:30							
Matrix: RAW							
MB Chemistry for PWS							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	26.5		1.2	mg/L		19-MAY-16	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		19-MAY-16	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		19-MAY-16	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	21.7		1.0	mg/L		17-MAY-16	R3460739
Ammonia by colour							
Ammonia, Total (as N)	<0.010		0.010	mg/L		10-MAY-16	R3455381
Bromide in Water by IC							
Bromide (Br)	<0.10		0.10	mg/L		09-MAY-16	R3454296
Chloride in Water by IC (Low Level)							
Chloride (Cl)	4.16		0.10	mg/L		09-MAY-16	R3454296
Colour, True							
Colour, True	24.2		5.0	CU		09-MAY-16	R3454396
Conductivity							
Conductivity	57.3		1.0	umhos/cm		17-MAY-16	R3460739
Dissolved Organic Carbon by Combustion							
Dissolved Organic Carbon	7.78		0.50	mg/L		11-MAY-16	R3456850
Fluoride in Water by IC							
Fluoride (F)	0.044		0.020	mg/L		09-MAY-16	R3454296
Hardness Calculated							
Hardness (as CaCO3)	19.7		0.30	mg/L		12-MAY-16	
Langelier Index 4C							
Langelier Index (4 C)	-2.7					26-MAY-16	
Langelier Index 60C							

* 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
L1765695-3 BS-2016-SITE 2							
Sampled By: RH on 08-MAY-16 @ 11:30							
Matrix: RAW							
Langelier Index 60C							
Langelier Index (60 C)	-1.9					26-MAY-16	
Nitrate in Water by IC (Low Level)							
Nitrate (as N)	0.0490		0.0050	mg/L		09-MAY-16	R3454296
Nitrite in Water by IC (Low Level)							
Nitrite (as N)	<0.0010		0.0010	mg/L		09-MAY-16	R3454296
Sulfate in Water by IC							
Sulfate (SO4)	1.97		0.30	mg/L		09-MAY-16	R3454296
Total Dissolved Solids (TDS)							
Total Dissolved Solids	52	HTD	13	mg/L		24-MAY-16	R3465207
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.0655		0.0050	mg/L	11-MAY-16	11-MAY-16	R3456024
Antimony (Sb)-Total	<0.00020		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Arsenic (As)-Total	0.00030		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Barium (Ba)-Total	0.00822		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Beryllium (Be)-Total	<0.00020		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Bismuth (Bi)-Total	<0.00020		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Boron (B)-Total	<0.010		0.010	mg/L	11-MAY-16	11-MAY-16	R3456024
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	11-MAY-16	11-MAY-16	R3456024
Calcium (Ca)-Total	5.25		0.10	mg/L	11-MAY-16	11-MAY-16	R3456024
Cesium (Cs)-Total	<0.00010		0.00010	mg/L	11-MAY-16	11-MAY-16	R3456024
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	11-MAY-16	11-MAY-16	R3456024
Cobalt (Co)-Total	<0.00020		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Copper (Cu)-Total	0.00062		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Iron (Fe)-Total	0.111		0.010	mg/L	11-MAY-16	11-MAY-16	R3456024
Lead (Pb)-Total	<0.000090		0.000090	mg/L	11-MAY-16	11-MAY-16	R3456024
Lithium (Li)-Total	<0.0020		0.0020	mg/L	11-MAY-16	11-MAY-16	R3456024
Magnesium (Mg)-Total	1.61		0.010	mg/L	11-MAY-16	11-MAY-16	R3456024
Manganese (Mn)-Total	0.0151		0.00030	mg/L	11-MAY-16	11-MAY-16	R3456024
Molybdenum (Mo)-Total	<0.00020		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	11-MAY-16	11-MAY-16	R3456024
Phosphorus (P)-Total	<0.10		0.10	mg/L	11-MAY-16	11-MAY-16	R3456024
Potassium (K)-Total	0.995		0.020	mg/L	11-MAY-16	11-MAY-16	R3456024
Rubidium (Rb)-Total	0.00193		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Selenium (Se)-Total	<0.0010		0.0010	mg/L	11-MAY-16	11-MAY-16	R3456024
Silicon (Si)-Total	1.07		0.10	mg/L	11-MAY-16	11-MAY-16	R3456024
Silver (Ag)-Total	<0.00010		0.00010	mg/L	11-MAY-16	11-MAY-16	R3456024
Sodium (Na)-Total	3.07		0.030	mg/L	11-MAY-16	11-MAY-16	R3456024
Strontium (Sr)-Total	0.0230		0.00010	mg/L	11-MAY-16	11-MAY-16	R3456024
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	11-MAY-16	11-MAY-16	R3456024
Thorium (Th)-Total	<0.00010		0.00010	mg/L	11-MAY-16	11-MAY-16	R3456024
Tin (Sn)-Total	<0.00020		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Titanium (Ti)-Total	0.00162		0.00050	mg/L	11-MAY-16	11-MAY-16	R3456024
Tungsten (W)-Total	<0.00010		0.00010	mg/L	11-MAY-16	11-MAY-16	R3456024
Uranium (U)-Total	<0.00010		0.00010	mg/L	11-MAY-16	11-MAY-16	R3456024
Vanadium (V)-Total	0.00022		0.00020	mg/L	11-MAY-16	11-MAY-16	R3456024
Zinc (Zn)-Total	<0.0020		0.0020	mg/L	11-MAY-16	11-MAY-16	R3456024
Zirconium (Zr)-Total	<0.00040		0.00040	mg/L	11-MAY-16	11-MAY-16	R3456024
Total Organic Carbon by Combustion							
Total Organic Carbon	8.14		0.50	mg/L		13-MAY-16	R3458779
Turbidity							
Turbidity	1.31		0.10	NTU		09-MAY-16	R3454392

