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April 24<sup>th</sup>, 2021  
File No. W2020-20.2020

**KICKING HORSE MOUNTAIN UTILITIES CORP.**  
1505 17<sup>th</sup> Avenue SW  
Calgary, Alberta  
T2T 0E2

Attention: Mr. Patrick Majer  
  
Tel: 403.861.8730  
e-mail: [pmajer@skircr.com](mailto:pmajer@skircr.com)

Dear Mr. Majer:

**Re: KICKING HORSE MOUNTAIN RESORT  
WASTEWATER TREATMENT PLANT  
2020 ANNUAL REPORT**

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Forwarded is a pdf copy of the 2020 Annual Wastewater Report for the above property.

Should you have any questions, please call us at 403-238-9510 or email to [jana@iqwater.ca](mailto:jana@iqwater.ca).

Sincerely,

**IQWATER INC.**

A handwritten signature in blue ink, appearing to read "Jana Zverina", is written over the company name.

Jana Zverina, M.Sc., P.Eng.

**IQWater Inc.**



**2020 WASTEWATER TREATMENT PLANT  
ANNUAL REPORT**

**KICKING HORSE MOUNTAIN RESORT  
1339 KICKING HORSE TRAIL  
GOLDEN, B.C.**

Prepared for:

**KICKING HORSE MOUNTAIN UTILITIES CORP.**  
1505-17<sup>th</sup> Avenue SW  
Calgary, Alberta  
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Prepared by:

***IQWATER INC.***  
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April 24<sup>th</sup>, 2021  
Report # W2020-020.2020

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## **1.0 INTRODUCTION**

### **1.1 BACKGROUND**

The following annual report for the Wastewater Treatment Plant at Kicking Horse Mountain Resort (further KHMR) operated by Kicking Horse Mountain Utility Corporation (further KHMUC) is compiled in accordance with the requirements of the Municipal Sewage Regulation (further MSR). This report summarizes the calendar year 2020.

In January 2012 Resorts of the Canadian Rockies (RCR) took over the resort and the plant operations and formed KHMUC. KHMUC has made changes to the way the plant operates, mainly by using a spare tank as an equalization tank. There has been a noticeable difference in plant operations since RCR took over and KHMUC was formed.

The resort is an ongoing development currently consisting of a combination of a single family, multi-family, and rental pool/hotel style facilities. These contribute to the total loading of the site in addition to ski hill use and ancillary services.

### **1.2 RESORT CONSTRUCTION AND OCCUPANCY**

Kicking Horse Mountain Resort is located approximately 13 km from Golden, B.C. The sewage treatment plant, which was constructed in 2000, is located adjacent to the resort. The treatment USBF (Upflow Sludge Blanket Filtration) technology employed is a modified conventional activated sludge process applying an up-flow sludge blanket filtration clarifier. There are two independent treatment trains that are operated in parallel during the peak season (December to April) and as a single train during the rest of the calendar year.

The system incorporates two treatment zones and one clarification zone that are interconnected with the flow been driven by the hydraulic pressure from the influent storage tank pumps.

The two treatment zones consist of an Anoxic Zone and Aeration Zone discharging into an effluent clarifier.

Each zone is triangular in shape. Two 10" underflow pipes on either side of the clarification zone join in the anoxic and aeration zones together. The aeration zone is connected to the clarifier by a slotted flow through, approximately 18" above the clarifier bottom and the width of the clarifier wall. Each zone is approximately 15' deep. Effluent clarification is enhanced by an up-flow sludge blanket in the clarifier that serves to filter the solids.

Clarified effluent flows over the clarifier weir into a dual micro filtration well, equipped with dual drum screens. Leaving the drum screens, the final effluent enters an open channel Trojan U.V. disinfection system to be discharged through a 4 km long gravity main to the outfall in the Columbia River.

Waste activated sludge used to be stored in a thickener and removed by a vacuum tanker. In the fall of 2014, a 12 unit Teknofanghi (Model Number 12BCAVPK) supplied by Drycake was installed and was commissioned in mid-December. Historically, the sludge was bagged and disposed of at the CSRD Landfill located in Golden, BC; however, due to increased costs for disposal at this facility, the sludge is now disposed of at the Crowsnest/Pincher Creek Landfill site.

## 2.0 REGISTRATION REQUIREMENTS

This section describes operating requirements as specified in the Kicking Horse Mountain Resort (KHMR) Registration Letter RE 15474. The registration describes parameters that must be tested for as well as the operating conditions, sampling frequency and sampling locations.

### 2.1 PARAMETERS

The following parameters are to be monitored:

pH	Field Sample
Temperature	Field Sample, measured in Celsius
Flow	Field Samples, measured as m <sup>3</sup> /d
BOD <sub>5</sub>	Five day biochemical oxygen demand, measured in mg/l
TSS	Total suspended solids or non-filterable residue, measured in mg/l
NH <sub>3</sub>	Ammonia concentration, expressed as nitrogen in mg/l
NO <sub>3</sub>	Nitrate concentration, expressed as nitrogen in mg/l
NO <sub>2</sub>	Nitrite concentration, expressed as nitrogen in mg/l
Total-P	Total phosphorous concentration, measured in mg/l
Ortho-P	Orthophosphate concentration, measured in mg/l
Fecal coliform	Bacterial concentration, measured as colony forming units per 100ml
Enterococci	Bacterial concentration, measured as colony forming units per 100ml
E. Coli	Bacterial concentration, measured as colony forming units per 100ml
Toxicity Bioassay	96 hour toxicity test, recorded as pass or fail

### 2.2 REGISTRATION LETTER OPERATING CONDITIONS

The treatment plant is required to meet the effluent discharge conditions outlined in Table 1.

Table 1  
Effluent Limits

Parameter	Limit	Unit
Flow	300	m <sup>3</sup> /d
BOD <sub>5</sub>	45	mg/l
TSS	45	mg/l
Total-P	1.0	mg/l
Ortho-P	0.5	mg/l
Fecal Coliforms*	200	CFU/100ml
E. Coli*	77	CFU/100ml
Enterococci*	20	CFU/100ml
Toxicity Bioassay	pass	n/a

\*Limit for recreational waters only, not included in RCRI registration letter

Waste activated sludge used to be stored in a thickener and removed by a vacuum tanker. In the fall of 2014, a 12 unit Teknofanghi (Model Number 12BCAVPK) supplied by Drycake was installed and was commissioned in mid-December. The sludge is bagged and disposed of at the Crowsnest/Pincher Creek Landfill site.

Operators at the plant are required to be certified in Accordance with Section 22 of the MSR.

## **2.3 REPORTING REQUIREMENTS**

An annual report demonstrating the performance of the facility is to be publicly posted on the Internet within 120 days of the end of the calendar year.

In addition the report must also include the following:

- Tabulated results of the Effluent and Environmental Monitoring Data with standards and criteria
- Interpretation of the monitoring data
- The total volume discharged over the year
- Total sludge wasted over the year and its final destination
- The state of compliance of the treatment facility/process
- Indicated the percentage of residential development, as defined in the regulation, that contributes to the effluent discharge
- Any additional relevant information the discharger wishes to provide

## **2.4 SAMPLING FREQUENCY**

The MSR Registration requires KHMR and, as such, the contract operator KHMUC, to undertake the environmental testing program outlined in Table 2 below.

Columbia River testing requires that a minimum of 10 samples annually are taken from each of the upstream, the side channel (further also referred to as a side stream) and downstream river locations, relative to the outfall diffuser. The sampling locations were identified in Masse & Miller Consulting Ltd. letter dated February 17<sup>th</sup>, 2005. Flow data is to be collected continuously.

The intent of the environmental testing procedure outlined in Table 2 is to collect weekly samples of effluent during the summer and winter seasons. Commencement of the winter weekly seasonal sampling (weekly samples for a period of 5 weeks) is when the river sampling sites open up and the summer monitoring usually commences during low water flow in the river, usually in September or October.

In addition to the program and tests listed above, other in-plant testing is needed to permit operational control of the process.

Table 2  
Sampling Location/Frequency/Type

Parameter	Location				
	Columbia River Upstream at Bridge	Columbia River ~200 d/s of outfall from east shore	Columbia River d/s of island from west shore ~1km d/s of outfall	Columbia River side channel ~350m d/s of outfall	Effluent
EMS Number	E256694	E258898	E258899	E258897	E256696
	Winter/Summer	Winter/Summer	Winter	Summer	Winter/Summer
pH	WS/G	WS/G	WS/G	WS/G	W
Temp	WS/G	WS/G	WS/G	WS/G	W
Flow	/	/	/	/	W
BOD <sub>5</sub>	/	/	/	/	W
TSS	WS/G	WS/G	WS/G	WS/G	WS/G+Q/G
NH <sub>3</sub> -N	WS/G	WS/G	WS/G	WS/G	WS/G
NO <sub>3</sub> -N	WS/G	WS/G	WS/G	WS/G	WS/G
NO <sub>2</sub> -N	WS/G	WS/G	WS/G	WS/G	WS/G
Total-P	WS/G	WS/G	WS/G	WS/G	WS/G
Ortho-P	WS/G	WS/G	WS/G	WS/G	WS/G
Fecal Coliform	WS/G	WS/G	WS/G	WS/G	WS/G+Q/G
Enterococci	WS/G	WS/G	WS/G	WS/G	WS/G
E. Coli	WS/G	WS/G	WS/G	WS/G	WS/G
Toxicity Bioassay	/	/	/	/	1/3Y/G
Coordinates	11.500456 5684421	11.500288 5684880	N51 19.364 W 11700.218	11.500126 5684835	At sewage treatment plant

Where:

WS	Weekly seasonal (weekly samples for a period of 5 weeks)
Q	Quarterly
W	Weekly
G	Grab
1/3Y	Once every 3 years

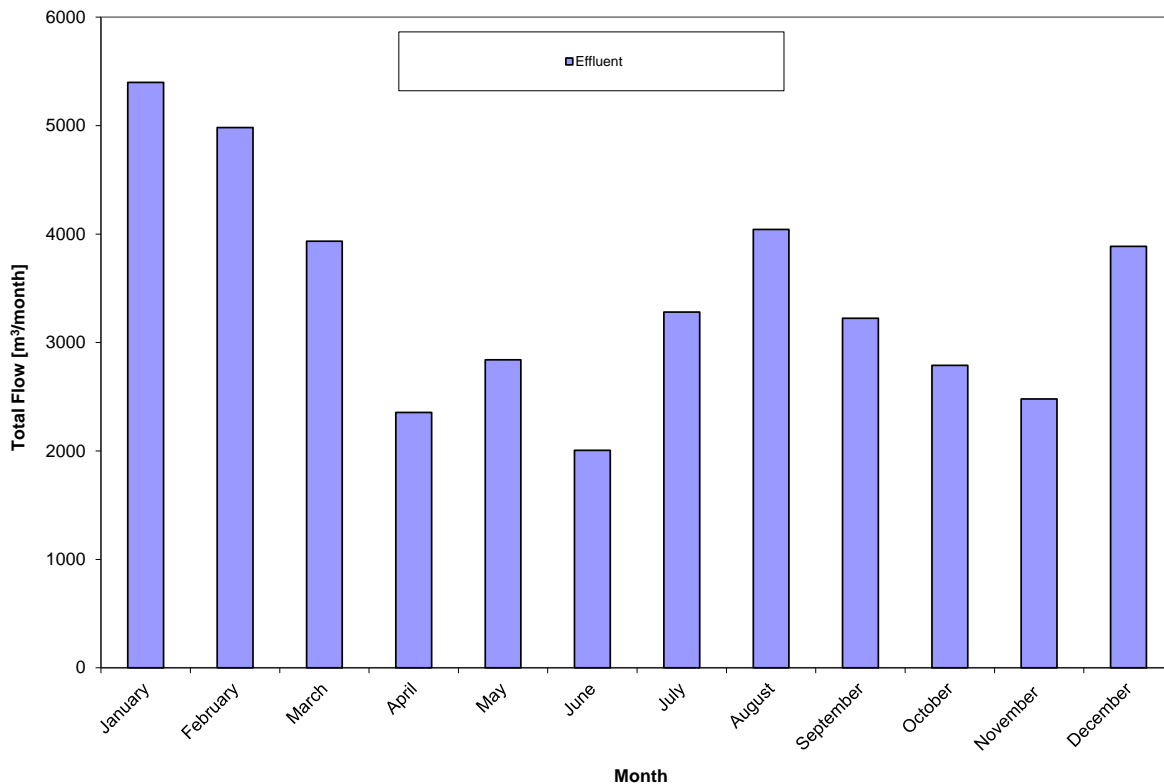
### 3.0 SEWAGE FLOW RECORDS

This section provides data and analysis regarding plant effluent flows, and compares 2020 data to the previous years.

Flow data is continuously monitored at the discharge to the outfall using a flow meter to be recorded in the SCADA system. Operators then transcribe the daily flows into a logbook.

The total effluent flow recorded for 2020 was 41,218 m<sup>3</sup> with an average of 113 m<sup>3</sup>/day. Available monthly total effluent flow meter records for 2020 are provided in Figure 1a.

**Figure 1a**  
2020 Effluent Flow Meter Monthly Flow Totals



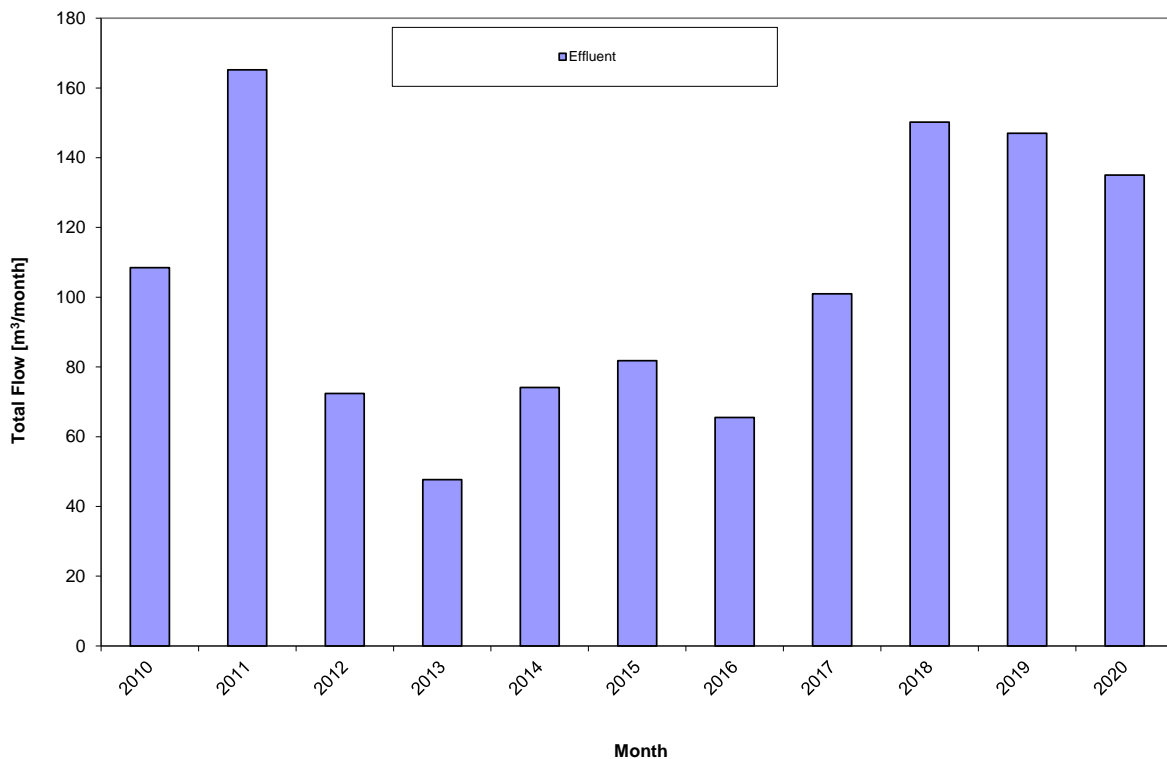
The ski resort operates with higher winter and early spring sewage flows than during any other period. Larger sewage flows were typically observed during January, February, March and December. The highest monthly flow is usually observed in March, however, in 2020 it was observed in January at 5,398 m<sup>3</sup>/month. It should be noted that summer month flows i.e. July and August are becoming similar to those of December, i.e. August 2020 was higher than March 2020, which could have been due to start of Covid19 restrictions.

The average daily plant flow through January to March and December of 2020 was 150 m<sup>3</sup>/day compared to the last year average at 156 m<sup>3</sup>/day.



In the previous reports the highest plant flow was compared to January, February, March, April and December. In 2020 the flow for these five months was lower at 135 m<sup>3</sup>/day than that of 2019 at 147 and 2018 at 150.2 m<sup>3</sup>/day. These averages are higher compared to 100.96 m<sup>3</sup>/day over the same period in 2017, 65.52 m<sup>3</sup>/day in 2016, 81.79 m<sup>3</sup>/day in 2015, 74.10 m<sup>3</sup>/day in 2014, 47.73 m<sup>3</sup>/day in 2013, 72.41 m<sup>3</sup>/day in 2012 and 108.5 m<sup>3</sup>/day in 2010. The only exception was 2011 at 165.2 m<sup>3</sup>/day (note that data for Dec was missing).

**Figure 1b**  
Average Effluent Flow in Peak Period – Jan to April and Dec (Historical)



Peak flow for the year reached was 247 m<sup>3</sup>/day on December 31<sup>st</sup>, 2020, which is below the allowable limit of 300 m<sup>3</sup>/day.

The peak flow is lower than that of the previous two years at 265 and 262 m<sup>3</sup>/day. It is similar to 2017 with peak flow at 244 m<sup>3</sup>/day. The peak flow day occurred during the ski season.

Historical peak flows were 162.25 m<sup>3</sup>/day in 2016, 137.32 m<sup>3</sup>/day in 2015, 145.71 m<sup>3</sup>/day in 2014, 165.03 m<sup>3</sup>/day in 2013, 159.05 m<sup>3</sup>/day in 2012, 311.54 m<sup>3</sup>/day in 2011 (again note that the data for one of the historically highest months, December was missing), 317.6 m<sup>3</sup>/day in 2010 and 251.3 m<sup>3</sup>/day in 2009.

There is currently no method of measuring influent to the treatment plant.

A summary of sewage flow for years 2009 through 2019 is provided in Table 3 and Figures 2 and 3:

**Table 3**  
**2009 – 2019 Flow Comparisons**

Year	Sewage Flow (m <sup>3</sup> /day)			Days Over Limit
	Total	Average	Peak	
2009	25,093.9	69.4	251.3	0
2010	27,467.5	77.6	317.6	2
2011	27,771* (42,340) <sup>1</sup>	116	311.54**	2
2012	17,323.4	47.85	159.05	0
2013	16,089	44.73	165.03	0
2014	19,279 <sup>2</sup>	52.88	145.71	0
2015	20,594	56.4	167.32	0
2016	21,125	58.9	162.25	0
2017	31,431 <sup>3</sup>	85.9	240	0
2018	45,147	123.8	262	0
2019	41,785	114.0	265	0
2020	41,218	113.0	247	0

\*not including all of September, October, November or December

\*\*the number does not reflect a true peak as all the data was not available during the high flow months

<sup>1</sup> (data) in bracket – estimate based on daily average

<sup>2</sup> The SCADA failed to record flow for the entire day on several occasions; therefore flow was estimated on partial data

<sup>3</sup> The SCADA failed to record correct flow from July 24<sup>th</sup> until September 7<sup>th</sup>; therefore flow was based on partial estimates

### 2009 - 2019

Peak flows in **2009** coincided with the weekends, holidays, ski season and summer recreational activities. The highest daily flow was recorded on Feb 15<sup>th</sup> at 215.1 m<sup>3</sup>/day and on December 31<sup>st</sup> at 251.3 m<sup>3</sup>/day. At no time was the maximum allowed daily flow exceeded.

Peak flows in **2010** coincided with weekends, holidays, ski season and summer recreational activities. The highest daily flow was recorded on New Year's Day at 242.7 m<sup>3</sup>/day, February 14<sup>th</sup> at 206.4 m<sup>3</sup>/day, and on December 31<sup>st</sup> at 317.6 m<sup>3</sup>/day. During the third week of July 2010 a lightning strike damaged the level sensors in the wastewater treatment plant resulting in inaccurate measurement of flows. The Ministry of Environment was notified. The operators indicated that during daily monitoring of the system, there was no time when the flows came close to exceeding the permit based on visual observation and process control monitoring.

Peak flows in **2011** also coincided with weekends, holidays, ski season and summer recreational activities. The highest daily flow was recorded on a weekend (March 26<sup>th</sup>) at 311.54 m<sup>3</sup>/day and the second highest peak was observed on New Year's Day at 303.04 m<sup>3</sup>/day. The daily flow limit was exceeded on both occasions. Please note the data was incomplete for September, October, November and December 2011.

Peak flows in **2012** also coincided with the peak season in January, February, March and December. There were no daily flow limit exceedances observed in 2012. The reduction in daily flows and reduction in peak flow is due to flow equalization which has now been implemented in the facility using the vacant tank that will one day be used for additional process trains. Flow equalization began in January 2012.

Peak flows in **2013** also coincided with the peak season in January, February, March and December. There were no daily flow limit exceedances observed in 2013. The highest daily flow was recorded on December 29<sup>th</sup> at 165.03 m<sup>3</sup>/day.

Peak flows in **2014** coincided with the peak season in January, February, March and December. There were no daily flow limit exceedances observed in 2014. The highest daily flow was recorded on January 2<sup>nd</sup> at 145.71 m<sup>3</sup>/day. The SCADA failed to record flow for the entire day on several occasions and partial data was used to estimate total flow. The failure was due to computer issues.

On January 9, 24, 25; February 4; March 3, 28, 29; May 23 to June 2, June 9, 14, 15, 23, 27; July 4, 6-10, 12, 13, 28; August 12, 13, 16, 17; September 5, 6; October 1, 3; November 21, 22, 25, 26; and December 7, 8, and 9 the flow was estimated.

Peak flows in **2015** coincided with the peak season in January, February, March and December. There were no daily flow limit exceedances observed in 2015. The highest daily flow was recorded on January 2<sup>nd</sup> at 167.32 m<sup>3</sup>/day.

Peak flows in **2016** coincided with the peak season in January, February, March and December. There were no daily flow limit exceedances observed in 2016. The highest daily flow was recorded on December 29<sup>th</sup> at 162.25 m<sup>3</sup>/day.

Peak flows in **2017** coincided with the peak season in January, February, March and December. There were no daily flow limit exceedances observed in 2017. The highest daily flow was recorded on December 29<sup>th</sup> at 244 m<sup>3</sup>/day. Please note that the SCADA failed to record correct flow from July 24<sup>th</sup> until September 7<sup>th</sup>; therefore flow was based on partial estimates.

Peak flows in **2018** coincided with the peak season in January, February, March and December. There were no daily flow limit exceedances observed in 2018. The highest daily flow was recorded on December 31<sup>st</sup> at 262 m<sup>3</sup>/day.

Peak flows in **2019** generally coincided with the peak season in January, February, March and December. The highest daily flow, however, was recorded on November 3<sup>rd</sup> at 265 m<sup>3</sup>/day.

## **2020**

Peak flows in 2020 generally coincided with the peak season in January, February, March and December. The highest daily flow was recorded on December 31<sup>st</sup> at 247 m<sup>3</sup>/day. Also note that the summer months i.e. July and August are becoming busy with the flows similar to those in December. There were no daily flow limit exceedances observed in 2020.

Daily wastewater flows are strongly correlated to weather and the number of day-users at the resort with the peak ski season having the highest flows. Summer flows result from non-skiing related recreational activities, generally hiking or mountain biking events. The lowest plant flow was experienced in the shoulder season periods (April to June and September to November).

There are approximately 100 full time year round residents at the resort. In total, there are currently:

- ✓ 98 single family homes (Purcell Woods, Cache Estates, Cache Residences, Dogtooth and Cedar Creek Estates)
- ✓ 116 multi-family units i.e. duplexes and triplexes (Whispering Pines, The Cedars, Selkirk Resort Homes, Aspen – Phase 1 and 2)
- ✓ 155 multi-storey condos (Mountaineer Lodge, Palliser Lodge, Glacier Lodge)
- ✓ 3 commercial lodges (Cache Lodges)
- ✓ Five seasonal restaurants
- ✓ Administration office, day-care facilities, general store and rental shop

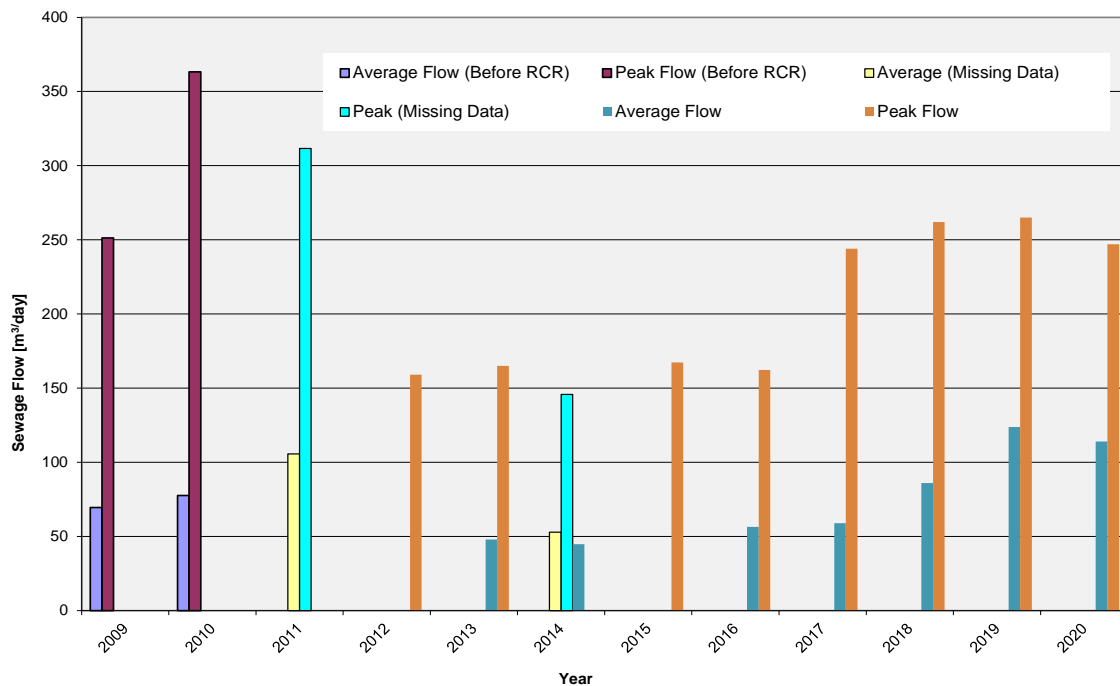
OCCUPANCY*	Family Residences	Hotel Units	Allocation	EQ Bed Units
<b>Seasonal</b>				
Multi-story condos (3 units)	-	155	2	310
Commercial Lodges (3)	-	-	As per tariff	122
Single Family Residences	98	-	varies	718
Multi-Family Units (Duplex & Triplex)	116	-	varies	448
<b>Non-residential</b>				
5 Restaurants	-	-	As per tariff	241
Office	-	-	As per tariff	4
Daylodge	-	-	As per tariff	144

\*Note that the occupancy significantly varies throughout the year with near full occupancy only during the ski season and during the long weekends.

Current Total Bed Unit Count – Updated April 22, 2021 = 2448 BU

Figure 2 provides historical average and peak flow and Figure 3 shows historical total flows for 2009 to 2020 for comparison.

**Figure 2**  
Historical (2009 – 2020) Average and Peak Sewage Effluent Flow Comparison Graph



**Figure 3**  
Historical (2009 – 2020) Total Sewage Effluent Flow Graph

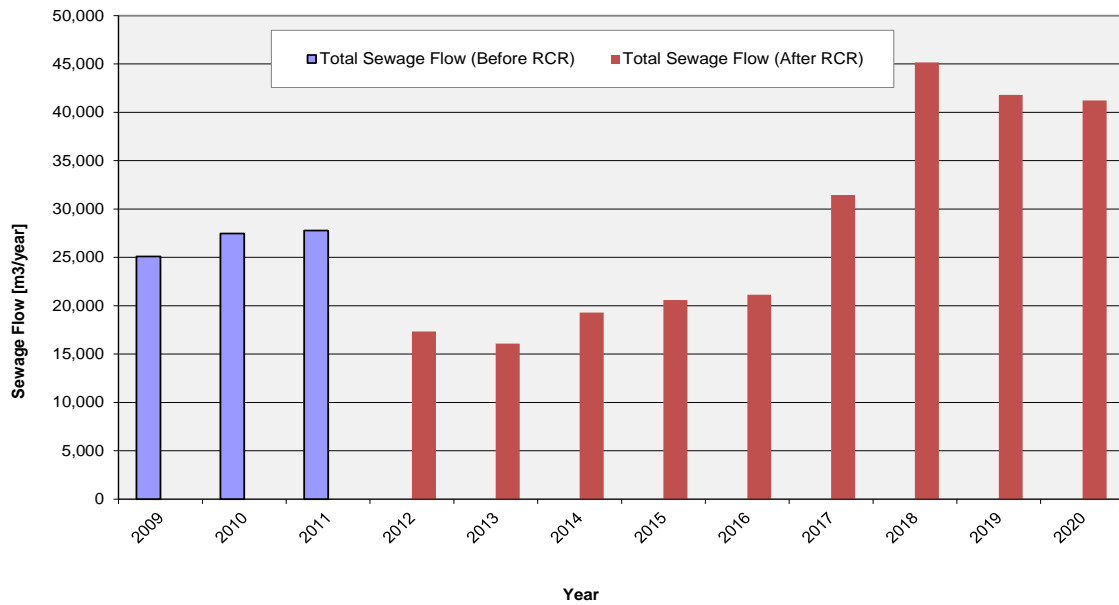
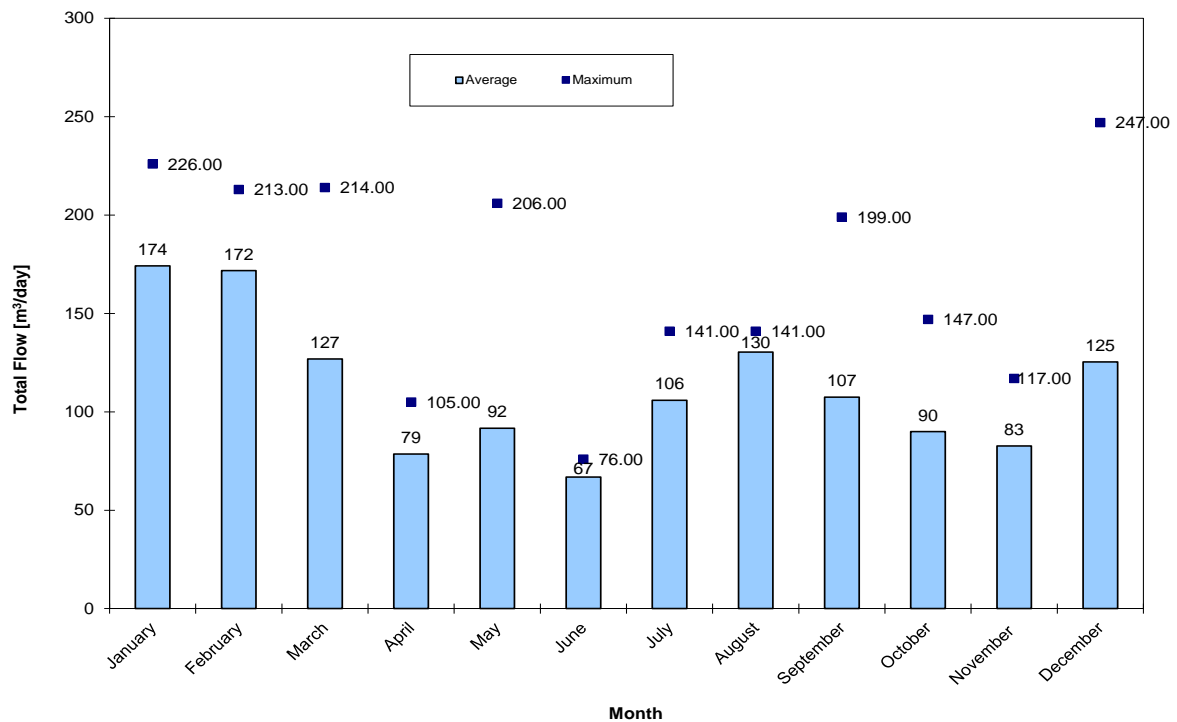


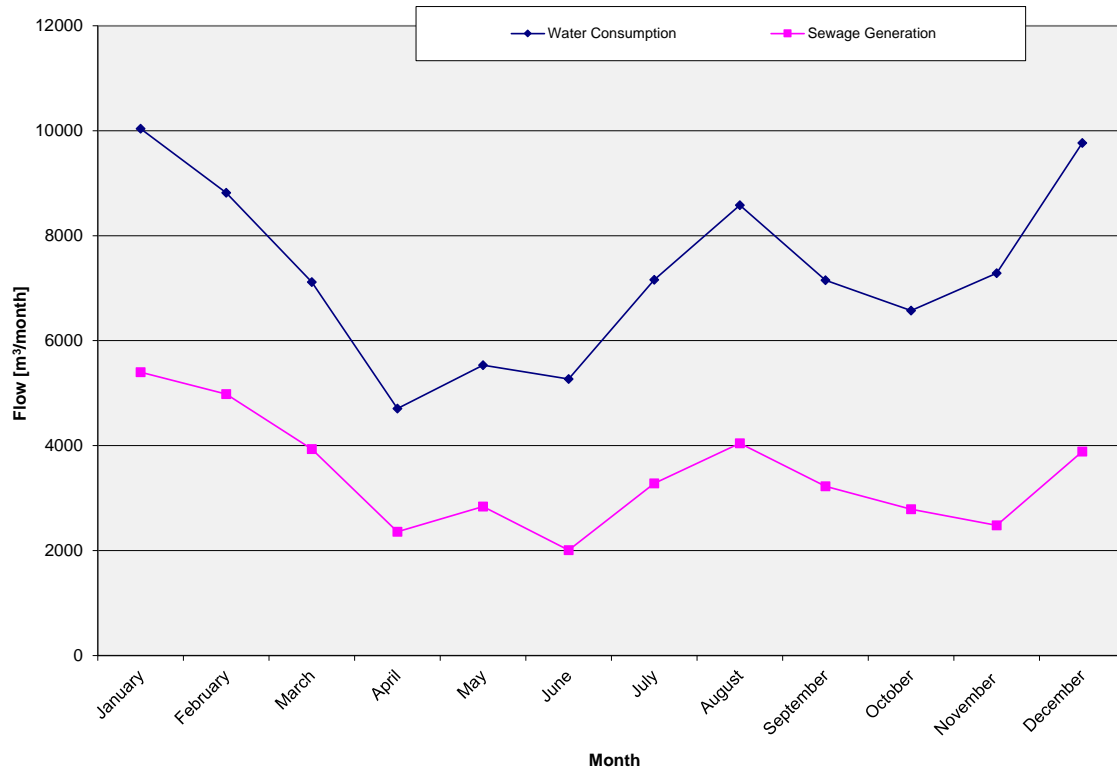
Figure 4 below shows average and peak flows for 2020.

**Figure 4**  
2020 Sewage Effluent Average and Peak Flows by Month



This year, the total effluent discharged was equal to 47.0 % of the total water production, which is similar or lower than during the previous years. Monthly water usage at the hill is compared to the amount of effluent discharged at the WWTP in Figure 5.

**Figure 5**  
2020 Water Consumption and Sewage Effluent Generation



#### 4.0 SEWAGE FLOW PROJECTION

This section shows projected wastewater flow for 2011 through 2020 based on the current development plans and provides an estimate of remaining plant capacity.

Based on unit generation rates provided in the BC Health Act for various lodging types as well as the assumption that wastewater generation would have been similar in 2011 to that calculated in 2015, the estimated highest day wastewater generation for 2011 would have been 705.5 m<sup>3</sup>/day. Using the actual peak flow of 312 m<sup>3</sup>/day, a correction factor of 0.44 was calculated. Averaged correction factor for the last eight years (2012 to 2019) was also calculated and multiplied by the future estimated flows to more accurately reflect potential resort sewage generation rates. In 2019 the correction factor was 0.38. The correction factor for 2020 was calculated at 0.35 and the average correction factor for 2011 to 2019 was 0.30.

Projected daily peak wastewater flows from 2011 by year were provided in Table 4 for the Resort's planned expansions. The highest water generation for 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019 and 2020 was calculated based on the BC Health Act (refer to Table 10 enclosed at the end of this report). The future flows will be re-evaluated as further expansion occurs. The resort is committed to continuing the initiative on introducing a stormwater infiltration program, flow restrictive devices, and other water consumption measures.

Flow restrictive devices are intended to be utilized in all new construction and the infiltration/rehabilitation program is expected to be ongoing. The intent is to reduce the amount of per unit sewage generation and to reduce the amount of ground and surface water infiltration into the sewer system. KHMUC will monitor sewage flows to determine the efficiency of the program.

Even with additional expansion, KHMUC may not require an increase to permit discharge above the current limit of 300 m<sup>3</sup>/day if the flow restriction measures prove to be sustainable. Sewage discharge rates will be monitored and an application will be submitted to increase the maximum daily discharge when warranted.

Based on 2020 flow data, the plant has an unused capacity of 53 m<sup>3</sup>/day (based on an operating limit of 300 m<sup>3</sup>/day) due to the flow saving measures. This still needs to be closely monitored during 2021 and further considered when adding additional development.

**Table 4**  
Projected Peak Flows: 2011-2020

	2011	2012	2013	2014
<b>Estimated Wastewater Flow (m<sup>3</sup>/day)</b>	705.5*	705.5*	705.5*	705.5
<b>Actual and Corrected (m<sup>3</sup>/day)</b>	312** (a)	159 (a)	165 (a)	146 (a)

	2015	2016	2017	2018
<b>Estimated Wastewater Flow (m<sup>3</sup>/day)</b>	705.5	705.5	705.5	705.5
<b>Actual and Corrected (m<sup>3</sup>/day)</b>	167 (a)	162 (a)	244 (a)	262 (a)

\*the number was calculated based on 2014 occupancy, which is likely overestimated

\*\*the number does not reflect a true peak as all the data was not available during the high flow months

	2019	2020	2021
<b>Estimated Wastewater Flow (m<sup>3</sup>/day)</b>	705.5	707.2	711.2*
<b>Actual and Corrected (m<sup>3</sup>/day)</b>	265 (a)	247 (a)	213 (b)

\*the number was calculated based on 2014 occupancy, which is likely overestimated

(a) actual peak flow

(b) corrected daily peak flows by the averaged correction factor for 2011 - 2020 correction factor:

2011	correction factor of	312*/705.5	0.44
2012	"	159/705.5	0.22
2013	"	165/705.5	0.23
2014	"	146/705.5	0.21
2015	"	167/705.5	0.24
2016	"	162/705.5	0.23
2017	"	244/705.5	0.34
2018	"	262/705.5	0.37
2019	"	265/705.5	0.38
2020	"	247/707.2	0.35
<b>AVERAGE</b>			<b>0.30</b>

A graph showing estimated vs actual historical peak flows is shown below.

**Figure 6a**

Historical Correction Factors

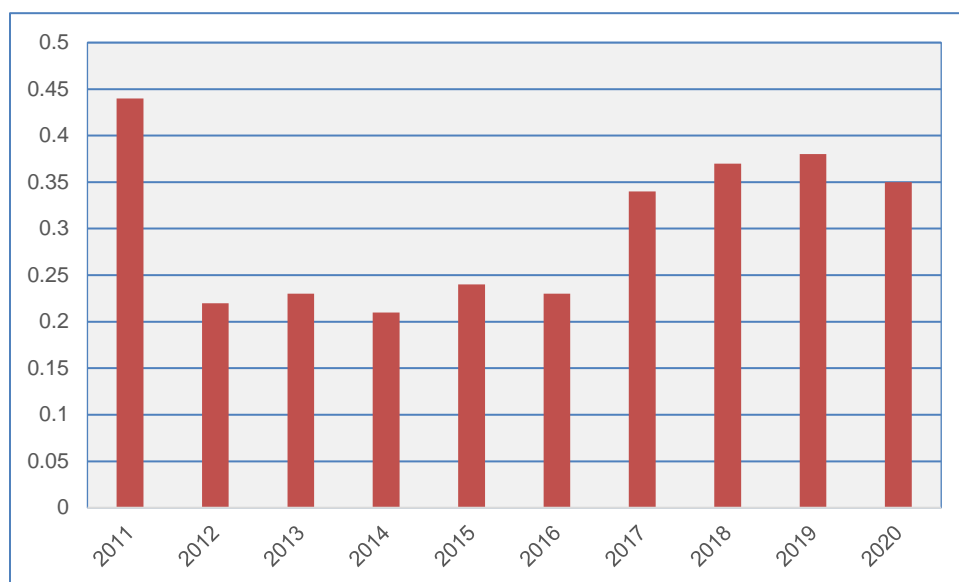
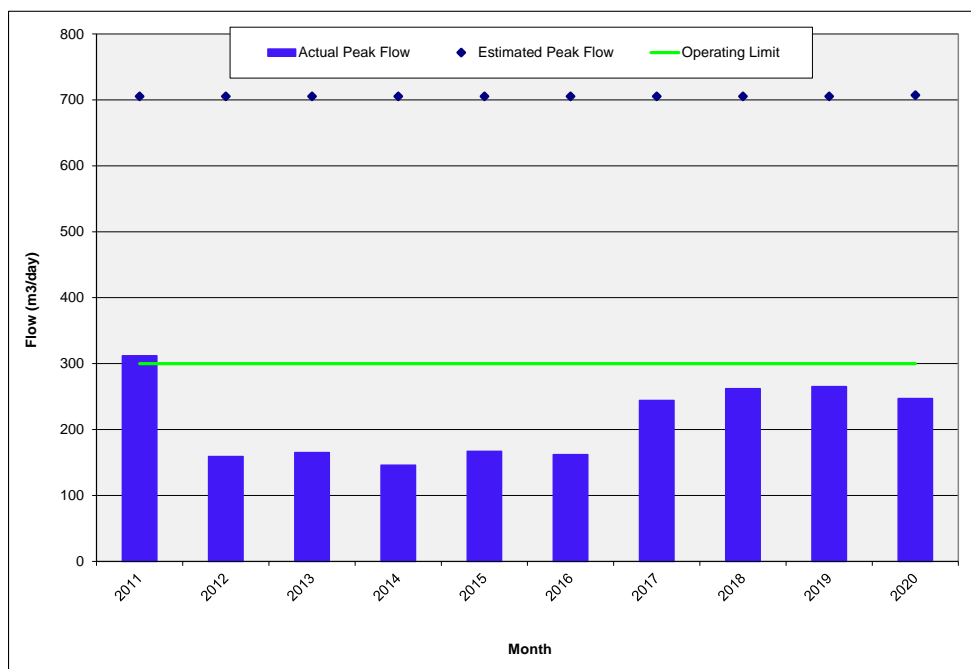




Figure 6b  
Estimated vs Actual Peak Flows (Historical)



## 5.0 OVERVIEW OF COLUMBIA RIVER SAMPLE RESULTS

This section provides data and analysis for the Columbia River samples taken during 2020.

Table 5 provides a summary record of the Columbia River test results for the period of May 11<sup>th</sup> to June 8<sup>th</sup>, 2020 and October 14<sup>th</sup> to November 9<sup>th</sup>, 2020.

Table 5  
2020 Columbia River Sample Results

Sample Date yyyy/mm/dd	NH <sub>4</sub> -N			Ortho-P			Fecal Coliform			E.Coli			Total P mg/L		
	UP	SIDE	DN	UP	SIDE	DN	UP	SIDE	DN	UP	SIDE	DN	UP	SIDE	DN
2020-05-11	0.050	0.062	0.062	0.005	0.028	0.072	0	0	2	1	1	0	0.016	0.083	0.081
2020-05-19	0.050	0.050	0.050	0.005	0.005	0.005	9	11	6	5	9	2	0.042	0.029	0.070
2020-05-26	0.050	0.050	0.050	0.005	0.007	0.005	3	4	2	1	4	1	0.015	0.030	0.013
2020-06-03	0.050	0.050	0.050	0.005	0.005	0.005	16	46	4	6	22	3	0.128	0.055	0.150
2020-06-08	0.050	0.050	0.050	0.005	0.005	0.005	1	11	1	-	-	-	0.029	0.022	0.034
2020-10-14	0.050	0.050	0.050	0.005	0.098	0.005	24	30	20	20	16	15	0.024	0.186	0.087
2020-10-20	0.050	0.050	0.050	0.005	0.005	0.005	2	28	6	2	22	5	0.051	0.011	0.179
2020-10-27	0.050	0.050	0.050	0.005	0.005	0.005	0	2	0	-	-	-	0.008	0.008	0.017
2020-11-03	0.050	0.050	0.050	0.005	0.005	0.005	1	0	0	0	0	0	0.006	0.007	0.009
2020-11-09	0.050	0.050	0.050	0.005	0.005	0.005	3	1	1	0	0	1	0.012	0.012	0.009
# Samples	10	10	10	10	10	10	10	10	10	8	8	8	10	10	10
Average	0.050	0.051	0.051	0.005	0.017	0.012	6	13	4	4	9	3	0.033	0.044	0.065
Maximum	0.050	0.062	0.062	0.005	0.098	0.072	24	46	20	20	22	15	0.128	0.186	0.179
Minimum	0.050	0.050	0.050	0.005	0.005	0.005	0.0	0.0	0.0	0.0	0.0	0.0	0.006	0.007	0.009

Sample Date yyyy/mm/dd	Field pH			TSS			NO <sub>3</sub> -N			NO <sub>2</sub> -N			Enterococcus		
	UP	SIDE	DN	UP	SIDE	DN	UP	SIDE	DN	UP	SIDE	DN	UP	SIDE	DN
2020-05-11	8.0	8.0	8.0	18.0	12.0	24.0	0.185	0.146	0.197	0.010	0.010	0.010	3.1	2.0	5.2
2020-05-19	7.8	7.8	7.8	85.0	23.0	176.0	0.216	0.211	0.230	0.010	0.010	0.010	0.0	2.0	4.1
2020-05-26	-	-	-	36.7	37.3	39.3	0.219	0.204	0.236	0.010	0.010	0.010	3.1	3.0	4.0
2020-06-03	-	-	-	215.0	123.0	311.0	0.161	0.160	0.190	0.010	0.010	0.010	5.0	6.3	1.0
2020-06-08	-	-	-	60.7	30.7	78.0	0.141	0.077	0.206	0.010	0.010	0.010	1.0	3.0	2.0
2020-10-14	-	-	-	19.9	20.9	8.3	0.061	0.053	0.075	0.010	0.010	0.010	13.4	19.7	8.4
2020-10-20	-	-	-	3.0	6.8	18.2	0.090	0.192	0.098	0.010	0.010	0.010	2.0	1.0	0.0
2020-10-27	-	-	-	16.2	5.6	4.8	0.117	0.188	0.100	0.010	0.010	0.010	1.0	0.0	2.0
2020-11-03	-	-	-	5.4	5.0	9.8	0.123	0.117	0.098	0.010	0.010	0.010	1.0	2.0	1.0
2020-11-09	-	-	-	17.7	18.1	11.5	0.104	0.122	0.118	0.010	0.010	0.010	4.0	0.0	2.0
# Samples	2	2	2	10	10	7	10	10	10	10	10	10	10	10	10
Average	7.9	7.9	7.9	47.8	28.2	68.1	0.142	0.147	0.155	0.01	0.01	0.01	3.4	3.9	3.0
Maximum	8.0	8.0	8.0	215.0	123.0	311.0	0.219	0.211	0.236	0.01	0.01	0.01	13.4	19.7	8.4
Minimum	7.8	7.8	7.8	3.0	5.0	4.8	0.061	0.053	0.075	0.01	0.01	0.01	0.0	0.0	0.0

Green shaded squares show tests reported at less than the stated value, for calculations these are listed as equal to the value stated, ie; <0.05 is assumed to be 0.05

UP – Upstream

SIDE – 1 km downstream of outfall from west shore (winter) and river side channel 350 m downstream of outfall (summer)

DN – Downstream

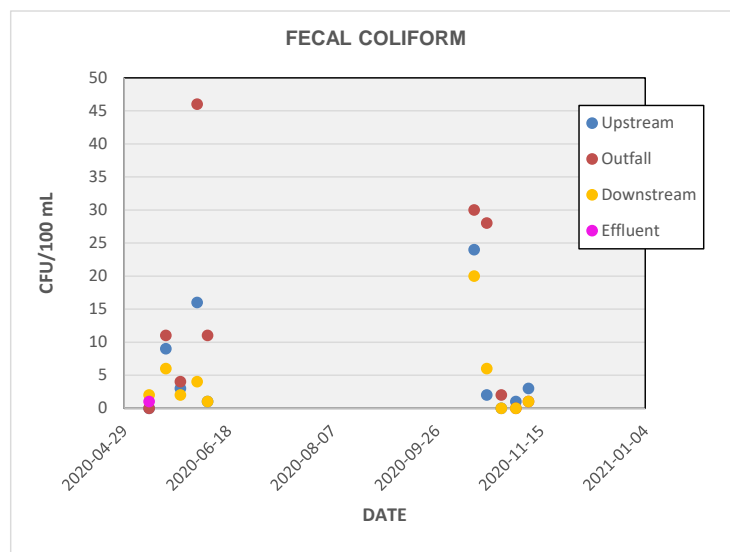
### **Fecal coliforms, E-coli and Enterococci**

Elevated Fecal coliforms and E.Coli were observed in the upstream and side stream samples on May 19<sup>th</sup>, June 3<sup>rd</sup> and October 14<sup>th</sup>, 2020. Elevated Enterococcus results were also recorded on October 14<sup>th</sup>, 2020. Downstream results were generally lower than the upstream or side stream. Low or below detection results were tested in the effluent on the same dates.

Positive Fecal coliforms, Enterococci and E-coli results were tested in the up-stream, side stream and down-stream samples throughout the sampling seasons; the results in the effluent as well as the side stream were at or below the detection limit on these specific dates.

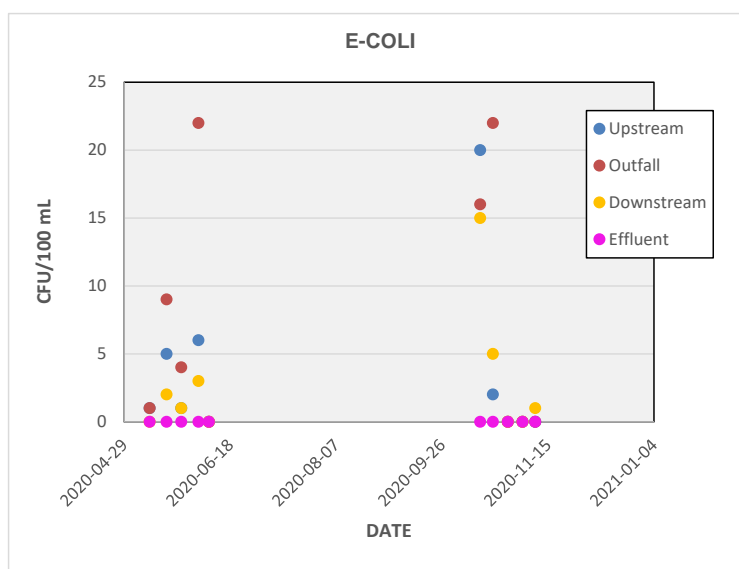
As shown on the graph below the highest Fecal coliform results were recorded at the outfall.

**Figure 7a**  
Fecal Coliform Levels in the Columbia River and the Effluent



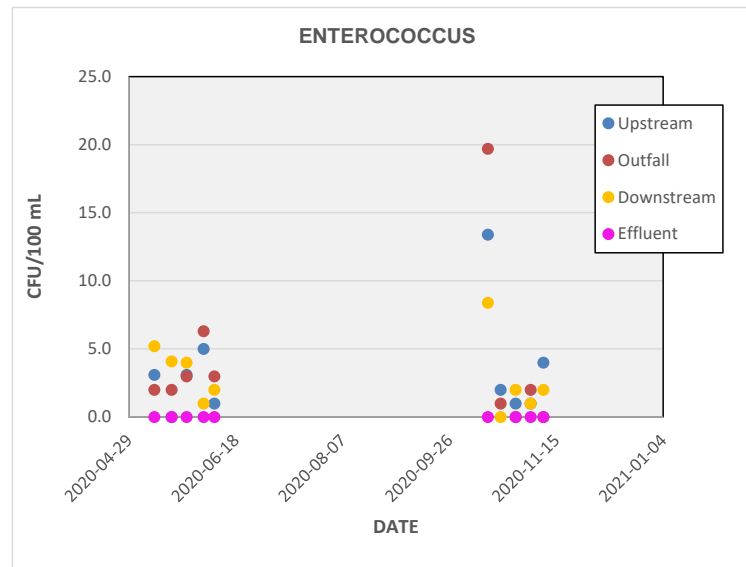
A graph below shows the highest E-coli results at the outfall followed by the river upstream and downstream.

**Figure 7b**  
E.Coli Levels in the Columbia River and the Effluent



A graph below shows levels of Enterococci at its highest at the outfall in the fall, note that the corresponding levels in the effluent are below the detection limits.

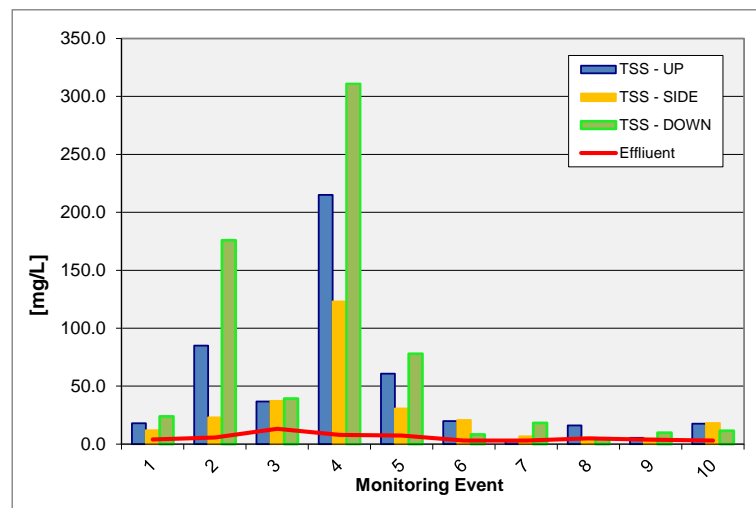
**Figure 7c**  
Enterococci Levels in the Columbia River and the Effluent



### TSS

The highest TSS levels were recorded on June 3<sup>rd</sup>, 2020 in the river downstream at 311 mg/L. TSS concentration upstream was 215 mg/L, while the effluent significantly lower at only 8 mg/L, indicating that the effluent was not likely the source of high TSS results in the river.