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
B	Method Blank exceeds ALS DQO. All associated sample results are at least 5 times greater than blank levels and are considered reliable.
HTD	Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.
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 ₃ 2-/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 ₃ -/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-/L.			
ALK-TITR-WP	Water	Alkalinity, Total (as CaCO ₃)	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 ₃ - and H ₂ CO ₃ endpoints indicated electrometrically.			
BR-IC-N-WP	Water	Bromide in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
C-DOC-HTC-WP	Water	Dissolved Organic Carbon by Combustion	APHA 5310 B-WP
Filtered (0.45 um) sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO ₂ which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
C-TOC-HTC-WP	Water	Total Organic Carbon by Combustion	APHA 5310 B-WP
Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO ₂ 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.			
COLOUR-TRUE-WP	Water	Colour, True	APHA 2120C
True Colour is measured spectrophotometrically by comparison to platinum-cobalt standards using the single wavelength method (450 - 465 nm) after filtration of sample through a 0.45 um filter. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment. Concurrent measurement of sample pH is recommended.			
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.			
ETL-HARDNESS-TOT-WP	Water	Hardness Calculated	HARDNESS CALCULATED
ETL-LANGELIER-4-WP	Water	Langelier Index 4C	Calculated
ETL-LANGELIER-60-WP	Water	Langelier Index 60C	Calculated
F-IC-N-WP	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
IONBALANCE-CALC-WP	Water	Ion Balance Calculation	APHA 1030E
MET-T-L-MS-WP	Water	Total Metals by ICP-MS	APHA 3030E/EPA 6020A-TL
This analysis involves preliminary sample treatment by hotblock acid digestion (APHA 3030E). Instrumental analysis is by inductively coupled plasma -			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
		mass spectrometry (EPA Method 6020A).	
N-TOTKJ-WP	Water	Total Kjeldahl Nitrogen	Quickchem method 10-107-06-2-E Lachat
		<p>Samples are digested with a sulphuric acid solution, cooled, diluted with water, and analyzed for ammonia. Total Kjeldahl nitrogen is the sum of free-ammonia and organic nitrogen compounds which are converted to ammonium sulphate through this digestion process. Analysis is performed by Flow Injection Analysis (FIA). The pH of the digested sample is raised to a known, basic pH by neutralization with a concentrated buffer solution. This neutralization converts the ammonium cation to ammonia. The ammonia produced is heated with salicylate and hypochlorite to produce blue colour which is proportional to the ammonia concentration.</p>	
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
		<p>Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.</p>	
NO2-L-IC-N-WP	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)
		<p>Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.</p>	
NO3-L-IC-N-WP	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)
		<p>Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.</p>	
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS
		<p>This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourmetrically after persulphate digestion of the sample.</p>	
PH-WP	Water	pH	APHA 4500H
		<p>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.</p>	
SO4-IC-N-WP	Water	Sulfate in Water by IC	EPA 300.1 (mod)
		<p>Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.</p>	
TDS-WP	Water	Total Dissolved Solids (TDS)	APHA 2540 SOLIDS C,E
		<p>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.</p>	
TURBIDITY-WP	Water	Turbidity	APHA 2130B (modified)
		<p>Turbidity in aqueous matrices is determined by the nephelometric method.</p>	
UV-%TRANS-WP	Water	UV Transmittance (Calculated)	APHA 5910B
		<p>Test method is adapted from APHA Method 5910B. A sample is filtered through a 0.45 um filter and its UV Absorbance is measured in a quartz cell at 254 nm. UV Transmittance is calculated from the UV Absorbance result and reported as UV Transmittance per cm. The analysis is carried out without pH adjustment.</p>	

** 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:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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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-adjusted weight

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.