**Figure 8**  
TSS Levels in the Columbia River and the Effluent

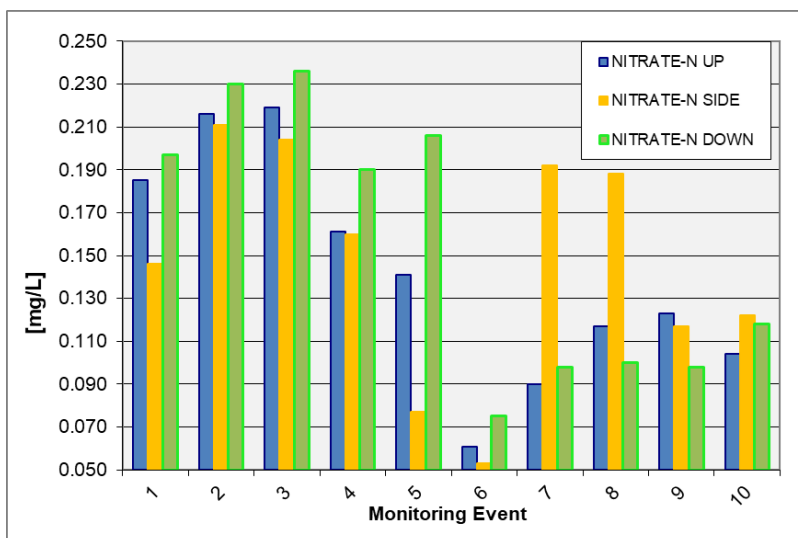


Although another elevated reading was recorded in the river downstream on May 19<sup>th</sup>, 2020, the effluent levels were very low at 5.7 mg/L. Based on the above it was determined that the observed spikes in the river downstream do not correlate with the levels found in the effluent on the same day. Based on the above there were no changes higher than 5 mg/L (B.C. Approved Water Quality Guidelines; Aquatic Life, Wildlife and Agriculture, August 2019; further BC AWQG) between the upstream and downstream values due to the effluent discharge.

#### **Ammonia-N, Nitrate-N and Nitrite-N**

With the exception of one event the ammonia-n and nitrite-n levels at the outfall were at or below their respective detection limits. The nitrate-n outfall levels were low with a maximum of 0.211 mg/L on May 19, 2020. The corresponding levels in the river upstream and downstream were 0.216 and 0.230 mg/L. Note that all the downstream results were within the BC AWQG Long Term Chronic threshold at 3.0 mg/L.

Figure 9  
Nitrate-N Levels in the Columbia River



No significant changes were observed in **pH** or **phosphorus** concentrations during any of the river sample periods. Note that only two monitoring events included pH testing, KHMUC has reviewed this oversight with its operators and will strive to ensure all testing meet the requirements going forward. pH results in the downstream samples followed closely those in the upstream with no guideline (6.5 – 9.0) exceedance.

In general, ortho-phosphorus values at the outfall and downstream were at or below the respective detection limits with the exception of three events at the outfall and one downstream. The highest ortho-phosphorus level was tested at the outfall on October 14<sup>th</sup>, 2020 at 0.098 mg/L with levels below the detection limits downstream. Total phosphorus was the highest downstream on

Total phosphorus was also the highest downstream on October 14<sup>th</sup>, 2020 at 0.186 mg/L with the upstream values at 0.024 and downstream at 0.087 mg/L.

Overall, the analysed concentrations remain constant between the upstream (UP) sampling zone and the downstream (DN) sampling zone. The data indicates that the plant's effluent does not appear to have any adverse effect on background nutrient concentrations in the Columbia River.

## 6.0 OVERVIEW OF EFFLUENT RESULTS

This section provides data and analysis for the effluent (treated) samples and plant flows for 2020.

A total of 18 effluent samples (19 for BOD) were collected and analysed. Table 6 summarizes effluent test results for 2020.

Table 6  
2020 Effluent Results

Date Sampled	2020 Effluent Results Summary												
	Flow	Temp	pH	NH4-N	BOD	P-OP04	Coliforms Fecal	E.Coli	Total P	TSS	NO <sub>3</sub> -N	NO <sub>2</sub> -N	Enterococci
yyyy/mm/dd	m³/d	C		mg/L	mg/L	mg/L	cfu/100ml	cfu/100ml	mg/L	mg/L	mg/L	mg/L	cfu/100ml
2021-01-28	171	-4.0	-	-	2.7	0.089	25	-	0.090	7.0	-	-	-
2021-02-25	142	-14.0	-	-	26.0	0.703	9100	-	1.420	35.5	-	-	-
2021-03-03	176	-2.0	-	-	16.0	0.084	3800	-	0.909	25.0	-	-	-
2021-04-07	75	-5.0	-	-	2.0	0.307	6	-	0.503	8.9	-	-	-
2021-05-11	77	5.0	7.2	0.066	2.3	0.127	0	0	0.225	4.0	15.2	0.031	0
2021-05-19	71	8.0	7.0	0.050	2.2	0.142	0	0	0.263	5.7	18.7	0.043	0
2021-05-26	76	8.0	7.2	0.050	3.9	0.199	0	0	0.617	13.3	18.8	0.038	0
2021-06-03	74	6.0	-	0.054	2.2	0.170	2	0	0.394	8.0	19.5	0.042	0
2021-06-08	68	6.0	-	0.062	2.0	0.159	0	-	0.283	7.3	23.4	0.070	0
2021-07-20	95	20.0	-	-	2.0	0.234	0	-	0.301	3.0	-	-	-
2021-08-24	129	10.0	-	-	2.0	0.307	0	-	0.462	3.0	-	-	-
2021-09-30	74	8.0	-	-	2.0	-	-	-	-	5.4	-	-	-
2021-10-14	84	4.0	-	0.050	10.5	0.378	0	0	0.494	3.0	17.4	0.018	0
2021-10-20	85	-2.0	-	0.050	2.0	0.320	0	0	0.466	3.0	22.0	0.033	0
2021-10-27	53	-3.0	-	0.050	2.0	0.350	0	-	0.434	5.0	16.6	0.042	0
2021-11-03	57	1.0	-	0.065	2.0	0.354	0	0	0.399	3.8	15.1	0.010	0
2021-11-09	84	-4.0	-	0.050	2.0	0.457	0	0	0.593	3.0	20.3	0.021	0
2021-12-21	149	-4.0	-	-	6.1	0.045	0	-	0.358	5.5	-	-	-
# Samples	19	19	3	10	19	18	18	8	18	19	10	10	10
Average	97	2.1	7.1	0.055	5.0	0.260	761	0.0	0.483	8.3	18.7	0.035	0.0
High	176	20.0	7.20	0.066	26	0.703	9100	0.0	1.42	35.5	23.4	0.07	0.0
Low	53	-14.0	7.00	0.050	2	0.0447	0	0.0	0.09	3.0	15.1	0.01	0.0
Limit	300	N/A	N/A	N/A	45	0.5	200	77	1	45	N/A	N/A	20
# Over Limit	0	N/A	N/A	N/A	0	1	2	0	1	0	N/A	N/A	0

1. Shaded squares show tests reported at less than the stated value, for calculations these are listed as equal to the value stated, ie; <0.05 is assumed to be 0.05

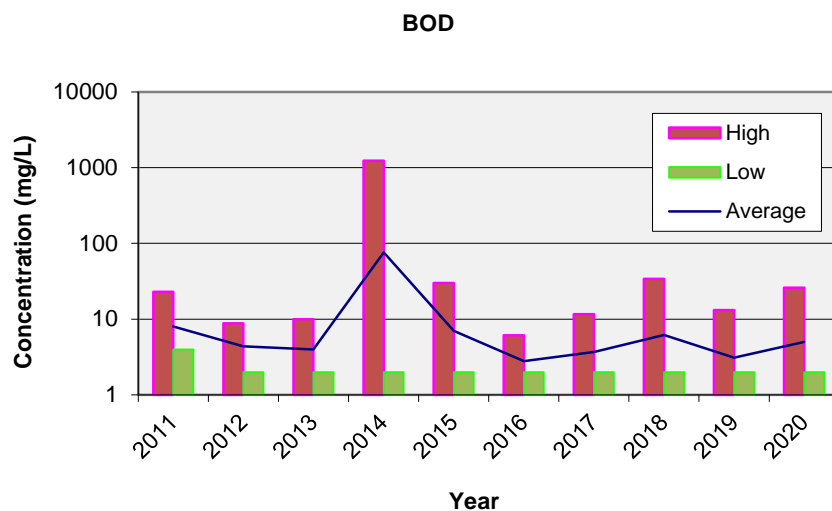
2. Geometric mean is used for coliform results

## 6.1 RESULTS ANALYSIS

Effluent **ammonia-n** concentrations were generally low (slightly above or at/below the detection limit) throughout the year with the highest level at 0.066 mg/L on May 11<sup>th</sup>, 2020. The results for ammonia-nitrogen were comparable or lower than to those in previous years.

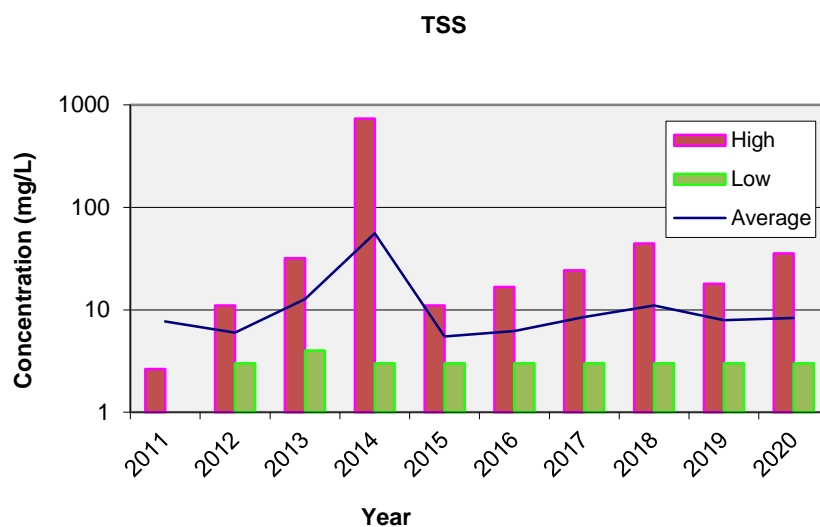
The average **BOD** in the effluent was low at 5.0 mg/L, which is similar to the previous years. The highest BOD results were recorded in the effluent on February 25<sup>th</sup>, 2020 at 26 mg/L, however, BOD was below the MSR limits for all the samples.

Figure 10



**TSS** results averaged at 8.3 mg/L with a maximum concentration of 35.5 mg/L, both which were similar to the results during the previous years. TSS was below the MSR limits for all the samples.

Figure 11

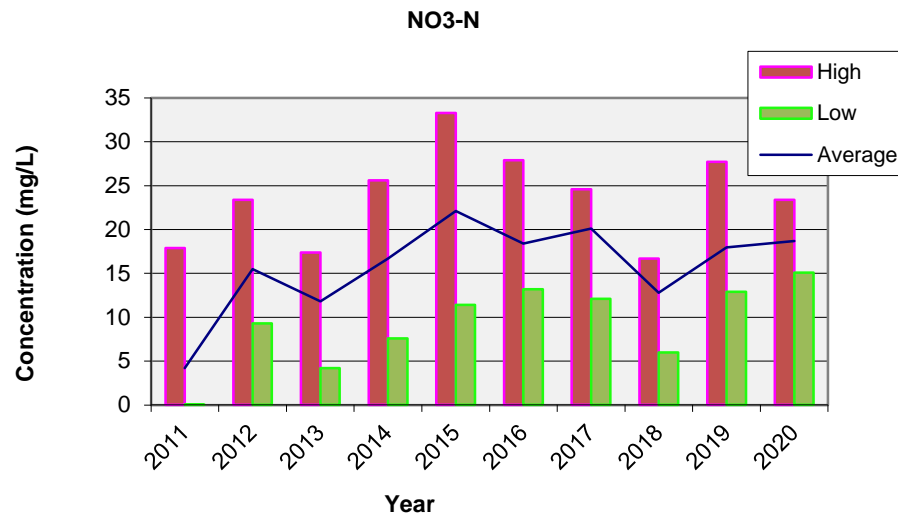


**Nitrate-N** averaged in the effluent at 18.7 mg/L with a maximum concentration at 23.4 mg/L on June 8<sup>th</sup>, 2020. As shown on the graph below the average and maximum values were higher than in 2018 and similar to 2014 to 2017 and 2019.

**Nitrite-N** averaged in the effluent at 0.035 mg/L with a maximum concentration at 0.07 mg/L. The 2020 results were higher than in 2019 and comparable to the 2018 results at 0.041 and 0.074 mg/L.

Note that nitrate-n levels in the river downstream were similar to the upstream or the side stream values. All nitrite-n values in the river downstream were below the detection limit.

Figure 12



**Fecal Coliforms and E-coli**

Majority of the results for fecal coliforms were below the detection limits with the exception of elevated results on January 28<sup>th</sup>, 2020 and high results on February 25<sup>th</sup> and March 3<sup>rd</sup>, 2020. The February and March results exceeded the MSR limits.

All E-coli test results were below the detection limits on the day of the testing and, therefore, below the MSR limits.

**Enterococci**

All the results were at or below their respective detection limits and, therefore, below the MSR limit.

**Phosphorus and Ortho-phosphorus**

Only one out of 18 samples for ortho-phosphorus as well as for phosphorus exceeded the MSR discharge limits on February 25<sup>th</sup>, 2020.

The 2020 average for total phosphorus was 0.483 mg/L which was lower than 2019 average at 0.506 mg/L and significantly lower than in 2018 with average at 7.55 mg/L or compared to 1.20 mg/L in 2017, 1.07 mg/L in 2016, 2.77 mg/L in 2015, 2.43 mg/L in 2014, 1.65 mg/L in 2013 and 0.97 mg/L in 2012. (However, note that 2018 average phosphorus value would be 0.61 mg/L if the December 27<sup>th</sup> result was not considered; this high results could have been due to a sampling error).



The 2020 average for ortho-phosphorus was 0.26 mg/L which is similar to 2019 average at 0.277 mg/L and significantly lower than in 2018 at 0.485 mg/L or 0.91 mg/L in 2017, 0.88 mg/L in 2016, 2.37 mg/L in 2015, 2.18 mg/L in 2014, 1.26 mg/L in 2013 and 0.67 mg/L in 2012.

Two results for ortho-phosphorus and one for phosphorus exceeded the MSR limit in 2019. Six results for ortho-phosphorus and four results for phosphorus exceeded the MSR limits in 2018. Twelve samples out of sixteen for ortho phosphorus and eleven out of sixteen for total phosphorus were above MSR discharge limits in 2017. Ten samples out of fourteen for ortho phosphorus and six out of fourteen for total phosphorus were over the limits in 2016. Ten samples out of ten for ortho phosphorus and nine out of ten samples for total phosphorus were over the limits in 2015. Ten samples for ortho phosphorus and eight samples for total phosphours were over the limits in 2014. Nine samples for ortho phosphorus and seven samples for total phosphorus were over the limits in 2013 and five samples for total and ortho phosphorus were over the limits in 2012. Only one sample for total phosphorus was over the limit in 2011. In 2009 and 2010, there were no exceedances for total phosphorus or ortho phosphorus. Phosphorus is further discussed in Section 11. Phosphorus levels are under review and KHMUC will continue to modify and adjust dosing of ClearPac until all the test results show levels within the allowable limits.

The bioassay toxicity testing was completed this year as it is to be done every 3 years. The most recent testing showed that plant effluent was non-toxic. The results of the 2020 tests are shown below in Table 7.

Table 7  
Toxicity Test Results

Sample Date	Result
2020-10-15	Pass

## 6.2 COMPLIANCE SUMMARY

Table 8 summarizes the number of days that samples exceeded MSR effluent requirements.

Table 8  
2020 MSR Parameter Compliance

Parameter	Unit	MSR Limit	No. Of Samples	Average Value	Max. Value	Samples Over Limit
Flow	m <sup>3</sup> /day	300	365	113	247	0
BOD <sub>5</sub>	mg/l	45	19	6.0	26	0
TSS	mg/l	45	18	8.3	35.5	0
Total Phosphorus	mg/l	1	18	0.483	1.42	1*
Ortho Phosphate	mg/l	0.5	18	0.26	0.703	1*
Fecal Coliforms	CFU/100ml	200	18	761	9100	2*
Enterococci	CFU/100ml	20	10	<1	<1	0
E.Coli	CFU/100ml	77	12	<1	<1	0
96 hr LC <sub>50</sub> Bioassay**	/	Non-toxic	1	Pass	Pass	0

\*This year the test results indicated that out of all the samples collected there were 1 exceedances for ortho-phosphorus and 1 exceedance for total phosphorus; 2 fecal coliform results exceed the limits.

\*\*The most recent test was done in 2020.

## 7.0 SLUDGE PRODUCTION AND DISPOSAL

This section provides data regarding the disposal of bio-solids (sludge) from the treatment facility in 2020.

Waste activated sludge used to be stored in a thickener and removed by a vacuum tanker. In the fall of 2014, a 12 unit Teknofanghi (Model Number 12BCAVPK) supplied by Drycake was installed and was commissioned in mid-December. All solids were transported to the Crowsnest/Pincher Creek Landfill site.

Hauling data for pumped solids are in Table 9.

Table 9

2020 Pumped Solids Data

Month	Vol. Pumped (m <sup>3</sup> )
January	199
February	214
March	211
April	150
May	24
June	53
July	112
August	74
September	94
October	36
November	82
December	116
<b>Total</b>	<b>1365</b>

Volumes of sludge are currently being estimated by counting the quantity of bags produced. Long range plans call for the installation of a flow meter to better measure the quantity of sludge bagged.

Please note, the calculations for bagged solids are being reviewed to ensure consistency.

## **8.0 PLANT IMPROVEMENTS & BYPASS EVENTS**

The resort is committed to improvements to the phosphorus monitoring program and to implement further monitoring and increase dosage of clearpac. The resort will continue to address the phosphorus concern and bring phosphorus levels down.

KHMUC has engaged an engineer and is currently undertaking an assessment to determine the plant's capacity to accommodate additional growth and recommend plant improvements.

KHMUC will be looking into purchasing a new flow meter for the sludge and they will calibrate their flow meter for the effluent.

There were no bypass events for 2020.

## 9.0 PHOSPHORUS REMOVAL

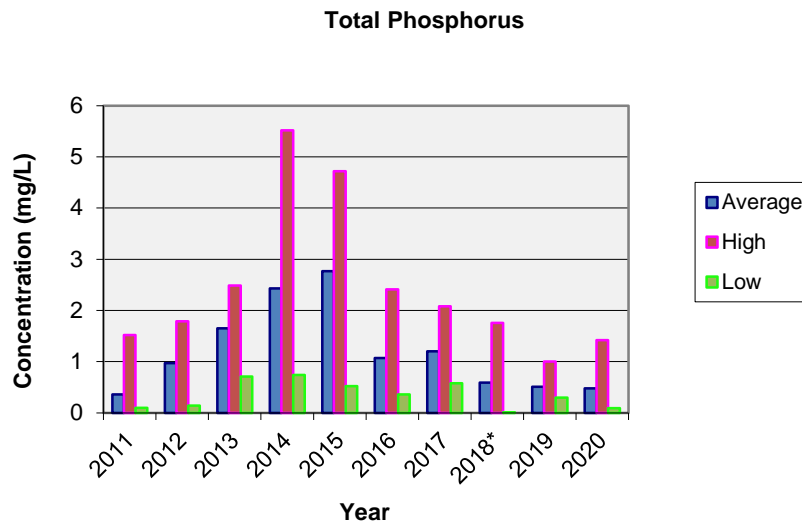
This section describes the phosphorus monitoring and removal strategy being implemented to bring the plant into compliance with effluent limits.

During 2020 total **phosphorus** varied between 0.09 and 1.42 mg/L with an average value at 0.48 mg/L.

As seen in the graphs below, the levels of phosphorus were increasing from 2011 until 2015 (average at 2.77 mg/L) and there had been a continuous decrease since 2015. The values in 2020 were low and similar to the previous year at an average value of 0.51 mg/L.

Note that on December 27<sup>th</sup>, 2018 high phosphorus value was tested resulting in very high yearly average at 7.55 mg/L. This value was likely a sampling error; without the high result being included, the 2018 yearly average would be 0.61 mg/L which is consistent with historical levels as shown on the following graph.

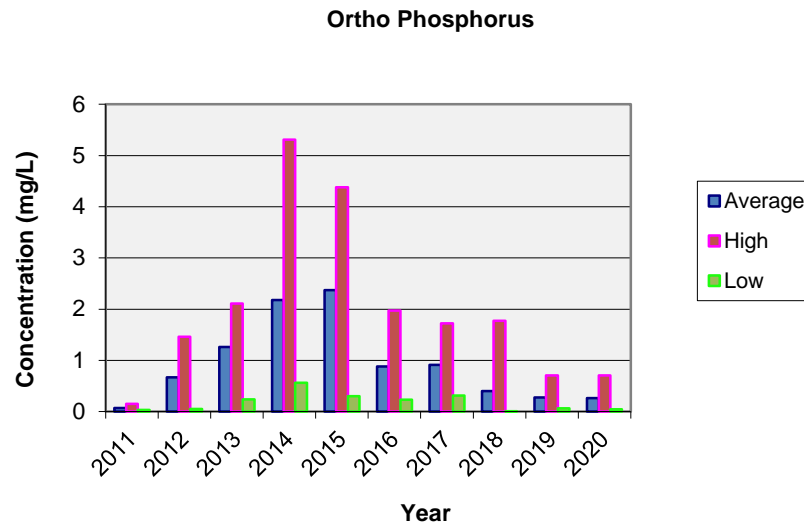
Figure 13  
Total Phosphorus Levels 2011-2020



During 2020 **ortho-phosphorus** varied between 0.048 and 0.703 mg/L with an average value at 0.26 mg/L, which was very similar to 2019 at average value of 0.277 mg/L.

The historical levels of ortho-phosphorus were increasing until they peaked in 2014/2015 (average concentration at 2.18 and 2.37 mg/L), there has been a decreasing trend since.

**Figure 14**  
**Ortho-Phosphorus Levels 2011-2020**



The days over limit for both phosphorus and ortho-phosphorus were increasing from 2011 to 2014 and then were fairly consistent for several years (10 days over limit for 2014, 2015 and 2016), increased again in 2017 at 12 days over the limit and then decreased to 6 days over the limit in 2018. The days over limit for total phosphorus increased from 2011 until 2015, decreased in 2016, increased to 11 days over the limit in 2017 and decreased again to four days over the limit in 2018. There was a significant decrease in exceedances in 2019 and 2020 with only one day over limit for both phosphorus and ortho-phosphorus in 2020.

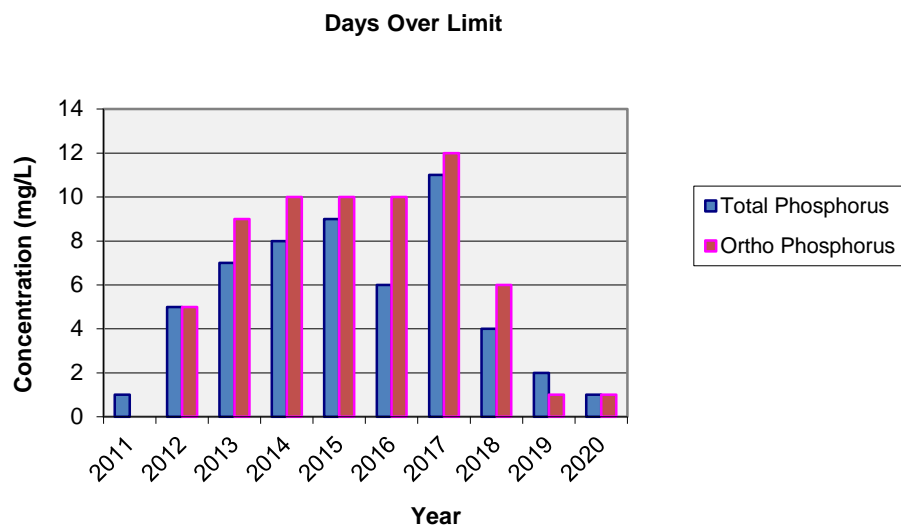
In the fall of 2015 KHMUC began injecting alum into the effluent to reduce the phosphorus levels in the plant effluent. There was a noticeable drop in the levels in the final EMS test run in 2015.

Beginning in December 2016, KHMUC switched to ClearPac addition in the winter months to control phosphorus. In 2020 ClearPac was used year round. Phosphorus levels were easier to control and with the lower summer flows, we found that ClearPac was a superior product and will likely continue with its year round use. Note that the levels in 2019 and 2020 levels have been the lowest since 2011.

Additionally, KHMUC will continue to test total phosphorus and ortho phosphorus with the monthly effluent sampling. This will help to monitor the levels on an ongoing basis and help to determine dosage levels. KHMUC has also agreed to collect a laboratory sample in first week of January going forward in order to better characterize/monitoring the effluent during the peak capacity. It is also recommended that as soon as very high results are found, samples be collected immediately and submitted for testing to ensure the levels drop below the allowable limits.

Historical limits exceedance is shown on the graph below, the 2020 exceedances for both total phosphorus and ortho-phosphorus are the lowest since 2011 indicating the current phosphorus reduction strategy has been successful.

**Figure 15**  
Days over Limit 2011-2020



## 10.0 ASSESSMENT SUMMARY

The total effluent flow recorded for 2020 was 41,218 m<sup>3</sup> with an average of 113 m<sup>3</sup>/day and a maximum peak flow at 247 m<sup>3</sup>/day. There were no days where the flow was over the allowable limit.

The average **BOD** in the effluent was low at 5.0 mg/L, which is similar to the prior years. The highest BOD results were recorded in the effluent on February 25<sup>th</sup>, 2020 at 26 mg/L, however, BOD was below the MSR limits for all the samples.

**TSS** results averaged at 8.3 mg/L with a maximum concentration of 35.5 mg/L, both which were similar to the results during the previous years. TSS was below the MSR limits for all the samples.

### **Fecal Coliforms and E-coli**

Majority of the results for fecal coliforms were below the detection limits with the exception of elevated results on January 28<sup>th</sup>, 2020 and high results on February 25<sup>th</sup> and March 3<sup>rd</sup>, 2020. The February and March results exceeded the MSR limits.

All E-coli test results were below the detection limits on the days of the testing and, therefore, below the MSR limits.

### **Enterococci**

All the results were at or below their respective detection limits and, therefore, below the MSR limit.

### **Nitrogen**

Effluent **ammonia-n** concentrations were generally low (slightly above or at/below the detection limit) throughout the year with the highest level at 0.066 mg/L on May 11<sup>th</sup>, 2020. The results for ammonia-nitrogen were comparable or lower than to those in previous years.