L1765695-COFC

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COC #

L1765695 Page 1 of 1

Report To				Service Requested (Rush for routine analysis subject to availability)																																																																
Company: Kenora Resource Consultants Inc.				<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days) <input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT <input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT <input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT																																																																
Contact: RYAN HAINES		<input checked="" type="checkbox"/> PDF <input type="checkbox"/> Excel <input type="checkbox"/> Digital <input checked="" type="checkbox"/> Fax		Email 1: ryanhaines123@gmail.com		Email 2: ryan.haines@kenoraconsultants.com																																																														
Address: Site 155, Compartment 14, RR1 Kenora, ON P9N 3W7				Email 3:																																																																
Phone: 807-465-5689		Fax:		Analysis Request																																																																
Invoice To Same as Report? <input type="checkbox"/> Yes <input type="checkbox"/> No				Please indicate below Filtered, Preserved or both (F, P, F/P)																																																																
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No				<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width: 10%;"></td> <td rowspan="5" style="writing-mode: vertical-rl; transform: rotate(180deg);">Number of Containers</td> </tr> <tr> <td style="writing-mode: vertical-rl; transform: rotate(180deg);">MB-CH-PWS-WP</td> <td style="writing-mode: vertical-rl; transform: rotate(180deg);">N-TOTKJ-WP</td> <td style="writing-mode: vertical-rl; transform: rotate(180deg);">P-T-COL-WP</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> </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> </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> </tr> </table>																Number of Containers	MB-CH-PWS-WP	N-TOTKJ-WP	P-T-COL-WP																																													
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Client / Project Information Job #: PO / AFE: LSD: Quote #: Q55945																																																																				
Lab Work Order # (lab use only) ALS <i>Shen non</i> Contact: <i>Sawatsky</i>				Sampler: <i>RH</i>																																																																
Sample #	Sample Identification <small>(This description will appear on the report)</small>	Date <small>(dd-mmm-yy)</small>	Time <small>(hh:mm)</small>	Sample Type	MB-CH-PWS-WP	N-TOTKJ-WP	P-T-COL-WP																																																													
	<i>BS-2016-Site X</i>	<i>08-MAY-16</i>	<i>10:40</i>	<i>RAW</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						<i>4</i>																																																							
	<i>BS-2016-Site 3</i>	<i>08-MAY-16</i>	<i>11:00</i>	<i>RAW</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						<i>4</i>																																																							
	<i>BS-2016-Site 2</i>	<i>08-MAY-16</i>	<i>11:30</i>	<i>RAW</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						<i>4</i>																																																							
Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details																																																																				
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 provided on a separate Excel tab. Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.																																																																				
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Released by: <i>[Signature]</i>	Date (dd-mmm-yy) <i>08-MAY-16</i>	Time (hh-mm) <i>17:00</i>	Received by: <i>[Signature]</i>	Date: <i>may 9</i>	Time: <i>5:00</i>	Temperature: <i>5</i> °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF																																																										



Kenora Resource Consultants Inc.
ATTN: RYAN HAINES
SITE 155, COMPARTMENT 14, RR1
KENORA ON P9N 3W7

Date Received: 29-AUG-16
Report Date: 31-AUG-16 14:17 (MT)
Version: FINAL

Client Phone: 807-548-8123

Certificate of Analysis

Lab Work Order #: L1820250
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:

Hua Wo
Chemistry Laboratory Manager

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

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1820250-1 BS-2016 SITE 2-S Sampled By: RH on 28-AUG-16 @ 11:30 Matrix: RAW WATER Miscellaneous Parameters Phosphorus (P)-Total	0.012		0.010	mg/L		31-AUG-16	R3537980
L1820250-2 BS-2016 SITE 2-B Sampled By: RH on 28-AUG-16 @ 11:30 Matrix: RAW WATER Miscellaneous Parameters Phosphorus (P)-Total	0.018		0.010	mg/L		31-AUG-16	R3537980
L1820250-3 BS-2016 SITE 3-S Sampled By: RH on 28-AUG-16 @ 10:40 Matrix: RAW WATER Miscellaneous Parameters Phosphorus (P)-Total	0.018		0.010	mg/L		31-AUG-16	R3537980
L1820250-4 BS-2016 SITE 3-B Sampled By: RH on 28-AUG-16 @ 10:40 Matrix: RAW WATER Miscellaneous Parameters Phosphorus (P)-Total	0.036		0.010	mg/L		31-AUG-16	R3537980
L1820250-5 BS-2016 SITE X-S Sampled By: RH on 28-AUG-16 @ 10:15 Matrix: RAW WATER Miscellaneous Parameters Phosphorus (P)-Total	0.011		0.010	mg/L		31-AUG-16	R3537980
L1820250-6 BS-2016 SITE X-B Sampled By: RH on 28-AUG-16 @ 10:15 Matrix: RAW WATER Miscellaneous Parameters Phosphorus (P)-Total	<0.010		0.010	mg/L		31-AUG-16	R3537980

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

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

** 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-adjusted weight

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.