**Nitrate-N** averaged in the effluent at 18.7 mg/L with a maximum concentration at 23.4 mg/L on June 8<sup>th</sup>, 2020. As shown on the graph below the average and maximum values were higher than in 2018 and similar to 2014 to 2017 and 2019. **Nitrite-N** averaged in the effluent at 0.035 mg/L with a maximum concentration at 0.07 mg/L. The 2020 results were higher than in 2019 and comparable to the 2018 results at 0.041 and 0.074 mg/L.

Note that nitrate-n levels in the river downstream were similar to the upstream or the side stream values. All nitrite-n values in the river downstream were below the detection limit.

### **Phosphorus and Ortho-phosphorus**

During 2020 total **phosphorus** varied between 0.09 and 1.42 mg/L with an average value at 0.48 mg/L. The values in 2020 were low and similar to the previous year at an average value of 0.51 mg/L. The levels of phosphorus were increasing from 2011 until 2015 (average at 2.77 mg/L) and there had been a continuous decrease since 2015.

During 2020 **ortho-phosphorus** varied between 0.048 and 0.703 mg/L with an average value at 0.26 mg/L, which was very similar to 2019 at average value of 0.277 mg/L. The historical levels of ortho-phosphorus were increasing until they peaked in 2014/2015 (average concentration at 2.18 and 2.37 mg/L), there has been a decreasing trend since.

The days over limit for total phosphorus increased from 2011 until 2015, decreased in 2016, increased to 11 days over the limit in 2017 and decreased again to four days over the limit in 2018. There was a significant decrease in exceedances in 2019 and 2020 with only one day over limit for both phosphorus and ortho-phosphorus in 2020.

In the fall of 2015 KHMUC began injecting alum into the effluent to reduce the phosphorus levels in the plant effluent. There was a noticeable drop in the levels in the final EMS test run in 2015. Beginning in December 2016, KHMUC switched to ClearPac addition in the winter months to control phosphorus. In 2020 ClearPac was used year round. Phosphorus levels are under review and KHMUC will continue to modify and adjust dosing of ClearPac until all the test results show levels within the allowable limits. Note that the levels in 2020 have been the lowest since 2011.

KHMUC will continue to test total phosphorus and ortho-phosphorus with the monthly effluent sampling. This will help to monitor the levels on an ongoing basis and help to determine dosage levels.

A small 26 unit subdivision was proposed and construction started in 2014. Out of the 26 units approved, Phase 1 (8 units) and Phase 2 (8 units) are now completed. Phase 3 (10 units) is currently under construction, with subdivision approval anticipated in 2021. Flows will be monitored closely and additional improvements may be required as growth at the resort continues.

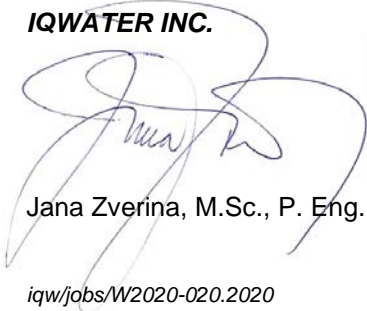
It has been noted that only two monitoring events included pH testing, KHMUC has reviewed this oversight with its operators and will strive to ensure all testing meet the requirements going forward.



## 11.0 AUTHORIZATION AND CLOSING

This report, titled *2020 Sewage Treatment Plant Annual Report*, was prepared for KHMUC by IQWater Inc. The material in this report reflects the best judgement of IQWater Inc. based on the information available at the time of preparation. Any use that a third party makes of this report, or reliance on or decisions based on it, is the responsibility of the third party. IQWater Inc. accepts no responsibility for damages, if any, suffered by a third party as a result of decisions made or actions taken based on this report.

**IQWATER INC.**



Jana Zverina, M.Sc., P. Eng.

*iqw/jobs/W2020-020.2020*



## 12.0 REFERENCES

American Public Health Association, American Water Works Association and the Water Environment Federation: Standard Methods for Examination of Water and Wastewater

American Public Health Association, American Water Works Association and Water Environment Federation. Standard Methods for the Examination of Water and Wastewater. 23<sup>rd</sup> Edition

BC Environmental Management Act, Municipal Wastewater Regulation B.C. Reg. 87/2012, last Amended April 1<sup>st</sup>, 2018 by B.C. Reg. 46/2018

BC Ministry of Health, Health Protection Branch, Sewerage System Standard Practice Manual, Version 3, September 2014

BC Ministry of Environment & Climate Change Strategy, British Columbia Approved Water Quality Guidelines; Aquatic Life, Wildlife and Agriculture, August 2019

Canadian Council of Ministers of the Environment. Canadian Water Quality Guidelines for the Protection of Aquatic Life

Canadian Council of Ministers of the Environment. Canadian Water Quality Guidelines for the Protection of Agricultural Water Uses

Canadian Council of Ministers of the Environment. Protocols Manual for Water Quality Sampling in Canada. 2011

Health Canada. Guidelines for Canadian Drinking Water Quality. June 2019

### 13. TERMS AND CONDITIONS

1. Our reports are prepared to specifically fulfil our Clients' requirements. The conclusions are based on the time limitations and scope of the services provided and information obtained from those services. The Inspector certifies that he/she has no present or contemplated future interest in the inspected property.
  2. IQWATER INC. will provide skill, care and diligence in accordance with generally accepted engineering practices and procedures at the time and location in which the services are performed. With time, conditions may change and the interpretation of the findings may be altered.
  3. IQWATER INC. cannot assume responsibility for any deficiency, misstatement or inaccuracy in the report resulting from the omissions or misrepresentations of persons providing information to use in the report. Any sketch appearing in or attached to the inspection report, or any statement of dimensions, capacities, quantities, or distances, are approximate and are included to assist the reader in visualizing the property.
  4. The contents of the report are for the sole use of the Client. The report is the property of the Client and copies shall only be made by the Client or with the approval of the Client. IQWATER INC. is not responsible for any use of information contained in the report, or any reliance or decisions made based on it by an unauthorized third party.
  5. This report represents the conditions investigated and sampled at the time of study. Some of the services performed were based on visual observations of the site and the areas surrounding the site, and our opinion cannot be extended to areas that were unavailable for direct observation.
  6. The Client is responsible for all permits, authorization, or consents and giving any required notices that enable EDI to perform the services required.
- IQWATER INC. may use any contractor with appropriate recognized professional status or with special skills or knowledge to assist in performing the services, at the expense of the client.
7. Any documents provided to IQWATER INC. from the Client will remain the property of the Client, and upon written request IQWATER INC. will return such documents as soon as possible. Any information or documents obtained by IQWATER INC. while performing the services requested will remain the property of IQWATER INC.
  8. IQWATER INC. and the client will take reasonable care to prevent any disclosure of the reports or documents, or any information obtained or contained in the reports prepared by IQWATER INC., unless it is to the persons who require such access to the information in order to discharge their responsibilities to IQWATER INC. or as required by law.
  9. This report is not intended to have any direct effect on the value of the property, but rather to provide information on apparent site conditions. The Client acknowledges that IQWATER INC. is not making any recommendations with respect to the purchase, sale, investment, or development of the property; and that all decisions associated therewith are the sole responsibility and liability of the Client. Further, IQWATER INC. assumes no responsibility for matters of legal nature affecting the property or title thereto.
  10. Limits of Liability – To the fullest extent permitted by law, and notwithstanding any other provision of the Service Agreement between the Client and IQWATER INC., total liability, in the aggregate, of IQWATER INC. and the IQWATER INC. officers, directors, partners, employees and sub-consultants, and any of them, to the Client and anyone claiming by or through the Client, for any and all claims, losses, costs or damages, including attorneys' fees and costs and expert-witness fees and costs of any nature whatsoever or claims expenses resulting from or in any way related to the Project shall not exceed the limit of IQWATER's insurance in effect at the time of this report.
  11. In accepting and using this report the Client agrees to indemnify and hold harmless IQWATER INC., its officers, partners, employees and consultant (collectively IQWATER INC.) from and against any and all claims, suits, demands, liabilities, losses, damages or costs, including reasonable attorney's fees and defence costs arising out of or in any way connected to the findings and results of the proposed work, whether liability arises under breach of contract or warranty, tort, including negligence, strict liability or statutory liability or any other cause of action.
  12. IQWATER INC. will exercise due diligence, however, IQWATER INC. will not assume any liability for any damage to any facilities, utilities, ground or above-ground surface infrastructure within or outside the subject property boundary since any sampling if needed is intrusive in nature and damage may have to be done to obtain samples.
  13. IQWATER INC. will not assume any responsibility for any actual or perceived loss of business to owner's operations as a result of the work proposed herein.
  14. The governing law for this contract will be the Alberta law.
  15. All claims of costs, losses, damages, etc. have to be immediately forward to IQWATER INC. insurance

Table 10 - Kicking Horse Mountain Resort Estimated Sewage Generation (m3/day)

Current Development	Flow* (l/unit/day)	Units	2011 Generation (m3/day)	2018 Generation (m3/day)	Flow* (l/unit/day)	Units	2019 Generation (m3/day)	2020 Generation (m3/day)	Units	2021 Generation (m3/day)
Single Family	318	972	309.1	309.1	1300	98	127.4	127.4	98	127.4
Duplexes & Triplexes	318	see single family	see single family	see single family	1000	112	112.0	112.0	116	116.0
Lodges (EBU)	318	296	94.1	94.1	700	296	207.2	207.2	296	207.2
Condominiums	318	952	302.7	302.7	1000	155	155.0	155.0	155	155.0
	Subtotal	2220	706.0	706.0	Subtotal	661	601.6	601.6	665	605.6

Commercial	Flow* (l/unit/day)	Unit	2011 Generation (m3/day)	2018 Generation (m3/day)	Flow* (l/unit/day)	Units	2019 Generation (m3/day)	2020 Generation (m3/day)	Units	2021 Generation (m3/day)
Administration	75	20	0	0.0	57	20	0.0	1.1	20	1.1
Other (day care, shops etc.)	20	5	0	0.0	20	5	0	0.1	5	0.1
	Subtotal	5	0	0.0	Subtotal	5	0.0	1.2	5	1.2

Dining Facilites/Bars	Flow* (l/m <sup>2</sup> /day)	Area (m2)	2011 Generation (m3/day)	2018 Generation (m3/day)	Flow* (l/m <sup>2</sup> /day)	Area (m2)	2019 Generation (m3/day)	2020 Generation (m3/day)	Area (m2)	2021 Generation (m3/day)
Peaks Grill	97	256	0	0.0	97	256	0.0	24.8	256	24.8
Double Black	97	190	0	0.0	97	190	0.0	18.4	190	18.4
Whitetooth Grill	97	300	0	0.0	97	300	0.0	29.1	300	29.1
Copperhorse Steak House	97	110	0	0.0	97	110	0.0	10.7	110	10.7
Winston	97	220	0	0.0	97	220	0.0	21.3	220	21.3
	Subtotal	1076	0	0.0	Subtotal	1076	0.0	104.4	1076	104.4

Daily Wastewater Flow (m3/day)*	705.5	705.5
Corrected Daily Peak Flow Projections**	167 (actual)	262 (actual)

705.5	707.2
265 (actual)	247 (actual)

711.2
212 (projected)

\*Estimated Wastewater Flows - Residential and Non-residential Daily Flows  
Note that the occupancy significantly varies throughout the year with near full occupancy only during the ski season and during the long weekends.



April 28, 2005

File: RE-15474

**REGISTERED MAIL**

Kicking Horse Mountain Sanitary Sewer Services Ltd.  
2100- 1075 W. Georgia Street  
Vancouver, BC V6E 3G2

Attn: Arijan van Vuure

Dear Mr. van Vuure:

**Re: Letter of Transmittal for Registration under the *Municipal Sewage Regulation* of the discharge to Columbia River from the Kicking Horse Mountain Resort located at Unsurveyed Crown land in the vicinity of Section 9, together with those parts of the Northwest  $\frac{1}{4}$  of Section 14 and 15, all of Township 27, R22 West of 5<sup>th</sup> Meridian, and Unsurveyed Crown Foreshore, being part of the Columbia River, Kootenay District**

Enclosed herewith is a copy of the registration letter RE-15474 in the name of the Kicking Horse Mountain Sanitary Sewer Services Ltd. Your attention is respectfully directed to the conditions outlined in the registration letter.

In addition to the registration letter and the terms and conditions of the Environmental Impact Study, dated November 20, 2000, you are directed to comply with the following requirements:

**A. Outfall**

The outfall shall consist of a permanent outfall with diffusers.

The permittee shall have the outfall inspected once each five years by independent qualified personnel to ensure it is in good working condition. An inspection report shall be submitted to the Regional Manager, Environmental Protection within 30 days after the inspection date. The first report shall be submitted by January 2006.

... 2

B. Environmental Monitoring

In accordance with Part 7, Section 26 and 27 and applicable conditions of Schedule 6 of the *Regulation*, the discharger shall undertake the discharge and receiving environment monitoring programs established by Masse & Miller Consulting Ltd., in their letter dated February 17, 2005.

The person collecting samples shall be properly trained in sample collection and handling.

C. Reporting non-compliances

The discharger is required to report instances of non-compliance within 15 days of the date of discovery. The discharger is required to provide a report of actions taken to remediate non-compliance within 30 days from the start of non-compliance.

D. Financial Security requirements

The discharger is required to notify the Ministry and to set up either a capital replacement fund or financial security or assurance plan when the residential development content, as defined by the *regulation*, exceeds 10%.

The administration of this registration, including periodic inspections and audits shall be carried out by staff from our sub-regional office located at 205 Industrial Road G, Cranbrook, BC, V1C 7G5. Any required information may be submitted to the Regional Manager, Environmental Protection at this address in lieu of the Director.

Yours truly,



Kathy Eichenberger, P.Eng.  
for Director, *Environmental Management Act*  
Kootenay and Okanagan Regions

AMT/KE:lkM

cc: Environment Canada  
Kicking Horse Mountain Sanitary Sewer Services Ltd., 1500 Kicking Horse Trail, PO  
Box 839, Golden, BC V0A 1H0, Attn: John Urie  
Ecofluid, #101-334 E. Kent Ave. South, Vancouver, BC V5X 4N5 Attn: Rolf Loker, VP  
& Manager of Operations  
Ana C. May Tsui, MWLAP-Environment Protection, Cranbrook

April 28, 2005

File: RE-15474

**REGISTERED MAIL**

Kicking Horse Mountain Sanitary Sewer Services Ltd.  
2100-1075 W. Georgia Street  
Vancouver, BC V6E 3G2

Attn: Arijan van Vuure

Dear Mr. van Vuure:

Re: Registration under the Municipal Sewage Regulation of the discharge to Columbia River from the Kicking Horse Mountain Resort located at Unsurveyed Crown land in the vicinity of Section 9, together with those parts of the Northwest  $\frac{1}{4}$  of Section 14 and 15, all of Township 27, R22 West of 5<sup>th</sup> Meridian, and Unsurveyed Crown Foreshore, being part of the Columbia River, Kootenay District

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Receipt of the completed Municipal Sewage Regulation registration form for the subject discharge is acknowledged. Pursuant to Part 2, section 3 of the Municipal Sewage Regulation, the effective date of registration of this discharge is November 24, 2000. The ministry file number for this discharge is RE-15474. Please indicate this number on all future correspondence regarding this discharge.

An annual registration fee will be determined according to the Waste Management Permit Fees Regulation and you will be receiving an annual invoice from the ministry for payment of this fee. Payment of all fees due is necessary to comply with the Municipal Sewage Regulation. Fees will be calculated using a maximum daily effluent discharge of 300 m<sup>3</sup>/day, a maximum BOD<sub>5</sub> of 45 mg/L and a maximum TSS of 45 mg/L.

Acceptance of this registration under the Regulation is based on the following documents:

1. Kicking Horse Mountain Resort Ltd. Partnership, Registration Form dated November 24, 2000 and submitted by McElhanney Consulting Services Ltd.
2. Environmental Impact Study entitled Kicking Horse Mountain Resort – Environmental Impact Study for Sewage Treatment and Disposal, dated November 20, 2000, prepared by Western BioResources Consulting Ltd. and signed by Christopher Bullock, P.Eng.

... 2

Pursuant to Part 2, Section 3 (2) (k) of the Municipal Sewage Regulation, more stringent standards or requirements may be specified by the Director. Accordingly, in addition to the terms and conditions of the regulation, for this discharge the following standards and requirements apply. The following information related to RE-15474 must be submitted within 30 days:

1. Tables that summarize the Discharge Monitoring Program and the Environment Monitoring Sampling Programs. Tables should indicate sampling sites/locations and short description of the locations, parameters, sampling frequency, reporting frequency and standards and criteria to be met.
2. GPS coordinates for all sampling sites. Specify in decimal degrees to 4 decimal places using NAD83 Datum.

The discharger shall **report monitoring data** in accordance with Part 7, Section 28 of the *Regulation* and in accordance with the following requirements. Monitoring data shall be submitted to the Ministry (EMS) database quarterly within 30 days of the end of each quarter. Instances of non-compliances are to be notified and reported to the Manager in writing, with an explanation and action taken to remediate non-compliance.

In accordance with Part 7, Section 28 (3) of the *Regulation*, the discharger shall submit an annual report and do so in accordance with the annual report requirements of Section 28 of the *Regulation*. The annual report shall be prepared by a suitably qualified professional and shall include the following:

- Tabulated results of the Effluent and Environmental Monitoring Data with standards and criteria
- Interpretation of the monitoring data
- The total volume discharged over the year
- Total sludge wasted over the year and its final destination
- The state of compliance of the treatment facility/process
- Indicate the percentage of residential development, as defined in the *Regulation*, that contributes to the effluent discharge
- Any additional relevant information the discharger wishes to provide

The annual report shall contain recommendations of a qualified professional regarding changes (additions, deletions, modifications) to the monitoring program. Electronic and hard copies of the annual report submission is due within 120 days of the end of each calendar year.

This decision to specify more stringent standards or requirements under the Municipal Sewage Regulation may be appealed to the Environmental Appeal Board in accordance with Part 8 of the *Environmental Management Act*. An appeal must be delivered within 30 days from the date that notice of this decision is given, in accordance with the practices, procedures and forms prescribed by regulation under the *Environment Management Act*. For further information, please contact the Environmental Appeal Board at (250) 387-3464.



The ministry uses a reference number to track monitoring data associated with discharges. The following are the EMS site numbers assigned to the monitoring sites listed above. These numbers are to be used when entering data directly into the Ministry EMS database in accordance with Part 7, Section 28 (2) of the *Regulation*.

SAMPLING SITE/LOCATION	EMS NUMBER	DESCRIPTION
Columbia River UP IDZ	E256694	Upstream at the bridge
Columbia River 100m DN, main stem	E256695	~ 100 m downstream of outfall, at main stem from island
Columbia River 100m DN, side channel	E258897	~ 100 m downstream of outfall, at side channel
Columbia River 200m DN, east shore	E258898	~ 200 m downstream of outfall, from east shore
Columbia River 1km DN, west shore	E258899	~ 1 km downstream of outfall, downstream of island from west shore
Plant Effluent	E256696	Sample prior to the discharge outfall

For information on the use of EMS and the electronic data transfer utility, please refer to the following website: [http://wlapwww.gov.bc.ca/epd/ems\\_edt.html](http://wlapwww.gov.bc.ca/epd/ems_edt.html)

Your attention is respectfully directed to the terms and conditions outlined in the Municipal Sewage Regulation. Compliance with all the terms and conditions of the regulation is required. Contravention of any of the conditions of the regulation is a violation of the *Environmental Management Act* and may result in prosecution.

Registration under the Municipal Sewage Regulation should not be construed as a representation that the works are adequately designed or will satisfy all the requirements of the regulation. It is the responsibility of the discharger to ensure that the works are adequately designed, constructed and operated and that the discharge quality complies with the regulation. Registration under the regulation is without prejudice to any additional works that may be required or any additional requirements that may be specified by the Director. The Director may also issue Orders under the *Environmental Management Act*.

Registration under the Municipal Sewage Regulation does not authorise entry upon, crossing over, or use for any purpose of private or Crown lands or works, unless and except as authorised by the owner of such lands or works. The responsibility for obtaining such authority shall rest with the discharger. It is also the responsibility of the discharger to ensure that all activities conducted under this registration are carried out with regard to the rights of third parties and comply with other applicable legislation that may be in force. The discharger must also obtain any necessary approvals from other agencies.

Administration of the Municipal Sewage Regulation will be carried out by staff from our Sub-regional office located at 205 Industrial Road G, Cranbrook, British Columbia, V1C 7G5 (Telephone 250-489-8540). Plans, data and reports pertinent to the regulation are to be submitted to the Regional Manager, Environmental Protection, at this address. If you have any questions concerning this registration, please contact our Cranbrook Sub-Regional Office at 250-489-8540

Yours truly,



Kathy Eichenberger, P.Eng.  
for Director, *Environmental Management Act*  
Kootenay and Okanagan Regions

cc:	Environment Canada
	Kicking Horse Mountain Sanitary Sewer Services Ltd., 1500 Kicking Horse Trail, PO Box 839, Golden, BC V0A 1H0, Attn: John Urie
	Ecofluid, #101-334 E. Kent Ave. South, Vancouver, BC V5X 4N5 Attn: Rolf Loker, VP & Manager of Operations
	Ana C. May Tsui, MWLAP- Environmental Protection, Cranbrook

AMT/KE:lkM



KICKING HORSE MOUNTAIN UTILITY  
CORPORATION  
ATTN: TRAVIS JOBIN  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Date Received: 29-JAN-20  
Report Date: 04-FEB-20 13:50 (MT)  
Version: FINAL

Client Phone: 250-344-6003

## Certificate of Analysis

Lab Work Order #: L2410848

Project P.O. #: NOT SUBMITTED

Job Reference: RCR - KICKING HORSE MOUNTAIN RESORT

C of C Numbers:

Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.  
Account Manager

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

ADDRESS: 2559 29 Street NE, Calgary, AB T1Y 7B5 Canada | Phone: +1 403 291 9897 | Fax: +1 403 291 0298  
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

# ALS ENVIRONMENTAL ANALYTICAL REPORT

[illegible]

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

## Reference Information

## Qualifiers for Sample Submission Listed:

Qualifier	Description
SPL	No bottle for Total P so pour off from routine and preserved. - Sample was Preserved at the laboratory

## Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
FCC-MF-CL	Water	Fecal Coliform Count-MF	APHA 9222D
This analysis is carried out using procedures adapted from APHA Method 9222 "Membrane Filter Technique for Members of the Coliform Group". Coliform bacteria is enumerated by culturing and colony counting. A known sample volume is filtered through a 0.45 micron membrane filter. The test involves an initial 24 hour incubation at 44.5 degrees C of the filter with the appropriate growth medium. This method is specific for thermotolerant bacteria (Fecal) and is used for non-turbid water with a low background bacteria level.			
P-T-COL-CL	Water	Total P in Water by Colour	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.			
PO4-DO-COL-CL	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.			

\*\* 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
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, 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.

## Quality Control Report

Workorder: L2410848

Report Date: 04-FEB-20

Page 1 of 2

Client: KICKING HORSE MOUNTAIN UTILITY CORPORATION

1500 Kicking Horse Trail

Golden BC V0A 1H0

Contact: TRAVIS JOBIN

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>BOD-BC-CL Water</b>								
Batch	R4986993							
<b>WG3268797-2 LCS</b>								
Biochemical Oxygen Demand			92.4		%		85-115	29-JAN-20
<b>WG3268797-1 MB</b>								
Biochemical Oxygen Demand			<2.0		mg/L		2	29-JAN-20
<b>FCC-MF-CL Water</b>								
Batch	R4984934							
<b>WG3267167-2 DUP</b>								
Coliform Bacteria - Fecal		L2410848-1 25	18		CFU/100mL	33	65	29-JAN-20
<b>WG3267167-1 MB</b>								
Coliform Bacteria - Fecal			<1		CFU/100mL		1	29-JAN-20
<b>P-T-COL-CL Water</b>								
Batch	R4983861							
<b>WG3266605-2 LCS</b>								
Phosphorus (P)-Total			105.5		%		80-120	30-JAN-20
<b>WG3266605-1 MB</b>								
Phosphorus (P)-Total			<0.0050		mg/L		0.005	30-JAN-20
<b>PO4-DO-COL-CL Water</b>								
Batch	R4983579							
<b>WG3266053-2 LCS</b>								
Orthophosphate-Dissolved (as P)			100.7		%		80-120	29-JAN-20
<b>WG3266053-1 MB</b>								
Orthophosphate-Dissolved (as P)			<0.0050		mg/L		0.005	29-JAN-20
<b>TSS-CL Water</b>								
Batch	R4983808							
<b>WG3265690-5 LCS</b>								
Total Suspended Solids			93.1		%		85-115	29-JAN-20
<b>WG3265690-4 MB</b>								
Total Suspended Solids			<3.0		mg/L		3	29-JAN-20

# Quality Control Report

Workorder: L2410848

Report Date: 04-FEB-20

Page 2 of 2

## 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.

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---

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

[illegible]





KICKING HORSE MOUNTAIN UTILITY  
CORPORATION  
ATTN: TRAVIS JOBIN  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Date Received: 26-FEB-20  
Report Date: 04-MAR-20 13:38 (MT)  
Version: FINAL

Client Phone: 250-344-6003

## Certificate of Analysis

Lab Work Order #: L2421007

Project P.O. #: NOT SUBMITTED

Job Reference: RCR - KICKING HORSE MOUNTAIN RESORT

C of C Numbers:

Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.  
Account Manager

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# ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2421007-1      UV TROUGH Sampled By:    JD on 25-FEB-20 @ 08:30 Matrix:         WATER							
<b>Miscellaneous Parameters</b>							
Biochemical Oxygen Demand	26	BODP	20	mg/L		26-FEB-20	R5012381
Orthophosphate-Dissolved (as P)	0.703	DLHC	0.050	mg/L		26-FEB-20	R5008766
Coliform Bacteria - Fecal	9100	DLA	100	CFU/100mL		26-FEB-20	R5010691
Phosphorus (P)-Total	1.42	DLHC	0.050	mg/L		02-MAR-20	R5012378
Total Suspended Solids	35.5	DLHC	5.0	mg/L		02-MAR-20	R5013432

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

## Reference Information

## Sample Parameter Qualifier Key:

Qualifier	Description
BODP	BOD dilution results differed by more than 30% RPD. Precision of reported BOD result may be less than usual.
DLA	Detection Limit adjusted for required dilution
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

## Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
FCC-MF-CL	Water	Fecal Coliform Count-MF	APHA 9222D
This analysis is carried out using procedures adapted from APHA Method 9222 "Membrane Filter Technique for Members of the Coliform Group". Coliform bacteria is enumerated by culturing and colony counting. A known sample volume is filtered through a 0.45 micron membrane filter. The test involves an initial 24 hour incubation at 44.5 degrees C of the filter with the appropriate growth medium. This method is specific for thermotolerant bacteria (Fecal) and is used for non-turbid water with a low background bacteria level.			
P-T-COL-CL	Water	Total P in Water by Colour	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.			
PO4-DO-COL-CL	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.			

\*\* 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
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, 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.*

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## Quality Control Report

Workorder: L2421007

Report Date: 04-MAR-20

Page 1 of 2

Client: KICKING HORSE MOUNTAIN UTILITY CORPORATION

1500 Kicking Horse Trail

Golden BC V0A 1H0

Contact: TRAVIS JOBIN

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>BOD-BC-CL</b>	<b>Water</b>							
Batch	R5012381							
<b>WG3285099-2 LCS</b>								
Biochemical Oxygen Demand			101.5		%		85-115	26-FEB-20
<b>WG3285099-1 MB</b>								
Biochemical Oxygen Demand			<2.0		mg/L		2	26-FEB-20
<b>FCC-MF-CL</b>	<b>Water</b>							
Batch	R5010691							
<b>WG3283219-1 MB</b>								
Coliform Bacteria - Fecal			<1		CFU/100mL		1	26-FEB-20
<b>P-T-COL-CL</b>	<b>Water</b>							
Batch	R5012378							
<b>WG3285009-2 LCS</b>								
Phosphorus (P)-Total			97.5		%		80-120	02-MAR-20
<b>WG3285009-1 MB</b>								
Phosphorus (P)-Total			<0.0050		mg/L		0.005	02-MAR-20
<b>PO4-DO-COL-CL</b>	<b>Water</b>							
Batch	R5008766							
<b>WG3282263-2 LCS</b>								
Orthophosphate-Dissolved (as P)			105.0		%		80-120	26-FEB-20
<b>WG3282263-1 MB</b>								
Orthophosphate-Dissolved (as P)			<0.0050		mg/L		0.005	26-FEB-20
<b>TSS-CL</b>	<b>Water</b>							
Batch	R5013432							
<b>WG3285176-2 LCS</b>								
Total Suspended Solids			87.3		%		85-115	02-MAR-20
<b>WG3285176-1 MB</b>								
Total Suspended Solids			<3.0		mg/L		3	02-MAR-20

# Quality Control Report

Workorder: L2421007

Report Date: 04-MAR-20

Page 2 of 2

## 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

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KICKING HORSE MOUNTAIN UTILITY  
CORPORATION  
ATTN: TRAVIS JOBIN  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Date Received: 04-MAR-20  
Report Date: 10-MAR-20 09:29 (MT)  
Version: FINAL

Client Phone: 250-344-8442

## Certificate of Analysis

Lab Work Order #: L2423826  
Project P.O. #: NOT SUBMITTED  
Job Reference: RCR - KICKING HORSE MOUNTAIN RESORT  
C of C Numbers:  
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.  
Account Manager

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# ALS ENVIRONMENTAL ANALYTICAL REPORT

[illegible]

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



## Reference Information

### Sample Parameter Qualifier Key:

Qualifier	Description
BODP	BOD dilution results differed by more than 30% RPD. Precision of reported BOD result may be less than usual.
DLA	Detection Limit adjusted for required dilution
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

### Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
FCC-MF-CL	Water	Fecal Coliform Count-MF	APHA 9222D
This analysis is carried out using procedures adapted from APHA Method 9222 "Membrane Filter Technique for Members of the Coliform Group". Coliform bacteria is enumerated by culturing and colony counting. A known sample volume is filtered through a 0.45 micron membrane filter. The test involves an initial 24 hour incubation at 44.5 degrees C of the filter with the appropriate growth medium. This method is specific for thermotolerant bacteria (Fecal) and is used for non-turbid water with a low background bacteria level.			
P-T-COL-CL	Water	Total P in Water by Colour	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.			
PO4-DO-COL-CL	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.			

\*\* 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
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, 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.*

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## Quality Control Report

Workorder: L2423826

Report Date: 10-MAR-20

Page 1 of 2

Client: KICKING HORSE MOUNTAIN UTILITY CORPORATION

1500 Kicking Horse Trail

Golden BC V0A 1H0

Contact: TRAVIS JOBIN

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>BOD-BC-CL</b>	<b>Water</b>							
Batch	R5020134							
<b>WG3289138-2</b>	<b>LCS</b>							
Biochemical Oxygen Demand			93.2		%		85-115	04-MAR-20
<b>WG3289138-1</b>	<b>MB</b>							
Biochemical Oxygen Demand			<2.0		mg/L		2	04-MAR-20
<b>FCC-MF-CL</b>	<b>Water</b>							
Batch	R5017879							
<b>WG3287339-1</b>	<b>MB</b>							
Coliform Bacteria - Fecal			<1		CFU/100mL		1	04-MAR-20
<b>P-T-COL-CL</b>	<b>Water</b>							
Batch	R5019610							
<b>WG3288376-2</b>	<b>LCS</b>							
Phosphorus (P)-Total			99.9		%		80-120	07-MAR-20
<b>WG3288376-1</b>	<b>MB</b>							
Phosphorus (P)-Total			<0.0050		mg/L		0.005	07-MAR-20
<b>PO4-DO-COL-CL</b>	<b>Water</b>							
Batch	R5017368							
<b>WG3286570-7</b>	<b>LCS</b>							
Orthophosphate-Dissolved (as P)			102.2		%		80-120	04-MAR-20
<b>WG3286570-1</b>	<b>MB</b>							
Orthophosphate-Dissolved (as P)			<0.0050		mg/L		0.005	04-MAR-20
<b>TSS-CL</b>	<b>Water</b>							
Batch	R5019958							
<b>WG3288360-2</b>	<b>LCS</b>							
Total Suspended Solids			98.0		%		85-115	07-MAR-20
<b>WG3288360-1</b>	<b>MB</b>							
Total Suspended Solids			<3.0		mg/L		3	07-MAR-20

# Quality Control Report

Workorder: L2423826

Report Date: 10-MAR-20

Page 2 of 2

## 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

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L2423826-COFC

## Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

[www.alsglobal.com](http://www.alsglobal.com)

COC #

Page 1 of 1

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GENF 20.00 Front



KICKING HORSE MOUNTAIN UTILITY  
CORPORATION  
ATTN: TRAVIS JOBIN  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Date Received: 08-APR-20  
Report Date: 15-APR-20 17:49 (MT)  
Version: FINAL

Client Phone: 250-344-8442

## Certificate of Analysis

Lab Work Order #: L2435249

Project P.O. #: NOT SUBMITTED

Job Reference: RCR - KICKING HORSE MOUNTAIN RESORT

C of C Numbers:

Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.  
Account Manager

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# ALS ENVIRONMENTAL ANALYTICAL REPORT

[illegible]

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

## Reference Information

### Sample Parameter Qualifier Key:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).

### Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
FCC-MF-CL	Water	Fecal Coliform Count-MF	APHA 9222D
This analysis is carried out using procedures adapted from APHA Method 9222 "Membrane Filter Technique for Members of the Coliform Group". Coliform bacteria is enumerated by culturing and colony counting. A known sample volume is filtered through a 0.45 micron membrane filter. The test involves an initial 24 hour incubation at 44.5 degrees C of the filter with the appropriate growth medium. This method is specific for thermotolerant bacteria (Fecal) and is used for non-turbid water with a low background bacteria level.			
P-T-COL-CL	Water	Total P in Water by Colour	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.			
PO4-DO-COL-CL	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.			

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CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

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

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## Quality Control Report

Workorder: L2435249

Report Date: 15-APR-20

Page 1 of 2

Client: KICKING HORSE MOUNTAIN UTILITY CORPORATION

1500 Kicking Horse Trail

Golden BC V0A 1H0

Contact: TRAVIS JOBIN

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>BOD-BC-CL</b>	<b>Water</b>							
Batch	R5055976							
<b>WG3306993-2 LCS</b>								
Biochemical Oxygen Demand			94.3		%		85-115	08-APR-20
<b>WG3306993-1 MB</b>								
Biochemical Oxygen Demand			<2.0		mg/L		2	08-APR-20
<b>FCC-MF-CL</b>	<b>Water</b>							
Batch	R5055297							
<b>WG3306264-1 MB</b>								
Coliform Bacteria - Fecal			<1		CFU/100mL		1	08-APR-20
<b>P-T-COL-CL</b>	<b>Water</b>							
Batch	R5055934							
<b>WG3306934-2 LCS</b>								
Phosphorus (P)-Total			104.2		%		80-120	13-APR-20
<b>WG3306934-1 MB</b>								
Phosphorus (P)-Total			<0.0050		mg/L		0.005	13-APR-20
<b>PO4-DO-COL-CL</b>	<b>Water</b>							
Batch	R5054586							
<b>WG3305351-22 LCS</b>								
Orthophosphate-Dissolved (as P)			107.5		%		80-120	08-APR-20
<b>WG3305351-21 MB</b>								
Orthophosphate-Dissolved (as P)			<0.0050		mg/L		0.005	08-APR-20
<b>TSS-CL</b>	<b>Water</b>							
Batch	R5057076							
<b>WG3307328-2 LCS</b>								
Total Suspended Solids			90.3		%		85-115	14-APR-20
<b>WG3307328-1 MB</b>								
Total Suspended Solids			<3.0		mg/L		3	14-APR-20



# Quality Control Report

Workorder: L2435249

Report Date: 15-APR-20

Page 2 of 2

## 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

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KICKING HORSE MOUNTAIN UTILITY  
CORPORATION  
ATTN: TRAVIS JOBIN  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Date Received: 12-MAY-20  
Report Date: 26-MAY-20 12:45 (MT)  
Version: FINAL

Client Phone: 250-344-8442

## Certificate of Analysis

Lab Work Order #: L2446038  
Project P.O. #: NOT SUBMITTED  
Job Reference: WEEK 1 - 2020 SPRING EMS PROGRAM  
C of C Numbers:  
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.  
Account Manager

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Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2446038-1	WWTP EFFLUENT - UV TROUGH							
Sampled By:	TJ JD on 11-MAY-20 @ 13:00							
Matrix:	Water							
<b>Miscellaneous Parameters</b>								
Ammonia, Total (as N)		0.066		0.050	mg/L		25-MAY-20	R5096597
Biochemical Oxygen Demand		2.3		2.0	mg/L		12-MAY-20	R5089996
Orthophosphate-Dissolved (as P)		0.127	DLHC	0.010	mg/L		13-MAY-20	R5084420
Enterococcus		See Attached					12-MAY-20	R5091237
Coliform Bacteria - Fecal		<1		1	CFU/100mL		12-MAY-20	R5083206
MPN - E. coli		<1		1	MPN/100mL		12-MAY-20	R5082534
Phosphorus (P)-Total		0.225	DLHC	0.025	mg/L		13-MAY-20	R5082438
Total Suspended Solids		4.0		3.0	mg/L		13-MAY-20	R5084917
<b>NO2, NO3 and Sum of NO2/NO3</b>								
<b>Nitrate in Water by IC</b>								
Nitrate (as N)		15.2		0.020	mg/L		12-MAY-20	R5082279
<b>Nitrate+Nitrite</b>								
Nitrate and Nitrite (as N)		15.2		0.022	mg/L		13-MAY-20	
<b>Nitrite in Water by IC</b>								
Nitrite (as N)		0.031		0.010	mg/L		12-MAY-20	R5082279
L2446038-2	COLUMBIA RIVER UPSTREAM							
Sampled By:	TJ JD on 11-MAY-20 @ 14:00							
Matrix:	Water							
<b>Miscellaneous Parameters</b>								
Ammonia, Total (as N)		<0.050		0.050	mg/L		25-MAY-20	R5096597
Orthophosphate-Dissolved (as P)		<0.0050		0.0050	mg/L		13-MAY-20	R5084420
Enterococcus		See Attached					12-MAY-20	R5091237
Coliform Bacteria - Fecal		<1		1	CFU/100mL		12-MAY-20	R5083206
MPN - E. coli		1	OCR	1	MPN/100mL		12-MAY-20	R5082534
Phosphorus (P)-Total		0.0155		0.0050	mg/L		13-MAY-20	R5082438
Total Suspended Solids		18.0		3.0	mg/L		13-MAY-20	R5084917
<b>NO2, NO3 and Sum of NO2/NO3</b>								
<b>Nitrate in Water by IC</b>								
Nitrate (as N)		0.185		0.020	mg/L		12-MAY-20	R5082279
<b>Nitrate+Nitrite</b>								
Nitrate and Nitrite (as N)		0.185		0.022	mg/L		13-MAY-20	
<b>Nitrite in Water by IC</b>								
Nitrite (as N)		<0.010		0.010	mg/L		12-MAY-20	R5082279
L2446038-3	COLUMBIA RIVER DOWNSTREAM							
Sampled By:	TJ JD on 11-MAY-20 @ 14:00							
Matrix:	Water							
<b>Miscellaneous Parameters</b>								
Ammonia, Total (as N)		0.062		0.050	mg/L		25-MAY-20	R5096597
Orthophosphate-Dissolved (as P)		0.0724		0.0050	mg/L		13-MAY-20	R5084420
Enterococcus		See Attached					12-MAY-20	R5091237
Coliform Bacteria - Fecal		2		1	CFU/100mL		12-MAY-20	R5083206
MPN - E. coli		<1		1	MPN/100mL		12-MAY-20	R5082534
Phosphorus (P)-Total		0.0806		0.0050	mg/L		13-MAY-20	R5082438
Total Suspended Solids		24.0		3.0	mg/L		13-MAY-20	R5084917
<b>NO2, NO3 and Sum of NO2/NO3</b>								
<b>Nitrate in Water by IC</b>								
Nitrate (as N)		0.197		0.020	mg/L		12-MAY-20	R5082279
<b>Nitrate+Nitrite</b>								
Nitrate and Nitrite (as N)		0.197		0.022	mg/L		13-MAY-20	

\* 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
L2446038-3	COLUMBIA RIVER DOWNSTREAM							
Sampled By: TJ JD on 11-MAY-20 @ 14:00								
Matrix: Water								
Nitrite in Water by IC								
Nitrite (as N)		<0.010		0.010	mg/L		12-MAY-20	R5082279
L2446038-4	COLUMBIA RIVER SIDE CHANNEL							
Sampled By: TJ JD on 11-MAY-20 @ 14:00								
Matrix: Water								
Miscellaneous Parameters								
Ammonia, Total (as N)		0.062		0.050	mg/L		25-MAY-20	R5096597
Orthophosphate-Dissolved (as P)		0.0277		0.0050	mg/L		13-MAY-20	R5084420
Enterococcus		See Attached					12-MAY-20	R5091237
Coliform Bacteria - Fecal		<1		1	CFU/100mL		12-MAY-20	R5083206
MPN - E. coli		1	OCR	1	MPN/100mL		12-MAY-20	R5082534
Phosphorus (P)-Total		0.0832		0.0050	mg/L		13-MAY-20	R5082438
Total Suspended Solids		12.0		3.0	mg/L		13-MAY-20	R5084917
NO2, NO3 and Sum of NO2/NO3								
Nitrate in Water by IC								
Nitrate (as N)		0.146		0.020	mg/L		12-MAY-20	R5082279
Nitrate+Nitrite								
Nitrate and Nitrite (as N)		0.146		0.022	mg/L		13-MAY-20	
Nitrite in Water by IC								
Nitrite (as N)		<0.010		0.010	mg/L		12-MAY-20	R5082279

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

## Reference Information

## Sample Parameter Qualifier Key:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
OCR	Parameter is out of client specific range.

## Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
EC-MPN-CL	Water	MPN - E. coli	APHA 9223B
This analysis is carried out using procedures adapted from APHA Method 9223 "Enzyme Substrate Coliform Test". E. coli and Total Coliform are determined simultaneously. The sample is mixed with a mixture hydrolyzable substrates and then sealed in a multi-well packet. The packet is incubated for 18 or 24 hours and then the number of wells exhibiting a positive response are counted. The final result is obtained by comparing the positive responses to a probability table. Recommended Holding Time: Sample: 1 day Reference: APHA			
FCC-MF-CL	Water	Fecal Coliform Count-MF	APHA 9222D
This analysis is carried out using procedures adapted from APHA Method 9222 "Membrane Filter Technique for Members of the Coliform Group". Coliform bacteria is enumerated by culturing and colony counting. A known sample volume is filtered through a 0.45 micron membrane filter. The test involves an initial 24 hour incubation at 44.5 degrees C of the filter with the appropriate growth medium. This method is specific for thermotolerant bacteria (Fecal) and is used for non-turbid water with a low background bacteria level.			
N2N3-CALC-CL	Water	Nitrate+Nitrite	CALCULATION
NH3-F-CL	Water	Ammonia by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.			
NO2-IC-N-CL	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-CL	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-COL-CL	Water	Total P in Water by Colour	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.			
PO4-DO-COL-CL	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.			

\*\* 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
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, 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 ww - 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.

## Quality Control Report

Workorder: L2446038

Report Date: 26-MAY-20

Page 1 of 3

Client: KICKING HORSE MOUNTAIN UTILITY CORPORATION

1500 Kicking Horse Trail

Golden BC V0A 1H0

Contact: TRAVIS JOBIN

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>BOD-BC-CL</b>	<b>Water</b>							
Batch	R5089996							
<b>WG3324891-2 LCS</b>								
Biochemical Oxygen Demand			95.7		%		85-115	12-MAY-20
<b>WG3324891-1 MB</b>								
Biochemical Oxygen Demand			<2.0		mg/L		2	12-MAY-20
<b>EC-MPN-CL</b>	<b>Water</b>							
Batch	R5082534							
<b>WG3322791-1 MB</b>								
MPN - E. coli			<1		MPN/100mL		1	12-MAY-20
<b>FCC-MF-CL</b>	<b>Water</b>							
Batch	R5083206							
<b>WG3323220-1 MB</b>								
Coliform Bacteria - Fecal			<1		CFU/100mL		1	12-MAY-20
<b>NH3-F-CL</b>	<b>Water</b>							
Batch	R5096597							
<b>WG3328628-15 DUP</b>		<b>L2446038-4</b>						
Ammonia, Total (as N)		0.062	0.069		mg/L	11	20	25-MAY-20
<b>WG3328628-14 LCS</b>								
Ammonia, Total (as N)			101.7		%		85-115	25-MAY-20
<b>WG3328628-13 MB</b>								
Ammonia, Total (as N)			<0.050		mg/L		0.05	25-MAY-20
<b>WG3328628-16 MS</b>		<b>L2446038-4</b>						
Ammonia, Total (as N)			102.5		%		75-125	25-MAY-20
<b>NO2-IC-N-CL</b>	<b>Water</b>							
Batch	R5082279							
<b>WG3322483-2 LCS</b>								
Nitrite (as N)			106.5		%		90-110	12-MAY-20
<b>WG3322483-1 MB</b>								
Nitrite (as N)			<0.010		mg/L		0.01	12-MAY-20
<b>NO3-IC-N-CL</b>	<b>Water</b>							
Batch	R5082279							
<b>WG3322483-2 LCS</b>								
Nitrate (as N)			105.4		%		90-110	12-MAY-20
<b>WG3322483-1 MB</b>								
Nitrate (as N)			<0.020		mg/L		0.02	12-MAY-20
<b>P-T-COL-CL</b>	<b>Water</b>							



## Quality Control Report

Workorder: L2446038

Report Date: 26-MAY-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>P-T-COL-CL</b>								
<b>Water</b>								
<b>Batch R5082438</b>								
<b>WG3322703-14 LCS</b>								
Phosphorus (P)-Total			108.6		%		80-120	13-MAY-20
<b>WG3322703-18 LCS</b>								
Phosphorus (P)-Total			108.1		%		80-120	13-MAY-20
<b>WG3322703-13 MB</b>								
Phosphorus (P)-Total			<0.0050		mg/L		0.005	13-MAY-20
<b>WG3322703-17 MB</b>								
Phosphorus (P)-Total			<0.0050		mg/L		0.005	13-MAY-20
<b>PO4-DO-COL-CL</b>								
<b>Water</b>								
<b>Batch R5084420</b>								
<b>WG3322991-34 LCS</b>								
Orthophosphate-Dissolved (as P)			103.9		%		80-120	13-MAY-20
<b>WG3322991-9 MB</b>								
Orthophosphate-Dissolved (as P)			<0.0050		mg/L		0.005	13-MAY-20
<b>TSS-CL</b>								
<b>Water</b>								
<b>Batch R5084917</b>								
<b>WG3322555-12 DUP</b>		<b>L2446038-4</b>						
Total Suspended Solids		12.0	11.3		mg/L	5.7	20	13-MAY-20
<b>WG3322555-11 LCS</b>								
Total Suspended Solids			95.6		%		85-115	13-MAY-20
<b>WG3322555-8 LCS</b>								
Total Suspended Solids			96.0		%		85-115	13-MAY-20
<b>WG3322555-10 MB</b>								
Total Suspended Solids			<3.0		mg/L		3	13-MAY-20
<b>WG3322555-7 MB</b>								
Total Suspended Solids			<3.0		mg/L		3	13-MAY-20

# Quality Control Report

Workorder: L2446038

Report Date: 26-MAY-20

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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.



## Microbial Test Results

Samples collected May 11, 2020

Final Report

May 19, 2020

Submitted to: **ALS Environmental**  
Calgary, AB

## SAMPLE INFORMATION

Sample ID/ Internal ID	Dates		<i>Enterococcus</i> test initiation	Receipt temperature
	Collected	Received		
L2446038-1 WWTP EFFLUENT – UV TROUGH/ 1920-1221-01	11-May-20 at 1300h	12-May-20 at 1000h	12-May-20 at 1130h	10.1°C
L2446038-2 COLUMBIA RIVER UPSTREAM/ 1920-1221-02	11-May-20 at 1400h	12-May-20 at 1000h	12-May-20 at 1130h	8.3°C
L2446038-3 COLUMBIA RIVER DOWNSTREAM/ 1920-1221-03	11-May-20 at 1400h	12-May-20 at 1000h	12-May-20 at 1130h	8.7°C
L2446038-4 COLUMBIA RIVER SIDE CHANNEL/ 1920-1221-04	11-May-20 at 1400h	12-May-20 at 1000h	12-May-20 at 1130h	7.8°C

## TEST TYPES

- *Enterococcus* enumeration test

## RESULTS

### Microbial test results

Sample ID	MPN/100 mL <i>Enterococcus</i>
L2446038-1 WWTP EFFLUENT – UV TROUGH	<1
L2446038-2 COLUMBIA RIVER UPSTREAM	3.1
L2446038-3 COLUMBIA RIVER DOWNSTREAM	5.2
L2446038-4 COLUMBIA RIVER SIDE CHANNEL	2.0

MPN = Most Probable Number

## QA/QC

QA/QC summary	<i>Enterococcus</i>
Protocol deviations	None
Control performance	Acceptable
Test performance	Valid



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Report By:  
Courtney Bogstie, BSc  
Biologist



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Reviewed By:  
Leila Oosterbroek, BSc  
Environmental Scientist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

## REFERENCES

Enterolert Test Kit Literature, IDEXX Laboratories Ltd., One IDEXX Drive, Westbrook, ME, 04092 USA

MPN Tables for IDEXX Quanti-Tray 2000 (<http://www.idexx.com/water>)

## **APPENDIX A – Test data**

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## Quanti-Tray Bench Sheet - *Enterococcus*

 Client ALSIOL Reference 1920-122.1
**Test Initiation**

 Date: 2020/05/12  
 Time: 1130  
 Technician: KK
**Sample Information**

 Dilution Factor: —

 Reagent used: Enterolert™  
 Reagent Lot#/Expiry: AS176 AS176 2021/02/10

Comments:

 Thermometer Serial #: 12<sup>m</sup> 192702205  
 Incubator #: 7  
 Incubator Temperature: 41 (must be 41 ± 0.5°C)

 Quanti Tray 2000 Lot#/Expiry: H2021 2022/06/21
**Results - 24 Hour Incubation**

 Date: 2020/05/13 Time: 1145 Technician: ST

Incubator Temp: <u>41</u> (must be 41 ± 0.5°C)	Enterococci (Fluorescent)									
	CTL	-01	-02	-03	-04					
# Positive Large Wells:	0	0	3	4	2					
# Ambiguous Large Wells:	0	0	0	0	0					
# Positive Small Wells (Tray 2000 only):	0	0	0	1	0					
# Ambiguous Small Wells (Tray 2000 only):	0	0	0	0	0					
Most Probable Number at 24 hours:	41	41	3.1	52	2.0					

**Results - 28 Hour Incubation**

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Technician: \_\_\_\_\_

Incubator Temp: _____ (must be 41 ± 0.5°C)	Enterococci (Fluorescent)									
	CTL									
# Confirmed Positive Large Wells:										
# Confirmed Positive Small Wells (Tray 2000 only):										
Most Probable Number at 28 hours:										

Confirmed positive wells includes the positive wells from 24 hours plus the ambiguous wells that became positive at 28 hours  
 At 28 hours only score marked ambiguous from 24 hours

## **APPENDIX B – Chain-of-custody form**

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**Subcontract Request Form**
**Subcontract To:**
**NAUTILUS ENVIRONMENTAL COMPANY INC. - CALGARY, AB, CANADA**

 #4, 6125-12 STREET SE  
 CALGARY, AB T2H 2K1

**NOTES:** Please reference on final report and invoice: PO# L2446038  
 ALS requires QC data to be provided with your final results.

 Please see enclosed 4 sample(s) in 4 Container(s)

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED DUE DATE	Priority Flag
L2446038-1 WWTP EFFLUENT - UV TROUGH	1920-1221-01 10.1°C Enterococcus (ENTERO-HQ 1)	5/11/2020 5/25/2020	1300
L2446038-2 COLUMBIA RIVER UPSTREAM	-02 8.3°C Enterococcus (ENTERO-HQ 1)	5/11/2020 5/25/2020	1400
L2446038-3 COLUMBIA RIVER DOWNSTREAM	-03 8.7°C Enterococcus (ENTERO-HQ 1)	5/11/2020 5/25/2020	1400
L2446038-4 COLUMBIA RIVER SIDE CHANNEL	-04 7.8°C Enterococcus (ENTERO-HQ 1)	5/11/2020 5/25/2020	1400

Subcontract Info Contact: John Forbes (403) 291-9897  
 Analysis and reporting info contact: Patryk Wojciak, B.Sc., P.Chem.  
 2559 29 STREET NE  
 CALGARY, AB T1Y 7B5  
 Phone: (403) 291-9897 Email: patryk.wojciak@alsglobal.com

2020/05/12 10:00  
 Internal Driver  
 SC  
 4x400mL bottles  
 No Na3  
 Good Condition

 Please email confirmation of receipt to: **patryk.wojciak@alsglobal.com**

Shipped By: \_\_\_\_\_ Date Shipped: \_\_\_\_\_  
 Received By: \_\_\_\_\_ Date Received: \_\_\_\_\_  
 Verified By: \_\_\_\_\_ Date Verified: \_\_\_\_\_  
 Temperature: \_\_\_\_\_

Sample Integrity Issues: \_\_\_\_\_

**END OF REPORT**

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Page 1 of 1

GENF 20.00 Front



KICKING HORSE MOUNTAIN UTILITY  
CORPORATION  
ATTN: TRAVIS JOBIN  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Date Received: 20-MAY-20  
Report Date: 02-JUN-20 15:38 (MT)  
Version: FINAL

Client Phone: 250-344-8442

## Certificate of Analysis

Lab Work Order #: L2449030

Project P.O. #: NOT SUBMITTED

Job Reference: WEEK 2 - 2019 SPRING EMS PROGRAM - WW

C of C Numbers:

Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.  
Account Manager

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

ADDRESS: 2559 29 Street NE, Calgary, AB T1Y 7B5 Canada | Phone: +1 403 291 9897 | Fax: +1 403 291 0298  
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2449030-1	WWTP EFFLUENT - UV TROUGH							
Sampled By:	TJ/MS on 19-MAY-20 @ 12:30							
Matrix:	WATER							
<b>Miscellaneous Parameters</b>								
Ammonia, Total (as N)		<0.050		0.050	mg/L		01-JUN-20	R5102915
Biochemical Oxygen Demand		2.2		2.0	mg/L		20-MAY-20	R5098847
Orthophosphate-Dissolved (as P)		0.142	DLHC	0.010	mg/L		20-MAY-20	R5093921
Enterococcus		See Attached					20-MAY-20	R5102661
Coliform Bacteria - Fecal		<1		1	CFU/100mL		20-MAY-20	R5094635
MPN - E. coli		<1		1	MPN/100mL		20-MAY-20	R5094626
Phosphorus (P)-Total		0.263	DLHC	0.025	mg/L		21-MAY-20	R5094379
Total Suspended Solids		5.7		3.0	mg/L		26-MAY-20	R5099468
<b>NO2, NO3 and Sum of NO2/NO3</b>								
<b>Nitrate in Water by IC</b>								
Nitrate (as N)		18.7		0.020	mg/L		20-MAY-20	R5094276
<b>Nitrate+Nitrite</b>								
Nitrate and Nitrite (as N)		18.8		0.022	mg/L		21-MAY-20	
<b>Nitrite in Water by IC</b>								
Nitrite (as N)		0.043		0.010	mg/L		20-MAY-20	R5094276
L2449030-2	COLUMBIA RIVER UPSTREAM							
Sampled By:	TJ/MS on 19-MAY-20 @ 13:00							
Matrix:	WATER							
<b>Miscellaneous Parameters</b>								
Ammonia, Total (as N)		<0.050		0.050	mg/L		01-JUN-20	R5102915
Orthophosphate-Dissolved (as P)		<0.0050		0.0050	mg/L		20-MAY-20	R5093921
Enterococcus		See Attached					20-MAY-20	R5102661
Coliform Bacteria - Fecal		9		1	CFU/100mL		20-MAY-20	R5094635
MPN - E. coli		5	OCR	1	MPN/100mL		20-MAY-20	R5094626
Phosphorus (P)-Total		0.0416		0.0050	mg/L		21-MAY-20	R5094379
Total Suspended Solids		85.0		3.0	mg/L		26-MAY-20	R5099468
<b>NO2, NO3 and Sum of NO2/NO3</b>								
<b>Nitrate in Water by IC</b>								
Nitrate (as N)		0.216		0.020	mg/L		20-MAY-20	R5094276
<b>Nitrate+Nitrite</b>								
Nitrate and Nitrite (as N)		0.216		0.022	mg/L		21-MAY-20	
<b>Nitrite in Water by IC</b>								
Nitrite (as N)		<0.010		0.010	mg/L		20-MAY-20	R5094276
L2449030-3	COLUMBIA RIVER DOWN STREAM							
Sampled By:	TJ/MS on 19-MAY-20 @ 13:15							
Matrix:	WATER							
<b>Miscellaneous Parameters</b>								
Ammonia, Total (as N)		<0.050		0.050	mg/L		01-JUN-20	R5102915
Orthophosphate-Dissolved (as P)		<0.0050		0.0050	mg/L		20-MAY-20	R5093921
Enterococcus		See Attached					20-MAY-20	R5102661
Coliform Bacteria - Fecal		6		1	CFU/100mL		20-MAY-20	R5094635
MPN - E. coli		2	OCR	1	MPN/100mL		20-MAY-20	R5094626
Phosphorus (P)-Total		0.0703		0.0050	mg/L		21-MAY-20	R5094379
Total Suspended Solids		176		3.0	mg/L		26-MAY-20	R5099468
<b>NO2, NO3 and Sum of NO2/NO3</b>								
<b>Nitrate in Water by IC</b>								
Nitrate (as N)		0.230		0.020	mg/L		20-MAY-20	R5094276
<b>Nitrate+Nitrite</b>								
Nitrate and Nitrite (as N)		0.230		0.022	mg/L		21-MAY-20	

\* 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
L2449030-3 COLUMBIA RIVER DOWN STREAM Sampled By: TJ/MS on 19-MAY-20 @ 13:15 Matrix: WATER Nitrite in Water by IC Nitrite (as N)	<0.010		0.010	mg/L		20-MAY-20	R5094276
L2449030-4 COLUMBIA RIVER SIDE CHANNEL Sampled By: TJ/MS on 19-MAY-20 @ 13:30 Matrix: WATER Miscellaneous Parameters Ammonia, Total (as N) Orthophosphate-Dissolved (as P) Enterococcus Coliform Bacteria - Fecal MPN - E. coli Phosphorus (P)-Total Total Suspended Solids NO2, NO3 and Sum of NO2/NO3 Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite (as N) Nitrite in Water by IC Nitrite (as N)	<0.050 <0.0050 See Attached 11 9 0.0287 23.0	OCR	0.050 0.0050  1 1 0.0050 3.0	mg/L mg/L  CFU/100mL MPN/100mL mg/L mg/L		01-JUN-20 20-MAY-20 20-MAY-20 20-MAY-20 20-MAY-20 21-MAY-20 26-MAY-20  20-MAY-20 21-MAY-20 20-MAY-20	R5102915 R5093921 R5102661 R5094635 R5094626 R5094379 R5099468  R5094276  R5094276

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

## Reference Information

### Sample Parameter Qualifier Key:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
OCR	Parameter is out of client specific range.

### Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
EC-MPN-CL	Water	MPN - E. coli	APHA 9223B
This analysis is carried out using procedures adapted from APHA Method 9223 "Enzyme Substrate Coliform Test". E. coli and Total Coliform are determined simultaneously. The sample is mixed with a mixture hydrolyzable substrates and then sealed in a multi-well packet. The packet is incubated for 18 or 24 hours and then the number of wells exhibiting a positive response are counted. The final result is obtained by comparing the positive responses to a probability table. Recommended Holding Time: Sample: 1 day Reference: APHA			
FCC-MF-CL	Water	Fecal Coliform Count-MF	APHA 9222D
This analysis is carried out using procedures adapted from APHA Method 9222 "Membrane Filter Technique for Members of the Coliform Group". Coliform bacteria is enumerated by culturing and colony counting. A known sample volume is filtered through a 0.45 micron membrane filter. The test involves an initial 24 hour incubation at 44.5 degrees C of the filter with the appropriate growth medium. This method is specific for thermotolerant bacteria (Fecal) and is used for non-turbid water with a low background bacteria level.			
N2N3-CALC-CL	Water	Nitrate+Nitrite	CALCULATION
NH3-F-CL	Water	Ammonia by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.			
NO2-IC-N-CL	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-CL	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-COL-CL	Water	Total P in Water by Colour	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.			
PO4-DO-COL-CL	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.			

\*\* 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
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, 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 ww - 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.*



## Quality Control Report

Workorder: L2449030

Report Date: 02-JUN-20

Page 1 of 3

Client: KICKING HORSE MOUNTAIN UTILITY CORPORATION  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Contact: TRAVIS JOBIN

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>BOD-BC-CL</b>	<b>Water</b>							
Batch	R5098847							
<b>WG3329408-2 LCS</b>								
Biochemical Oxygen Demand			87.9		%		85-115	20-MAY-20
<b>WG3329408-1 MB</b>								
Biochemical Oxygen Demand			<2.0		mg/L		2	20-MAY-20
<b>EC-MPN-CL</b>	<b>Water</b>							
Batch	R5094626							
<b>WG3326897-4 MB</b>								
MPN - E. coli			<1		MPN/100mL		1	20-MAY-20
<b>FCC-MF-CL</b>	<b>Water</b>							
Batch	R5094635							
<b>WG3326919-1 MB</b>								
Coliform Bacteria - Fecal			<1		CFU/100mL		1	20-MAY-20
<b>NH3-F-CL</b>	<b>Water</b>							
Batch	R5102915							
<b>WG3332920-19 DUP</b>		<b>L2449030-2</b>						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	01-JUN-20
<b>WG3332920-14 LCS</b>								
Ammonia, Total (as N)			100.5		%		85-115	01-JUN-20
<b>WG3332920-18 LCS</b>								
Ammonia, Total (as N)			102.5		%		85-115	01-JUN-20
<b>WG3332920-13 MB</b>								
Ammonia, Total (as N)			<0.050		mg/L		0.05	01-JUN-20
<b>WG3332920-17 MB</b>								
Ammonia, Total (as N)			<0.050		mg/L		0.05	01-JUN-20
<b>WG3332920-20 MS</b>		<b>L2449030-2</b>						
Ammonia, Total (as N)			100.6		%		75-125	01-JUN-20
<b>NO2-IC-N-CL</b>	<b>Water</b>							
Batch	R5094276							
<b>WG3326666-6 LCS</b>								
Nitrite (as N)			104.8		%		90-110	20-MAY-20
<b>WG3326666-5 MB</b>								
Nitrite (as N)			<0.010		mg/L		0.01	20-MAY-20
<b>NO3-IC-N-CL</b>	<b>Water</b>							

## Quality Control Report

Workorder: L2449030

Report Date: 02-JUN-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>NO3-IC-N-CL</b>	<b>Water</b>							
Batch	R5094276							
<b>WG3326666-6</b>	<b>LCS</b>							
Nitrate (as N)			102.9		%		90-110	20-MAY-20
<b>WG3326666-5</b>	<b>MB</b>							
Nitrate (as N)			<0.020		mg/L		0.02	20-MAY-20
<b>P-T-COL-CL</b>	<b>Water</b>							
Batch	R5094379							
<b>WG3326511-2</b>	<b>LCS</b>							
Phosphorus (P)-Total			100.4		%		80-120	21-MAY-20
<b>WG3326511-1</b>	<b>MB</b>							
Phosphorus (P)-Total			<0.0050		mg/L		0.005	21-MAY-20
<b>PO4-DO-COL-CL</b>	<b>Water</b>							
Batch	R5093921							
<b>WG3325955-9</b>	<b>LCS</b>							
Orthophosphate-Dissolved (as P)			104.5		%		80-120	20-MAY-20
<b>WG3325955-1</b>	<b>MB</b>							
Orthophosphate-Dissolved (as P)			<0.0050		mg/L		0.005	20-MAY-20
<b>TSS-CL</b>	<b>Water</b>							
Batch	R5099468							
<b>WG3329337-3</b>	<b>DUP</b>	<b>L2449030-3</b>						
Total Suspended Solids		176	180		mg/L	1.8	20	26-MAY-20
<b>WG3329337-2</b>	<b>LCS</b>							
Total Suspended Solids			92.7		%		85-115	26-MAY-20
<b>WG3329337-1</b>	<b>MB</b>							
Total Suspended Solids			<3.0		mg/L		3	26-MAY-20

# Quality Control Report

Workorder: L2449030

Report Date: 02-JUN-20

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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
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.



## Microbial Test Results

Samples collected May 19, 2020

Final Report

May 28, 2020

Submitted to: **ALS Environmental**  
Calgary, AB

## SAMPLE INFORMATION

Sample ID/ Internal ID	Dates		<i>Enterococcus</i> test initiation	Receipt temperature
	Collected	Received		
L2449030-1 WWTP EFFLUENT - UV TROUGH / 1920-1255-01	19-May-20 at 1230h	20-May-20 at 1000h	20-May-20 at 1145h	10.6°C
L2449030-2 COLUMBIA RIVER UPSTREAM / 1920-1255-02	19-May-20 at 1300h	20-May-20 at 1000h	20-May-20 at 1145h	11.0°C
L2449030-3 COLUMBIA RIVER DOWNSTREAM / 1920-1255-03	19-May-20 at 1315h	20-May-20 at 1000h	20-May-20 at 1145h	10.6°C
L2449030-4 COLUMBIA RIVER SIDE CHANNEL / 1920-1255-04	19-May-20 at 1330h	20-May-20 at 1000h	20-May-20 at 1145h	10.1°C

## TEST TYPES

- *Enterococcus* enumeration test

## RESULTS

### Microbial test results

Sample ID	MPN/100 mL <i>Enterococcus</i>
L2449030-1 WWTP EFFLUENT - UV TROUGH	<1
L2449030-2 COLUMBIA RIVER UPSTREAM	<1
L2449030-3 COLUMBIA RIVER DOWNSTREAM	4.1
L2449030-4 COLUMBIA RIVER SIDE CHANNEL	2.0

MPN = Most Probable Number

## QA/QC

QA/QC summary	<i>Enterococcus</i>
Protocol deviations	None
Control performance	Acceptable
Test performance	Valid



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Report By:  
Shae Cole, BSc  
Biologist



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Reviewed By:  
Leila Oosterbroek, BSc  
Environmental Scientist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

## REFERENCES

Enterolert Test Kit Literature, IDEXX Laboratories Ltd., One IDEXX Drive, Westbrook, ME, 04092 USA

MPN Tables for IDEXX Quanti-Tray 2000 (<http://www.idexx.com/water>)

## **APPENDIX A – Test data**

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## Quanti-Tray Bench Sheet - *Enterococcus*

 Client ALSIDO Reference 1920-1255
**Test Initiation**

 Date: 2020/05/20  
 Time: 1145  
 Technician: CB

 Reagent used: Enterolert™  
 Reagent Lot#/Expiry: AS176 / 10 FEB 2021
**Sample Information**

 Dilution Factor: —
**Comments:**

 Thermometer Serial #: 192702205  
 Incubator #: 7  
 Incubator Temperature: 41 (must be 41 ± 0.5°C)

 Quanti Tray 2000 Lot#/Expiry: HR 021 / 08/27/2022
**Results - 24 Hour Incubation**

 Date: 2020/05/21 Time: 1200 Technician: CB

Incubator Temp: <u>41</u> (must be 41 ± 0.5°C)	Enterococci (Fluorescent)									
	CTL	-01	-02	-03	-04					
# Positive Large Wells:	0	0	0	3	2					
# Ambiguous Large Wells:	↓	↓	↓	0	0					
# Positive Small Wells (Tray 2000 only):	↓	↓	↓	0	0					
# Ambiguous Small Wells (Tray 2000 only):	↓	↓	↓	0	0					
Most Probable Number at 24 hours:	41	41	41	4.1	2.0					

**Results - 28 Hour Incubation**

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Technician: \_\_\_\_\_

Incubator Temp: _____ (must be 41 ± 0.5°C)	Enterococci (Fluorescent)									
	CTL									
# Confirmed Positive Large Wells:										
# Confirmed Positive Small Wells (Tray 2000 only):										
Most Probable Number at 28 hours:										

Confirmed positive wells includes the positive wells from 24 hours plus the ambiguous wells that became positive at 28 hours  
 At 28 hours only score marked ambiguous from 24 hours



## **APPENDIX B – Chain-of-custody form**

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**Subcontract Request Form**
**Subcontract To:**
**NAUTILUS ENVIRONMENTAL COMPANY INC. - CALGARY, AB, CANADA**

 #4, 6125-12 STREET SE  
 CALGARY, AB T2H 2K1

**NOTES:** Please reference on final report and invoice: PO# L2449030  
 ALS requires QC data to be provided with your final results.

 Please see enclosed 4 sample(s) in 4 Container(s)

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED	PRIORITY
		DUE DATE	Flag
L2449030-1 WWTP EFFLUENT - UV TROUGH	Enterococcus (ENTERO-HQ 1)	5/19/2020 6/1/2020	1230
L2449030-2 COLUMBIA RIVER UPSTREAM	Enterococcus (ENTERO-HQ 1)	5/19/2020 6/1/2020	1300
L2449030-3 COLUMBIA RIVER DOWN STREAM	Enterococcus (ENTERO-HQ 1)	5/19/2020 6/1/2020	1315
L2449030-4 COLUMBIA RIVER SIDE CHANNEL	Enterococcus (ENTERO-HQ 1)	5/19/2020 6/1/2020	1330

Subcontract Info Contact:

John Forbes (403) 291-9897

Analysis and reporting info contact:

Patryk Wojciak, B.Sc., P.Chem.

2559 29 STREET NE

CALGARY, AB T1Y 7B5

Phone: (403) 291-9897

2020/05/20

10:00

Internal Driver

JC

4x400mL bottles

NGS/NOT

Email: patryk.wojciak@alsglobal.com

Good Condition

Please email confirmation of receipt to:

patryk.wojciak@alsglobal.com

Shipped By:

Date Shipped:

Received By:

Date Received:

Verified By:

Date Verified:

Temperature:

Sample Integrity Issues:

**END OF REPORT**

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L2449030-COFC

## Chain of Custody / Analytical Request Form

**Canada Toll Free: 1 800 668 9878**

[www.alsglobal.com](http://www.alsglobal.com)

COC #

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[illegible]

GENF 20.00 Front



KICKING HORSE MOUNTAIN UTILITY  
CORPORATION  
ATTN: TRAVIS JOBIN  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Date Received: 28-MAY-20  
Report Date: 15-JUN-20 15:02 (MT)  
Version: FINAL

Client Phone: 250-344-8442

## Certificate of Analysis

Lab Work Order #: L2453015

Project P.O. #: NOT SUBMITTED

Job Reference: WEEK 3 - 2020 SPRING EMS PROGRAM - WW

C of C Numbers:

Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.  
Account Manager

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

ADDRESS: 2559 29 Street NE, Calgary, AB T1Y 7B5 Canada | Phone: +1 403 291 9897 | Fax: +1 403 291 0298  
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
L2453015-1    WWTP EFFLUENT - UV TROUGH Sampled By:    TJ/MS on 26-MAY-20 @ 11:00 Matrix:        WATER <b>Miscellaneous Parameters</b> Ammonia, Total (as N) Biochemical Oxygen Demand Orthophosphate-Dissolved (as P) Enterococcus Coliform Bacteria - Fecal MPN - E. coli Phosphorus (P)-Total Total Suspended Solids <b>NO2, NO3 and Sum of NO2/NO3</b> <b>Nitrate in Water by IC</b> Nitrate (as N) <b>Nitrate+Nitrite</b> Nitrate and Nitrite (as N) <b>Nitrite in Water by IC</b> Nitrite (as N)	<0.050 3.9 0.199 See Attached <1 <1 0.617 13.3	DLHC      DLHC	0.050 2.0 0.010  1 1 0.050 3.0	mg/L mg/L mg/L  CFU/100mL MPN/100mL mg/L mg/L		09-JUN-20 29-MAY-20 28-MAY-20 28-MAY-20 28-MAY-20 28-MAY-20 01-JUN-20 02-JUN-20  29-MAY-20 03-JUN-20 29-MAY-20	R5112383 R5105656 R5100319 R5117888 R5102024 R5102017 R5102855 R5105416  R5104564   R5104564
L2453015-2    COLUMBIA RIVER UPSTREAM Sampled By:    TJ/MS on 26-MAY-20 @ 11:20 Matrix:        WATER <b>Miscellaneous Parameters</b> Ammonia, Total (as N) Orthophosphate-Dissolved (as P) Enterococcus Coliform Bacteria - Fecal MPN - E. coli Phosphorus (P)-Total Total Suspended Solids <b>NO2, NO3 and Sum of NO2/NO3</b> <b>Nitrate in Water by IC</b> Nitrate (as N) <b>Nitrate+Nitrite</b> Nitrate and Nitrite (as N) <b>Nitrite in Water by IC</b> Nitrite (as N)	<0.050 <0.0050 See Attached 3 1 0.0146 36.7	OCR	0.050 0.0050  1 1 0.0050 3.0	mg/L mg/L  CFU/100mL MPN/100mL mg/L mg/L		09-JUN-20 28-MAY-20 28-MAY-20 28-MAY-20 28-MAY-20 01-JUN-20 02-JUN-20  29-MAY-20 03-JUN-20 29-MAY-20	R5112383 R5100319 R5117888 R5102024 R5102017 R5102855 R5105416  R5104564   R5104564
L2453015-3    COLUMBIA RIVER DOWN STREAM Sampled By:    TJ/MS on 26-MAY-20 @ 11:45 Matrix:        WATER <b>Miscellaneous Parameters</b> Ammonia, Total (as N) Orthophosphate-Dissolved (as P) Enterococcus Coliform Bacteria - Fecal MPN - E. coli Phosphorus (P)-Total Total Suspended Solids <b>NO2, NO3 and Sum of NO2/NO3</b> <b>Nitrate in Water by IC</b> Nitrate (as N) <b>Nitrate+Nitrite</b> Nitrate and Nitrite (as N)	<0.050 <0.0050 See Attached 2 1 0.0129 39.3	OCR	0.050 0.0050  1 1 0.0050 3.0	mg/L mg/L  CFU/100mL MPN/100mL mg/L mg/L		09-JUN-20 28-MAY-20 28-MAY-20 28-MAY-20 28-MAY-20 01-JUN-20 02-JUN-20  29-MAY-20 03-JUN-20	R5112383 R5100319 R5117888 R5102024 R5102017 R5102855 R5105416  R5104564

\* 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
L2453015-3 COLUMBIA RIVER DOWN STREAM Sampled By: TJ/MS on 26-MAY-20 @ 11:45 Matrix: WATER Nitrite in Water by IC Nitrite (as N)	<0.010		0.010	mg/L		29-MAY-20	R5104564
L2453015-4 COLUMBIA RIVER SIDE CHANNEL Sampled By: TJ/MS on 26-MAY-20 @ 12:00 Matrix: WATER Miscellaneous Parameters Ammonia, Total (as N) Orthophosphate-Dissolved (as P) Enterococcus Coliform Bacteria - Fecal MPN - E. coli Phosphorus (P)-Total Total Suspended Solids NO2, NO3 and Sum of NO2/NO3 Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite (as N) Nitrite in Water by IC Nitrite (as N)	<0.050 0.0074 See Attached 4 4 0.0304 37.3	OCR	0.050 0.0050  1 1 0.0050 3.0	mg/L mg/L  CFU/100mL MPN/100mL mg/L mg/L		09-JUN-20 28-MAY-20 28-MAY-20 28-MAY-20 28-MAY-20 01-JUN-20 02-JUN-20  29-MAY-20 03-JUN-20 29-MAY-20	R5112383 R5100319 R5117888 R5102024 R5102017 R5102855 R5105416  R5104564  R5104564

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

## Reference Information

### Qualifiers for Sample Submission Listed:

Qualifier	Description
EHR	FECAL,E. CXOLI, ENTEROCOCCI EXPIRED ON ARRIVAL - Exceeded Recommended Holding Time prior to receipt at the lab.
EXTEMP	RECEIVED 15C - Samples Received with temperature >15 Degrees C

### Sample Parameter Qualifier Key:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
OCR	Parameter is out of client specific range.

### Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
EC-MPN-CL	Water	MPN - E. coli	APHA 9223B
This analysis is carried out using procedures adapted from APHA Method 9223 "Enzyme Substrate Coliform Test". E. coli and Total Coliform are determined simultaneously. The sample is mixed with a mixture hydrolyzable substrates and then sealed in a multi-well packet. The packet is incubated for 18 or 24 hours and then the number of wells exhibiting a positive response are counted. The final result is obtained by comparing the positive responses to a probability table. Recommended Holding Time: Sample: 1 day Reference: APHA			
FCC-MF-CL	Water	Fecal Coliform Count-MF	APHA 9222D
This analysis is carried out using procedures adapted from APHA Method 9222 "Membrane Filter Technique for Members of the Coliform Group". Coliform bacteria is enumerated by culturing and colony counting. A known sample volume is filtered through a 0.45 micron membrane filter. The test involves an initial 24 hour incubation at 44.5 degrees C of the filter with the appropriate growth medium. This method is specific for thermotolerant bacteria (Fecal) and is used for non-turbid water with a low background bacteria level.			
N2N3-CALC-CL	Water	Nitrate+Nitrite	CALCULATION
NH3-F-CL	Water	Ammonia by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.			
NO2-IC-N-CL	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-CL	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-COL-CL	Water	Total P in Water by Colour	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.			
PO4-DO-COL-CL	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.			

\*\* 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:



## Reference Information

### Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
Laboratory Definition Code	Laboratory Location		
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, 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 ww - 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.

## Quality Control Report

Workorder: L2453015

Report Date: 15-JUN-20

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Client: KICKING HORSE MOUNTAIN UTILITY CORPORATION

1500 Kicking Horse Trail

Golden BC V0A 1H0

Contact: TRAVIS JOBIN

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>BOD-BC-CL</b>	<b>Water</b>							
Batch	R5105656							
<b>WG3334800-5 LCS</b>								
Biochemical Oxygen Demand			87.1		%		85-115	29-MAY-20
<b>WG3334800-4 MB</b>								
Biochemical Oxygen Demand			<2.0		mg/L		2	29-MAY-20
<b>EC-MPN-CL</b>	<b>Water</b>							
Batch	R5102017							
<b>WG3331852-4 MB</b>								
MPN - E. coli			<1		MPN/100mL		1	28-MAY-20
<b>FCC-MF-CL</b>	<b>Water</b>							
Batch	R5102024							
<b>WG3331871-1 MB</b>								
Coliform Bacteria - Fecal			<1		CFU/100mL		1	28-MAY-20
<b>NH3-F-CL</b>	<b>Water</b>							
Batch	R5112383							
<b>WG3338435-23 DUP</b>		<b>L2453015-4</b>						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	09-JUN-20
<b>WG3338435-22 LCS</b>								
Ammonia, Total (as N)			101.1		%		85-115	09-JUN-20
<b>WG3338435-21 MB</b>								
Ammonia, Total (as N)			<0.050		mg/L		0.05	09-JUN-20
<b>WG3338435-24 MS</b>		<b>L2453015-4</b>						
Ammonia, Total (as N)			119.0		%		75-125	09-JUN-20
<b>NO2-IC-N-CL</b>	<b>Water</b>							
Batch	R5104564							
<b>WG3334448-2 LCS</b>								
Nitrite (as N)			104.1		%		90-110	29-MAY-20
<b>WG3334448-1 MB</b>								
Nitrite (as N)			<0.010		mg/L		0.01	29-MAY-20
<b>NO3-IC-N-CL</b>	<b>Water</b>							
Batch	R5104564							
<b>WG3334448-2 LCS</b>								
Nitrate (as N)			105.2		%		90-110	29-MAY-20
<b>WG3334448-1 MB</b>								
Nitrate (as N)			<0.020		mg/L		0.02	29-MAY-20
<b>P-T-COL-CL</b>	<b>Water</b>							

## Quality Control Report

Workorder: L2453015

Report Date: 15-JUN-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>P-T-COL-CL</b>								
<b>Water</b>								
<b>Batch</b>	<b>R5102855</b>							
<b>WG3332850-26</b>	<b>LCS</b>							
Phosphorus (P)-Total			102.5		%		80-120	01-JUN-20
<b>WG3332850-25</b>	<b>MB</b>							
Phosphorus (P)-Total			<0.0050		mg/L		0.005	01-JUN-20
<b>PO4-DO-COL-CL</b>								
<b>Water</b>								
<b>Batch</b>	<b>R5100319</b>							
<b>WG3331067-7</b>	<b>DUP</b>	<b>L2453015-4</b>						
Orthophosphate-Dissolved (as P)		0.0074	0.0075		mg/L	1.6	20	28-MAY-20
<b>WG3331067-6</b>	<b>LCS</b>							
Orthophosphate-Dissolved (as P)			100.6		%		80-120	28-MAY-20
<b>WG3331067-5</b>	<b>MB</b>							
Orthophosphate-Dissolved (as P)			<0.0050		mg/L		0.005	28-MAY-20
<b>TSS-CL</b>								
<b>Water</b>								
<b>Batch</b>	<b>R5105416</b>							
<b>WG3333836-2</b>	<b>LCS</b>							
Total Suspended Solids			108.0		%		85-115	02-JUN-20
<b>WG3333836-1</b>	<b>MB</b>							
Total Suspended Solids			<3.0		mg/L		3	02-JUN-20

# Quality Control Report

Workorder: L2453015

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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
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

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# Quality Control Report

Workorder: L2453015

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## Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
<b>Bacteriological Tests</b>							
Fecal Coliform Count-MF	1	26-MAY-20 11:00	28-MAY-20 11:30	30	48	hours	EHTR
	2	26-MAY-20 11:20	28-MAY-20 11:30	30	48	hours	EHTR
	3	26-MAY-20 11:45	28-MAY-20 11:30	30	48	hours	EHTR
	4	26-MAY-20 12:00	28-MAY-20 11:30	30	48	hours	EHTR
MPN - E. coli	1	26-MAY-20 11:00	28-MAY-20 11:30	30	48	hours	EHTR
	2	26-MAY-20 11:20	28-MAY-20 11:30	30	48	hours	EHTR
	3	26-MAY-20 11:45	28-MAY-20 11:30	30	48	hours	EHTR
	4	26-MAY-20 12:00	28-MAY-20 11:30	30	48	hours	EHTR

## 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 L2453015 were received on 28-MAY-20 08:45.

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.



## Microbial Test Results

Samples collected May 26, 2020

Final Report

June 15, 2020

Submitted to: **ALS Environmental**  
Calgary, AB

## SAMPLE INFORMATION

Sample ID/ Internal ID	Dates		<i>Enterococcus</i> test initiation	Receipt temperature
	Collected	Received		
L2453015-1 WWTP EFFLUENT – UV TROUGH/ 1920-1324-01	26-May-20 at 1100h	28-May-20 at 1200h	28-May-20 at 1610h	12.8°C
L2453015-2 COLUMBIA RIVER UPSTREAM/ 1920-1324-02	26-May-20 at 1120h	28-May-20 at 1200h	28-May-20 at 1610h	12.7°C
L2453015-3 COLUMBIA RIVER DOWNSTREAM/ 1920-1324-03	26-May-20 at 1145h	28-May-20 at 1200h	28-May-20 at 1610h	13.8°C
L2453015-4 COLUMBIA RIVER SIDE CHANNEL/ 1920-1324-04	26-May-20 at 1200h	28-May-20 at 1200h	28-May-20 at 1610h	14.9°C

## TEST TYPES

- *Enterococcus* enumeration test

## RESULTS

### Microbial test results

Sample ID	MPN/100 mL <i>Enterococcus</i>
L2453015-1 WWTP EFFLUENT – UV TROUGH	<1
L2453015-2 COLUMBIA RIVER UPSTREAM	3.1
L2453015-3 COLUMBIA RIVER DOWNSTREAM	4.1
L2453015-4 COLUMBIA RIVER SIDE CHANNEL	3.1

MPN = Most Probable Number

## QA/QC

QA/QC summary	<i>Enterococcus</i>
Protocol deviations	See Below
Control performance	Acceptable
Test performance	Valid

The samples were received and testing initiated outside of the required hold time at the client's request resulting in a protocol deviation.



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Report By:  
Courtney Bogstie, BSc  
Biologist



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Reviewed By:  
Leila Oosterbroek, BSc  
Environmental Scientist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

## REFERENCES

Enterolert Test Kit Literature, IDEXX Laboratories Ltd., One IDEXX Drive, Westbrook, ME, 04092 USA

MPN Tables for IDEXX Quanti-Tray 2000 (<http://www.idexx.com/water>)



## **APPENDIX A – Test data**

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## Quanti-Tray Bench Sheet - *Enterococcus*

 Client ALS106 Reference 1920-1324
**Test Initiation**

 Date: 2020/05/28  
 Time: 1610  
 Technician: MF
**Sample Information**

 Dilution Factor: —

 Reagent used: Enterolert™  
 Reagent Lot#/Expiry: AST010 FEB 2021

Comments:

 Thermometer Serial #: 192702205  
 Incubator #: 7  
 Incubator Temperature: 41 (must be 41 ± 0.5°C)

 Quanti Tray 2000 Lot#/Expiry: H2021 08/27/2022
**Results - 24 Hour Incubation**

 Date: 2020/05/29 Time: 1610 Technician: MF

Incubator Temp: <u>41</u> (must be 41 ± 0.5°C)	Enterococci (Fluorescent)									
	CTL	-01	-02	-03	-04					
# Positive Large Wells:	0	0	3	3	3					
# Ambiguous Large Wells:	1	49	0	0	0					
# Positive Small Wells (Tray 2000 only):	↓	0	0	0	↓					
# Ambiguous Small Wells (Tray 2000 only):	↓	48	0	0	↓					
Most Probable Number at 24 hours:	4	4.1	3.1	4.1	3.1					

**Results - 28 Hour Incubation**

 Date: 2020/05/29/2020/05/30 Time: 1800 / 0730 Technician: MF

Incubator Temp: <u>41</u> (must be 41 ± 0.5°C)	Enterococci (Fluorescent)									
	CTL	-01								
# Confirmed Positive Large Wells:	0/0	0/0								
# Confirmed Positive Small Wells (Tray 2000 only):	0/0	0/0								
Most Probable Number at 28 hours:	4	4.1								

Confirmed positive wells includes the positive wells from 24 hours plus the ambiguous wells that became positive at 28 hours

At 28 hours only score marked ambiguous from 24 hours

Note: Test was scored at 26 hours and 39.5 hours to confirm ambiguous results as test could not be scored at exactly 28 hours.

## **APPENDIX B – Chain-of-custody form**

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**Subcontract Request Form**
**Subcontract To:**
**NAUTILUS ENVIRONMENTAL COMPANY INC. - CALGARY, AB, CANADA**

 #4, 6125-12 STREET SE  
 CALGARY, AB T2H 2K1

**NOTES:** Please reference on final report and invoice: PO# L2453015  
 ALS requires QC data to be provided with your final results.

Samples past Hold time - Please run

 Please see enclosed **4** sample(s) in **4** Container(s)

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED DUE DATE	Priority Flag
L2453015-1 WWTP EFFLUENT - UV TROUGH	Enterococcus (ENTERO-HQ 1)	5/26/2020 6/9/2020	1120
L2453015-2 COLUMBIA RIVER UPSTREAM	Enterococcus (ENTERO-HQ 1)	5/26/2020 6/9/2020	1120
L2453015-3 COLUMBIA RIVER DOWN STREAM	Enterococcus (ENTERO-HQ 1)	5/26/2020 6/9/2020	1145
L2453015-4 COLUMBIA RIVER SIDE CHANNEL	Enterococcus (ENTERO-HQ 1)	5/26/2020 6/9/2020	1200

Subcontract Info Contact:

John Forbes (403) 291-9897

Analysis and reporting info contact:

 Patryk Wojciak, B.Sc., P.Chem.  
 2559 29 STREET NE  
 CALGARY, AB T1Y 7B5  
 Phone: (403) 291-9897

1920-1324 AE  
 2020/05/28 4x400mL  
 1200 good cond  
 Dropoff no 8/10/1  
 Email: patryk.wojciak@alsglobal.com

**Please email confirmation of receipt to:**
**patryk.wojciak@alsglobal.com**

Shipped By: \_\_\_\_\_ Date Shipped: \_\_\_\_\_

Received By: \_\_\_\_\_ Date Received: \_\_\_\_\_

Verified By: \_\_\_\_\_ Date Verified: \_\_\_\_\_

Temperature: \_\_\_\_\_

Sample Integrity Issues: \_\_\_\_\_

**END OF REPORT**

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KICKING HORSE MOUNTAIN UTILITY  
CORPORATION  
ATTN: TRAVIS JOBIN  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Date Received: 04-JUN-20  
Report Date: 23-JUN-20 13:54 (MT)  
Version: FINAL

Client Phone: 250-344-8442

## Certificate of Analysis

Lab Work Order #: L2456017  
Project P.O. #: NOT SUBMITTED  
Job Reference: WEEK 4 - 2020 SPRING EMS  
C of C Numbers:  
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.  
Account Manager

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

ADDRESS: 2559 29 Street NE, Calgary, AB T1Y 7B5 Canada | Phone: +1 403 291 9897 | Fax: +1 403 291 0298  
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
L2456017-1	WWTP EFFLUENT - UV TROUGH							
Sampled By: TJ/JD on 03-JUN-20 @ 10:30								
Matrix: WATER								
<b>Miscellaneous Parameters</b>								
Ammonia, Total (as N)		0.054		0.050	mg/L		15-JUN-20	R5117878
Biochemical Oxygen Demand		2.2		2.0	mg/L		06-JUN-20	R5116844
Orthophosphate-Dissolved (as P)		0.170	DLHC	0.010	mg/L		04-JUN-20	R5108837
Enterococcus		See Attached					04-JUN-20	R5129996
Coliform Bacteria - Fecal		2		1	CFU/100mL		04-JUN-20	R5110537
MPN - E. coli		<1		1	MPN/100mL		04-JUN-20	R5110519
Phosphorus (P)-Total		0.394	DLHC	0.025	mg/L		11-JUN-20	R5116058
Total Suspended Solids		8.0		3.0	mg/L		10-JUN-20	R5116140
<b>NO2, NO3 and Sum of NO2/NO3</b>								
<b>Nitrate in Water by IC</b>								
Nitrate (as N)		19.5		0.020	mg/L		06-JUN-20	R5118717
<b>Nitrate+Nitrite</b>								
Nitrate and Nitrite (as N)		19.6		0.022	mg/L		16-JUN-20	
<b>Nitrite in Water by IC</b>								
Nitrite (as N)		0.042		0.010	mg/L		06-JUN-20	R5118717
L2456017-2	COLUMBIA RIVER UPSTREAM							
Sampled By: TJ/JD on 03-JUN-20 @ 11:15								
Matrix: WATER								
<b>Miscellaneous Parameters</b>								
Ammonia, Total (as N)		<0.050		0.050	mg/L		15-JUN-20	R5117878
Orthophosphate-Dissolved (as P)		<0.0050		0.0050	mg/L		04-JUN-20	R5108837
Enterococcus		See Attached					04-JUN-20	R5129996
Coliform Bacteria - Fecal		16	DLM	2	CFU/100mL		04-JUN-20	R5110537
MPN - E. coli		6	OCR	1	MPN/100mL		04-JUN-20	R5110519
Phosphorus (P)-Total		0.128	DLHC	0.010	mg/L		11-JUN-20	R5116058
Total Suspended Solids		215		3.0	mg/L		10-JUN-20	R5116140
<b>NO2, NO3 and Sum of NO2/NO3</b>								
<b>Nitrate in Water by IC</b>								
Nitrate (as N)		0.161		0.020	mg/L		06-JUN-20	R5118717
<b>Nitrate+Nitrite</b>								
Nitrate and Nitrite (as N)		0.161		0.022	mg/L		16-JUN-20	
<b>Nitrite in Water by IC</b>								
Nitrite (as N)		<0.010		0.010	mg/L		06-JUN-20	R5118717
L2456017-3	COLUMBIA RIVER DOWN STREAM							
Sampled By: TJ/JD on 03-JUN-20 @ 11:30								
Matrix: WATER								
<b>Miscellaneous Parameters</b>								
Ammonia, Total (as N)		<0.050		0.050	mg/L		15-JUN-20	R5117878
Orthophosphate-Dissolved (as P)		<0.0050		0.0050	mg/L		04-JUN-20	R5108837
Enterococcus		See Attached					04-JUN-20	R5129996
Coliform Bacteria - Fecal		4	DLM	2	CFU/100mL		04-JUN-20	R5110537
MPN - E. coli		3	OCR	1	MPN/100mL		04-JUN-20	R5110519
Phosphorus (P)-Total		0.150	DLHC	0.010	mg/L		11-JUN-20	R5116058
Total Suspended Solids		311		3.0	mg/L		10-JUN-20	R5116140
<b>NO2, NO3 and Sum of NO2/NO3</b>								
<b>Nitrate in Water by IC</b>								
Nitrate (as N)		0.190		0.020	mg/L		06-JUN-20	R5118717
<b>Nitrate+Nitrite</b>								
Nitrate and Nitrite (as N)		0.190		0.022	mg/L		16-JUN-20	

\* 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
L2456017-3 COLUMBIA RIVER DOWN STREAM Sampled By: TJ/JD on 03-JUN-20 @ 11:30 Matrix: WATER Nitrite in Water by IC Nitrite (as N)	<0.010		0.010	mg/L		06-JUN-20	R5118717
L2456017-4 COLUMBIA RIVER SIDE CHANNEL Sampled By: TJ/JD on 03-JUN-20 @ 11:00 Matrix: WATER Miscellaneous Parameters Ammonia, Total (as N) Orthophosphate-Dissolved (as P) Enterococcus Coliform Bacteria - Fecal MPN - E. coli Phosphorus (P)-Total Total Suspended Solids NO2, NO3 and Sum of NO2/NO3 Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite (as N) Nitrite in Water by IC Nitrite (as N)	<0.050 <0.0050 See Attached 46 22 0.0547 123	DLM OCR	0.050 0.0050  2 1 0.0050 3.0	mg/L mg/L  CFU/100mL MPN/100mL mg/L mg/L		15-JUN-20 04-JUN-20 04-JUN-20 04-JUN-20 04-JUN-20 11-JUN-20 10-JUN-20  06-JUN-20 16-JUN-20 06-JUN-20	R5117878 R5108837 R5129996 R5110537 R5110519 R5116058 R5116140  R5118717  R5118717

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

## Reference Information

## Sample Parameter Qualifier Key:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
OCR	Parameter is out of client specific range.

## Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
EC-MPN-CL	Water	MPN - E. coli	APHA 9223B
This analysis is carried out using procedures adapted from APHA Method 9223 "Enzyme Substrate Coliform Test". E. coli and Total Coliform are determined simultaneously. The sample is mixed with a mixture hydrolyzable substrates and then sealed in a multi-well packet. The packet is incubated for 18 or 24 hours and then the number of wells exhibiting a positive response are counted. The final result is obtained by comparing the positive responses to a probability table. Recommended Holding Time: Sample: 1 day Reference: APHA			
FCC-MF-CL	Water	Fecal Coliform Count-MF	APHA 9222D
This analysis is carried out using procedures adapted from APHA Method 9222 "Membrane Filter Technique for Members of the Coliform Group". Coliform bacteria is enumerated by culturing and colony counting. A known sample volume is filtered through a 0.45 micron membrane filter. The test involves an initial 24 hour incubation at 44.5 degrees C of the filter with the appropriate growth medium. This method is specific for thermotolerant bacteria (Fecal) and is used for non-turbid water with a low background bacteria level.			
N2N3-CALC-CL	Water	Nitrate+Nitrite	CALCULATION
NH3-F-CL	Water	Ammonia by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.			
NO2-IC-N-CL	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-CL	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-COL-CL	Water	Total P in Water by Colour	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.			
PO4-DO-COL-CL	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.			

\*\* 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
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

## Reference Information

### Test Method References:

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

### 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 ww - 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.

## Quality Control Report

Workorder: L2456017

Report Date: 23-JUN-20

Page 1 of 3

Client: KICKING HORSE MOUNTAIN UTILITY CORPORATION

1500 Kicking Horse Trail

Golden BC V0A 1H0

Contact: TRAVIS JOBIN

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>BOD-BC-CL</b>								
<b>Water</b>								
<b>Batch</b>	<b>R5116844</b>							
<b>WG3341265-2</b>	<b>LCS</b>							
Biochemical Oxygen Demand			100.6		%		85-115	06-JUN-20
<b>WG3341265-1</b>	<b>MB</b>							
Biochemical Oxygen Demand			<2.0		mg/L		2	06-JUN-20
<b>EC-MPN-CL</b>								
<b>Water</b>								
<b>Batch</b>	<b>R5110519</b>							
<b>WG3337186-4</b>	<b>MB</b>							
MPN - E. coli			<1		MPN/100mL		1	04-JUN-20
<b>FCC-MF-CL</b>								
<b>Water</b>								
<b>Batch</b>	<b>R5110537</b>							
<b>WG3337211-1</b>	<b>MB</b>							
Coliform Bacteria - Fecal			<1		CFU/100mL		1	04-JUN-20
<b>WG3337211-3</b>	<b>MB</b>							
Coliform Bacteria - Fecal			<1		CFU/100mL		1	04-JUN-20
<b>NH3-F-CL</b>								
<b>Water</b>								
<b>Batch</b>	<b>R5117878</b>							
<b>WG3342466-42</b>	<b>LCS</b>							
Ammonia, Total (as N)			85.5		%		85-115	15-JUN-20
<b>WG3342466-46</b>	<b>LCS</b>							
Ammonia, Total (as N)			107.9		%		85-115	15-JUN-20
<b>WG3342466-41</b>	<b>MB</b>							
Ammonia, Total (as N)			<0.050		mg/L		0.05	15-JUN-20
<b>WG3342466-45</b>	<b>MB</b>							
Ammonia, Total (as N)			<0.050		mg/L		0.05	15-JUN-20
<b>NO2-IC-N-CL</b>								
<b>Water</b>								
<b>Batch</b>	<b>R5118717</b>							
<b>WG3343045-2</b>	<b>LCS</b>							
Nitrite (as N)			98.7		%		90-110	10-JUN-20
<b>WG3343045-1</b>	<b>MB</b>							
Nitrite (as N)			<0.010		mg/L		0.01	10-JUN-20
<b>NO3-IC-N-CL</b>								
<b>Water</b>								
<b>Batch</b>	<b>R5118717</b>							
<b>WG3343045-2</b>	<b>LCS</b>							
Nitrate (as N)			102.0		%		90-110	10-JUN-20
<b>WG3343045-1</b>	<b>MB</b>							
Nitrate (as N)			<0.020		mg/L		0.02	10-JUN-20

## Quality Control Report

Workorder: L2456017

Report Date: 23-JUN-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>P-T-COL-CL</b>	<b>Water</b>							
<b>Batch R5116058</b>								
<b>WG3340169-2 LCS</b>								
Phosphorus (P)-Total			104.7		%		80-120	11-JUN-20
<b>WG3340169-1 MB</b>								
Phosphorus (P)-Total			<0.0050		mg/L		0.005	11-JUN-20
<b>PO4-DO-COL-CL</b>	<b>Water</b>							
<b>Batch R5108837</b>								
<b>WG3335588-14 LCS</b>								
Orthophosphate-Dissolved (as P)			108.0		%		80-120	04-JUN-20
<b>WG3335588-18 LCS</b>								
Orthophosphate-Dissolved (as P)			105.0		%		80-120	04-JUN-20
<b>WG3335588-13 MB</b>								
Orthophosphate-Dissolved (as P)			<0.0050		mg/L		0.005	04-JUN-20
<b>WG3335588-17 MB</b>								
Orthophosphate-Dissolved (as P)			<0.0050		mg/L		0.005	04-JUN-20
<b>TSS-CL</b>	<b>Water</b>							
<b>Batch R5116140</b>								
<b>WG3339622-2 LCS</b>								
Total Suspended Solids			91.1		%		85-115	10-JUN-20
<b>WG3339622-1 MB</b>								
Total Suspended Solids			<3.0		mg/L		3	10-JUN-20

# Quality Control Report

Workorder: L2456017

Report Date: 23-JUN-20

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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
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.



## Microbial Test Results

Sample collected June 3, 2020

Final Report

June 15, 2020

Submitted to: **ALS Environmental**  
Calgary, AB

## SAMPLE INFORMATION

Sample ID/ Internal ID	Dates		<i>Enterococcus</i> test initiation	Receipt temperature
	Collected	Received		
L2456017-1 WWTP EFFLUENT – UV TROUGH / 1920-1365-01	3-Jun-20 at 1030h	4-Jun-20 at 1000h	4-Jun-20 at 1030h	10.3°C
L2456017-2 COLUMBIA RIVER UPSTREAM / 1920-1365-02	3-Jun-20 at 1115h	4-Jun-20 at 1000h	4-Jun-20 at 1030h	10.2°C
L2456017-3 COLUMBIA RIVER DOWN STREAM / 1920-1365-03	3-Jun-20 at 1130h	4-Jun-20 at 1000h	4-Jun-20 at 1030h	9.8°C
L2456017-4 COLUMBIA RIVER SIDE CHANNEL / 1920-1365-04	3-Jun-20 at 1100h	4-Jun-20 at 1000h	4-Jun-20 at 1030h	10.4°C

## TEST TYPES

- *Enterococcus* enumeration test

## RESULTS

### Microbial test results

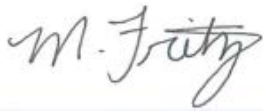
Sample ID	MPN/100 mL <i>Enterococcus</i>
L2456017-1 WWTP EFFLUENT – UV TROUGH	<1
L2456017-2 COLUMBIA RIVER UPSTREAM	5.2
L2456017-3 COLUMBIA RIVER DOWN STREAM	1.0
L2456017-4 COLUMBIA RIVER SIDE CHANNEL	6.3

MPN = Most Probable Number



## QA/QC

QA/QC summary	<i>Enterococcus</i>
Protocol deviations	None
Control performance	Acceptable
Test performance	Valid



Report By:  
Michelle Fritz, BSc  
Biologist



Reviewed By:  
Leila Oosterbroek, BSc  
Environmental Scientist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

## REFERENCES

Enterolert Test Kit Literature, IDEXX Laboratories Ltd., One IDEXX Drive, Westbrook, ME, 04092 USA

MPN Tables for IDEXX Quanti-Tray 2000 (<http://www.idexx.com/water>)

## **APPENDIX A – Test data**

---

## Quanti-Tray Bench Sheet - *Enterococcus*

 Client ALSIO Reference 1920-1365
**Test Initiation**

 Date: 2020/06/04  
 Time: 1030  
 Technician: MF
**Sample Information**

 Reagent used: Enterolert™  
 Reagent Lot#/Expiry: AS176 10 FEB 2021  
 Dilution Factor: 5

Comments:

 Thermometer Serial #: 192702205  
 Incubator #: 7  
 Incubator Temperature: 41 (must be 41 ± 0.5°C)

 Quanti Tray 2000 Lot#/Expiry: CS021  
03/31/2023
**Results - 24 Hour Incubation**

 Date: 2020/06/05 Time: 1030 Technician: MF

Incubator Temp: <u>41</u> (must be 41 ± 0.5°C)	Enterococci (Fluorescent)									
	CTL	-01	-02	-03	-04					
# Positive Large Wells:	0	0	4	5	5					
# Ambiguous Large Wells:	1	49	0	0	0					
# Positive Small Wells (Tray 2000 only):	1	0	1	1	1					
# Ambiguous Small Wells (Tray 2000 only):	1	48	0	1	0					
Most Probable Number at 24 hours:	1	1	5.2	1.0	0.3					

**Results - 28 Hour Incubation**

 Date: 2020/06/05 Time: 1430 Technician: MF

Incubator Temp: <u>41</u> (must be 41 ± 0.5°C)	Enterococci (Fluorescent)									
	CTL	-01								
# Confirmed Positive Large Wells:	0	0								
# Confirmed Positive Small Wells (Tray 2000 only):	1	1								
Most Probable Number at 28 hours:	1	1								

Confirmed positive wells includes the positive wells from 24 hours plus the ambiguous wells that became positive at 28 hours  
 At 28 hours only score marked ambiguous from 24 hours

## **APPENDIX B – Chain-of-custody form**

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## Subcontract Request Form

**Subcontract To:**
**NAUTILUS ENVIRONMENTAL COMPANY INC. - CALGARY, AB, CANADA**

 #4, 6125-12 STREET SE  
 CALGARY, AB T2H 2K1

**NOTES:** Please reference on final report and invoice: PO# L2456017  
 ALS requires QC data to be provided with your final results.

 Please see enclosed 4 sample(s) in 4 Container(s)

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED	PRIORITY Flag
L2456017-1 WWTP EFFLUENT - UV TROUGH	Enterococcus (ENTERO-HQ 1)	6/3/2020 10.3°C	1030 6/16/2020
L2456017-2 COLUMBIA RIVER UPSTREAM	Enterococcus (ENTERO-HQ 1)	6/3/2020 10.2°C	1115 6/16/2020
L2456017-3 COLUMBIA RIVER DOWN STREAM	Enterococcus (ENTERO-HQ 1)	6/3/2020 9.8°C	1130 6/16/2020
L2456017-4 COLUMBIA RIVER SIDE CHANNEL	Enterococcus (ENTERO-HQ 1)	6/3/2020 10.4°C	1100 6/16/2020

Subcontract Info Contact:

John Forbes (403) 291-9897

Analysis and reporting info contact:

 Patryk Wojciak, B.Sc., P.Chem.  
 2559 29 STREET NE  
 CALGARY, AB T1Y 7B5

Phone: (403) 291-9897

Email: patryk.wojciak@alsglobal.com

Please email confirmation of receipt to:

patryk.wojciak@alsglobal.com

Shipped By: \_\_\_\_\_ Date Shipped: \_\_\_\_\_

Received By: \_\_\_\_\_ Date Received: \_\_\_\_\_

Verified By: \_\_\_\_\_ Date Verified: \_\_\_\_\_

Temperature: \_\_\_\_\_

Sample Integrity Issues: \_\_\_\_\_

**END OF REPORT**

---



L2456017-COFC

## Chain of Custody / Analytical Request Form

**Canada Toll Free: 1 800 668 9878**

[www.alsglobal.com](http://www.alsglobal.com)

COC #

Page 1 of 1

Report To																		
Company:		Kicking Horse Mountain Resort Utility Corporation	<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other															
Contact:	Travis Jobin		<input type="checkbox"/> PDF <input type="checkbox"/> Excel <input type="checkbox"/> Digital <input checked="" type="checkbox"/> Fax															
Address:		1500 Kicking Horse Trail	Email 1:	tjobin@kickinghorseresort.com														
			Email 2:	pmajor@skircr.com														
Phone:	250-344-8442	Fax:		Email 3:	mskyring@kickinghorseresort.com													
Invoice To Same as Report?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Client / Project Information		Please indicate below Filtered, Preserved or both (F, P, F/P)													
Hardcopy of Invoice with Report?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Job #:		Week 3 - 2020 Spring EMS program - WW													
Company:		Resorts of the Canadian Rockies	PO / AFE:															
Contact:		Patrick Majer	LSD:															
Address:		1505 - 17th Ave SW Calgary AB	Quote #:															
Phone:																		
Lab Work Order # (lab use only)			ALS Contact: PW  Sampler: TJ/JD															
Sample #	Sample Identification (This description will appear on the report)		Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BOD5	TSS	N-NH4	N-NO3	N-NO2	Total P	Ortho P	Fecal Coliform	Enterococci	E. Coli			Number of Containers
	WWTP Effluent - UV trough Temp: pH:		03-Jun-20	1030	Water	X	X	X	X	X	X	X	X	X	X			5
	Columbia River Upstream Temp: pH:		03-Jun-20	1115	Water		X	X	X	X	X	X	X	X	X			4
	Columbia River Down stream Temp: pH:		03-Jun-20	1730	Water		X	X	X	X	X	X	X	X	X			4
	Columbia River Side Channel Temp: pH:		03-Jun-20	1100	Water		X	X	X	X	X	X	X	X	X			4
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.																		
SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)											
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:								
Travis Jobin	26-May-20		[Signature]	06/05	805	ND °C				Yes / No ? If Yes add SIF								

GENF 20.00 Front



KICKING HORSE MOUNTAIN UTILITY  
CORPORATION  
ATTN: TRAVIS JOBIN  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Date Received: 09-JUN-20  
Report Date: 22-JUN-20 13:25 (MT)  
Version: FINAL

Client Phone: 250-344-8442

## Certificate of Analysis

Lab Work Order #: L2457897

Project P.O. #: NOT SUBMITTED

Job Reference: WEEK 5 - 2020 SPRING EMS PROGRAM - WW

C of C Numbers:

Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.  
Account Manager

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

ADDRESS: 2559 29 Street NE, Calgary, AB T1Y 7B5 Canada | Phone: +1 403 291 9897 | Fax: +1 403 291 0298  
ALS CANADA LTD Part of the ALS Group An ALS Limited Company



Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2457897-1      WWTP EFFLUENT - UV TROUGH Sampled By:      TJ/JD on 08-JUN-20 @ 11:00 Matrix:            WATER <b>Miscellaneous Parameters</b> Ammonia, Total (as N) Biochemical Oxygen Demand Orthophosphate-Dissolved (as P) Enterococcus Coliform Bacteria - Fecal Phosphorus (P)-Total Total Suspended Solids <b>NO2, NO3 and Sum of NO2/NO3</b> <b>Nitrate in Water by IC</b> Nitrate (as N) <b>Nitrate+Nitrite</b> Nitrate and Nitrite (as N) <b>Nitrite in Water by IC</b> Nitrite (as N)	0.062 <2.0 0.159 See Attached <1 0.283 7.3	DLHC     DLHC	0.050 2.0 0.010  1 0.025 3.0	mg/L mg/L mg/L  CFU/100mL mg/L mg/L		22-JUN-20 09-JUN-20 09-JUN-20 09-JUN-20 09-JUN-20 18-JUN-20 14-JUN-20	R5127146 R5117407 R5115333 R5125582 R5115364 R5125258 R5117905
L2457897-2      COLUMBIA RIVER UPSTREAM Sampled By:      TJ/JD on 08-JUN-20 @ 11:45 Matrix:            WATER <b>Miscellaneous Parameters</b> Ammonia, Total (as N) Orthophosphate-Dissolved (as P) Enterococcus Coliform Bacteria - Fecal Phosphorus (P)-Total Total Suspended Solids <b>NO2, NO3 and Sum of NO2/NO3</b> <b>Nitrate in Water by IC</b> Nitrate (as N) <b>Nitrate+Nitrite</b> Nitrate and Nitrite (as N) <b>Nitrite in Water by IC</b> Nitrite (as N)	<0.050 <0.0050 See Attached 1 0.0285 60.7	DLHC	0.050 0.0050  1 0.0050 3.0	mg/L mg/L  CFU/100mL mg/L mg/L		22-JUN-20 09-JUN-20 09-JUN-20 09-JUN-20 18-JUN-20 14-JUN-20	R5127146 R5115333 R5125582 R5115364 R5125258 R5117905
L2457897-3      COLUMBIA RIVER DOWN STREAM Sampled By:      TJ/JD on 08-JUN-20 @ 12:00 Matrix:            WATER <b>Miscellaneous Parameters</b> Ammonia, Total (as N) Orthophosphate-Dissolved (as P) Enterococcus Coliform Bacteria - Fecal Phosphorus (P)-Total Total Suspended Solids <b>NO2, NO3 and Sum of NO2/NO3</b> <b>Nitrate in Water by IC</b> Nitrate (as N) <b>Nitrate+Nitrite</b> Nitrate and Nitrite (as N) <b>Nitrite in Water by IC</b> Nitrite (as N)	<0.050 <0.0050 See Attached 1 0.0344 78.0		0.050 0.0050  1 0.0050 3.0	mg/L mg/L  CFU/100mL mg/L mg/L		22-JUN-20 09-JUN-20 09-JUN-20 09-JUN-20 18-JUN-20 14-JUN-20	R5127146 R5115333 R5125582 R5115364 R5125258 R5117905

\* 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
L2457897-4 COLUMBIA RIVER SIDE CHANNEL								
Sampled By: TJ/JD on 08-JUN-20 @ 11:30								
Matrix: WATER								
Miscellaneous Parameters								
Ammonia, Total (as N)		<0.050		0.050	mg/L		22-JUN-20	R5127146
Orthophosphate-Dissolved (as P)		<0.0050		0.0050	mg/L		09-JUN-20	R5115333
Enterococcus		See Attached					09-JUN-20	R5125582
Coliform Bacteria - Fecal		11		1	CFU/100mL		09-JUN-20	R5115364
Phosphorus (P)-Total		0.0219		0.0050	mg/L		18-JUN-20	R5125258
Total Suspended Solids		30.7		3.0	mg/L		14-JUN-20	R5117905
NO2, NO3 and Sum of NO2/NO3								
Nitrate in Water by IC								
Nitrate (as N)		0.077		0.020	mg/L		09-JUN-20	R5115185
Nitrate+Nitrite								
Nitrate and Nitrite (as N)		0.077		0.022	mg/L		10-JUN-20	
Nitrite in Water by IC								
Nitrite (as N)		<0.010		0.010	mg/L		09-JUN-20	R5115185

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

## Reference Information

## Sample Parameter Qualifier Key:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

## Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
FCC-MF-CL	Water	Fecal Coliform Count-MF	APHA 9222D
This analysis is carried out using procedures adapted from APHA Method 9222 "Membrane Filter Technique for Members of the Coliform Group". Coliform bacteria is enumerated by culturing and colony counting. A known sample volume is filtered through a 0.45 micron membrane filter. The test involves an initial 24 hour incubation at 44.5 degrees C of the filter with the appropriate growth medium. This method is specific for thermotolerant bacteria (Fecal) and is used for non-turbid water with a low background bacteria level.			
N2N3-CALC-CL	Water	Nitrate+Nitrite	CALCULATION
NH3-F-CL	Water	Ammonia by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Weston et al.			
NO2-IC-N-CL	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-CL	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-COL-CL	Water	Total P in Water by Colour	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.			
PO4-DO-COL-CL	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.			

\*\* 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
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, 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 ww - 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.*

## Quality Control Report

Workorder: L2457897

Report Date: 22-JUN-20

Page 1 of 3

Client: KICKING HORSE MOUNTAIN UTILITY CORPORATION  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Contact: TRAVIS JOBIN

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>BOD-BC-CL Water</b>								
Batch	R5117407							
<b>WG3341882-2 LCS</b>								
Biochemical Oxygen Demand			97.5		%		85-115	09-JUN-20
<b>WG3341882-1 MB</b>								
Biochemical Oxygen Demand			<2.0		mg/L		2	09-JUN-20
<b>FCC-MF-CL Water</b>								
Batch	R5115364							
<b>WG3339477-1 MB</b>								
Coliform Bacteria - Fecal			<1		CFU/100mL		1	09-JUN-20
<b>NH3-F-CL Water</b>								
Batch	R5127146							
<b>WG3346251-3 DUP</b>		<b>L2457897-4</b>						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	22-JUN-20
<b>WG3346251-2 LCS</b>								
Ammonia, Total (as N)			108.5		%		85-115	22-JUN-20
<b>WG3346251-1 MB</b>								
Ammonia, Total (as N)			<0.050		mg/L		0.05	22-JUN-20
<b>WG3346251-4 MS</b>		<b>L2457897-4</b>						
Ammonia, Total (as N)			115.8		%		75-125	22-JUN-20
<b>NO2-IC-N-CL Water</b>								
Batch	R5115185							
<b>WG3339209-2 LCS</b>								
Nitrite (as N)			107.4		%		90-110	09-JUN-20
<b>WG3339209-1 MB</b>								
Nitrite (as N)			<0.010		mg/L		0.01	09-JUN-20
<b>NO3-IC-N-CL Water</b>								
Batch	R5115185							
<b>WG3339209-2 LCS</b>								
Nitrate (as N)			103.9		%		90-110	09-JUN-20
<b>WG3339209-1 MB</b>								
Nitrate (as N)			<0.020		mg/L		0.02	09-JUN-20
<b>P-T-COL-CL Water</b>								
Batch	R5125258							
<b>WG3344886-2 LCS</b>								
Phosphorus (P)-Total			96.3		%		80-120	18-JUN-20
<b>WG3344886-1 MB</b>								
Phosphorus (P)-Total			<0.0050		mg/L		0.005	18-JUN-20

## Quality Control Report

Workorder: L2457897

Report Date: 22-JUN-20

Page 2 of 3

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>PO4-DO-COL-CL</b>	<b>Water</b>							
Batch	R5115333							
<b>WG3338596-6 LCS</b>								
Orthophosphate-Dissolved (as P)			106.0		%		80-120	09-JUN-20
<b>WG3338596-1 MB</b>								
Orthophosphate-Dissolved (as P)			<0.0050		mg/L		0.005	09-JUN-20
<b>TSS-CL</b>	<b>Water</b>							
Batch	R5117905							
<b>WG3341909-2 LCS</b>								
Total Suspended Solids			105.3		%		85-115	14-JUN-20
<b>WG3341909-1 MB</b>								
Total Suspended Solids			<3.0		mg/L		3	14-JUN-20

# Quality Control Report

Workorder: L2457897

Report Date: 22-JUN-20

Page 3 of 3

## 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
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.

---

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.



## Microbial Test Results

Sample collected June 8, 2020

Final Report

June 18, 2020

Submitted to: **ALS Environmental**  
Calgary, AB



## SAMPLE INFORMATION

Sample ID/ Internal ID	Dates		<i>Enterococcus</i> test initiation	Receipt temperature
	Collected	Received		
L2457897-1 WWTP EFFLUENT-UV TROUGH / 1920-1394-01	8-Jun-20 at 1100h	9-Jun-20 at 1020h	9-Jun-20 at 1045h	12.3°C
L2457897-2 COLUMBIA RIVER UPSTREAM / 1920-1394-02	8-Jun-20 at 1145h	9-Jun-20 at 1020h	9-Jun-20 at 1045h	11.7°C
L2457897-3 COLUMBIA RIVER DOWNSTREAM / 1920-1394-03	8-Jun-20 at 1200h	9-Jun-20 at 1020h	9-Jun-20 at 1045h	11.8°C
L2457897-4 COLUMBIA RIVER SIDE CHANNEL / 1920-1394-04	8-Jun-20 at 1130h	9-Jun-20 at 1020h	9-Jun-20 at 1045h	12.3°C

## TEST TYPES

- *Enterococcus* enumeration test

## RESULTS

### Microbial test results

Sample ID	MPN/100 mL <i>Enterococcus</i>
L2457897-1 WWTP EFFLUENT-UV TROUGH	<1
L2457897-2 COLUMBIA RIVER UPSTREAM	1.0
L2457897-3 COLUMBIA RIVER DOWNSTREAM	2.0
L2457897-4 COLUMBIA RIVER SIDE CHANNEL	3.1

MPN = Most Probable Number

## QA/QC

QA/QC summary	<i>Enterococcus</i>
Protocol deviations	None
Control performance	Acceptable
Test performance	Valid



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Report By:  
Adam Wilson, BSc  
Biologist



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Reviewed By:  
Leila Oosterbroek, BSc  
Environmental Scientist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

## REFERENCES

Enterolert Test Kit Literature, IDEXX Laboratories Ltd., One IDEXX Drive, Westbrook, ME, 04092 USA

MPN Tables for IDEXX Quanti-Tray 2000 (<http://www.idexx.com/water>)

## **APPENDIX A – Test data**

---

## Quanti-Tray Bench Sheet - *Enterococcus*

 Client WISIOLO Reference 1920-1394
**Test Initiation**

 Date: 2020/06/09  
 Time: 1045  
 Technician: KUL
**Sample Information**

 Dilution Factor: —

 Reagent used: Enterolert™  
 Reagent Lot#/Expiry: W51710 2021/02/10

Comments:

 Thermometer Serial #: 1927102205  
 Incubator #: 7  
 Incubator Temperature: 41 (must be 41 ± 0.5°C)

 Quanti Tray 2000 Lot#/Expiry: 03021 2023/03/31
**Results - 24 Hour Incubation**

 Date: 2020/06/10 Time: 1045 Technician: KUL

Incubator Temp: _____ (must be 41 ± 0.5°C)	<i>Enterococci</i> (Fluorescent)									
	CTL	01	02	03	04					
# Positive Large Wells:	0	0	1	2	3					
# Ambiguous Large Wells:	0	0	0	0	0					
# Positive Small Wells (Tray 2000 only):	0	0	0	0	0					
# Ambiguous Small Wells (Tray 2000 only):	0	0	0	0	0					
Most Probable Number at 24 hours:	4	4	1.0	2.0	3.1					

**Results - 28 Hour Incubation**

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Technician: \_\_\_\_\_

Incubator Temp: _____ (must be 41 ± 0.5°C)	<i>Enterococci</i> (Fluorescent)									
	CTL									
# Confirmed Positive Large Wells:										
# Confirmed Positive Small Wells (Tray 2000 only):										
Most Probable Number at 28 hours:										

Confirmed positive wells includes the positive wells from 24 hours plus the ambiguous wells that became positive at 28 hours  
 At 28 hours only score marked ambiguos from 24 hours

## **APPENDIX B – Chain-of-custody form**

---

## Subcontract Request Form

**Subcontract To:**
**NAUTILUS ENVIRONMENTAL COMPANY INC. - CALGARY, AB, CANADA**

 #4, 6125-12 STREET SE  
 CALGARY, AB T2H 2K1

**NOTES:** Please reference on final report and invoice: PO# L2457897  
 ALS requires QC data to be provided with your final results.

 Please see enclosed **4** sample(s) in **4** Container(s)

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED	DUE DATE	Priority Flag
L2457897-1 WWTP EFFLUENT - UV TROUGH	Enterococcus (ENTERO-HQ 1)	6/8/2020	6/19/2020	1100 12.3°C
L2457897-2 COLUMBIA RIVER UPSTREAM	Enterococcus (ENTERO-HQ 1)	6/8/2020	6/19/2020	1145 11.7°C
L2457897-3 COLUMBIA RIVER DOWN STREAM	Enterococcus (ENTERO-HQ 1)	6/8/2020	6/19/2020	1200 11.8°C
L2457897-4 COLUMBIA RIVER SIDE CHANNEL	Enterococcus (ENTERO-HQ 1)	6/8/2020	6/19/2020	1130 12.3°C

Subcontract Info Contact:

John Forbes (403) 291-9897

Analysis and reporting info contact:

Patryk Wojciak, B.Sc., P.Chem.

2559 29 STREET NE

CALGARY, AB T1Y 7B5

Phone: (403) 291-9897

 2020/06/09  
 10:20  
 Drop off  
 5C  
 4x400ml bottles  
 NoS/NoB  
 Good Condition

Email: patryk.wojciak@alsglobal.com

Please email confirmation of receipt to:

patryk.wojciak@alsglobal.com

Shipped By: \_\_\_\_\_ Date Shipped: \_\_\_\_\_

Received By: \_\_\_\_\_ Date Received: \_\_\_\_\_

Verified By: \_\_\_\_\_ Date Verified: \_\_\_\_\_

Temperature: \_\_\_\_\_

Sample Integrity Issues: \_\_\_\_\_

**END OF REPORT**

---







KICKING HORSE MOUNTAIN UTILITY  
CORPORATION  
ATTN: TRAVIS JOBIN  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Date Received: 21-JUL-20  
Report Date: 27-JUL-20 15:43 (MT)  
Version: FINAL

Client Phone: 250-344-8442

## Certificate of Analysis

Lab Work Order #: L2477122

Project P.O. #: NOT SUBMITTED

Job Reference: RCR - KICKING HORSE MOUNTAIN RESORT

C of C Numbers:

Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.  
Account Manager

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ADDRESS: 2559 29 Street NE, Calgary, AB T1Y 7B5 Canada | Phone: +1 403 291 9897 | Fax: +1 403 291 0298  
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

# ALS ENVIRONMENTAL ANALYTICAL REPORT

[illegible]

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

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
FCC-MF-CL	Water	Fecal Coliform Count-MF	APHA 9222D
This analysis is carried out using procedures adapted from APHA Method 9222 "Membrane Filter Technique for Members of the Coliform Group". Coliform bacteria is enumerated by culturing and colony counting. A known sample volume is filtered through a 0.45 micron membrane filter. The test involves an initial 24 hour incubation at 44.5 degrees C of the filter with the appropriate growth medium. This method is specific for thermotolerant bacteria (Fecal) and is used for non-turbid water with a low background bacteria level.			
P-T-COL-CL	Water	Total P in Water by Colour	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.			
PO4-DO-COL-CL	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.			

\*\* 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
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, 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 ww - 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.

## Quality Control Report

Workorder: L2477122

Report Date: 27-JUL-20

Page 1 of 2

Client: KICKING HORSE MOUNTAIN UTILITY CORPORATION  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Contact: TRAVIS JOBIN

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>BOD-BC-CL Water</b>								
Batch	R5167695							
WG3371143-2	LCS							
Biochemical Oxygen Demand			90.5		%		85-115	22-JUL-20
WG3371143-1	MB							
Biochemical Oxygen Demand			<2.0		mg/L		2	22-JUL-20
<b>FCC-MF-CL Water</b>								
Batch	R5162048							
WG3368157-2	DUP	L2477122-1						
Coliform Bacteria - Fecal		<1	<1	RPD-NA	CFU/100mL	N/A	65	21-JUL-20
WG3368157-1	MB							
Coliform Bacteria - Fecal			<1		CFU/100mL		1	21-JUL-20
<b>P-T-COL-CL Water</b>								
Batch	R5165183							
WG3368949-18	LCS							
Phosphorus (P)-Total			104.4		%		80-120	23-JUL-20
WG3368949-17	MB							
Phosphorus (P)-Total			<0.0050		mg/L		0.005	23-JUL-20
<b>PO4-DO-COL-CL Water</b>								
Batch	R5160111							
WG3367235-6	LCS							
Orthophosphate-Dissolved (as P)			102.0		%		80-120	21-JUL-20
WG3367235-5	MB							
Orthophosphate-Dissolved (as P)			<0.0050		mg/L		0.005	21-JUL-20
<b>TSS-CL Water</b>								
Batch	R5167220							
WG3369494-2	LCS							
Total Suspended Solids			88.9		%		85-115	24-JUL-20
WG3369494-1	MB							
Total Suspended Solids			<3.0		mg/L		3	24-JUL-20

# Quality Control Report

Workorder: L2477122

Report Date: 27-JUL-20

Page 2 of 2

## Legend:

---

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

## Sample Parameter Qualifier Definitions:

---

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





KICKING HORSE MOUNTAIN UTILITY  
CORPORATION  
ATTN: MARK SKYRING  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Date Received: 25-AUG-20  
Report Date: 31-AUG-20 13:33 (MT)  
Version: FINAL

Client Phone: 250-344-8442

## Certificate of Analysis

Lab Work Order #: L2493419  
Project P.O. #: NOT SUBMITTED  
Job Reference: RCR-KICKING HORSE MOUNTAIN RESORT  
C of C Numbers:  
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.  
Account Manager

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ADDRESS: 2559 29 Street NE, Calgary, AB T1Y 7B5 Canada | Phone: +1 403 291 9897 | Fax: +1 403 291 0298  
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

# ALS ENVIRONMENTAL ANALYTICAL REPORT

[illegible]

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



## Reference Information

## Qualifiers for Individual Samples Listed:

Lab Sample ID	Client Sample ID	Qualifier	Description
L2493419-1	UV TROUGH	ISCR:ST	No amber routine bottle provided for Total Phosphorous - subsamples taken from Routine - Improper Sample Container Received: Subsamples Taken

## Sample Parameter Qualifier Key:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

## Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
FCC-MF-CL	Water	Fecal Coliform Count-MF	APHA 9222D
This analysis is carried out using procedures adapted from APHA Method 9222 "Membrane Filter Technique for Members of the Coliform Group". Coliform bacteria is enumerated by culturing and colony counting. A known sample volume is filtered through a 0.45 micron membrane filter. The test involves an initial 24 hour incubation at 44.5 degrees C of the filter with the appropriate growth medium. This method is specific for thermotolerant bacteria (Fecal) and is used for non-turbid water with a low background bacteria level.			
P-T-COL-CL	Water	Total P in Water by Colour	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.			
PO4-DO-COL-CL	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.			

\*\* 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
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, 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 ww - 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.

## Quality Control Report

Workorder: L2493419

Report Date: 31-AUG-20

Page 1 of 2

Client: KICKING HORSE MOUNTAIN UTILITY CORPORATION  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Contact: MARK SKYRING

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>BOD-BC-CL Water</b>								
Batch	R5205358							
WG3394966-2	LCS							
Biochemical Oxygen Demand			95.7		%		85-115	25-AUG-20
WG3394966-1	MB							
Biochemical Oxygen Demand			<2.0		mg/L		2	25-AUG-20
<b>FCC-MF-CL Water</b>								
Batch	R5202383							
WG3392287-2	DUP	L2493419-1						
Coliform Bacteria - Fecal		<1	<1	RPD-NA	CFU/100mL	N/A	65	25-AUG-20
WG3392287-1	MB							
Coliform Bacteria - Fecal			<1		CFU/100mL		1	25-AUG-20
<b>P-T-COL-CL Water</b>								
Batch	R5203597							
WG3393521-2	LCS							
Phosphorus (P)-Total			111.7		%		80-120	28-AUG-20
WG3393521-1	MB							
Phosphorus (P)-Total			<0.0050		mg/L		0.005	28-AUG-20
<b>PO4-DO-COL-CL Water</b>								
Batch	R5200140							
WG3390978-2	LCS							
Orthophosphate-Dissolved (as P)			98.5		%		80-120	25-AUG-20
WG3390978-1	MB							
Orthophosphate-Dissolved (as P)			<0.0050		mg/L		0.005	25-AUG-20
<b>TSS-CL Water</b>								
Batch	R5202830							
WG3392135-2	LCS							
Total Suspended Solids			93.9		%		85-115	26-AUG-20
WG3392135-1	MB							
Total Suspended Solids			<3.0		mg/L		3	26-AUG-20

# Quality Control Report

Workorder: L2493419

Report Date: 31-AUG-20

Page 2 of 2

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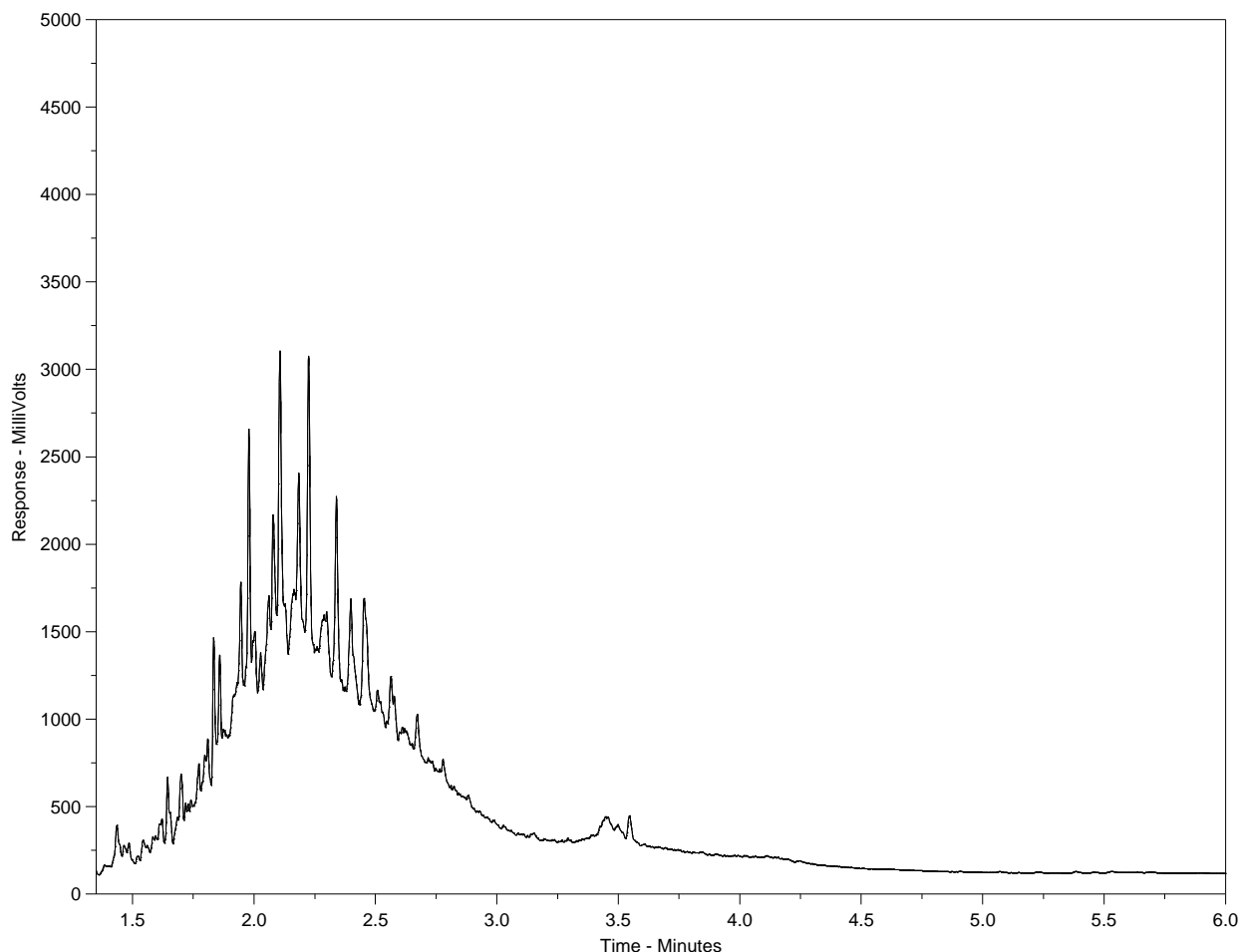
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide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

# Hydrocarbon Distribution Report



ALS Sample ID: L2493419-1  
 Client ID: UV TROUGH



F2		F3		F4		F4	
nC10	nC16			nC34			nC50
174°C	287°C			481°C			575°C
346°F	549°F			898°F			1067°F
Gasoline		Motor Oils/ Lube Oils/ Grease					
Diesel/ Jet Fuels							

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

**Note:**

This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

[illegible]



KICKING HORSE MOUNTAIN UTILITY  
CORPORATION  
ATTN: TRAVIS JOBIN  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Date Received: 01-OCT-20  
Report Date: 08-OCT-20 10:57 (MT)  
Version: FINAL

Client Phone: 250-344-8442

## Certificate of Analysis

Lab Work Order #: L2510634

Project P.O. #: NOT SUBMITTED

Job Reference: RCR - KICKING HORSE MOUNTAIN RESORT

C of C Numbers:

Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.  
Account Manager

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# ALS ENVIRONMENTAL ANALYTICAL REPORT

[illegible]

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

## Reference Information

### Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.			

\*\* 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
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, 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 ww - 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.*





## Quality Control Report

Workorder: L2510634

Report Date: 08-OCT-20

Page 1 of 2

Client: KICKING HORSE MOUNTAIN UTILITY CORPORATION

1500 Kicking Horse Trail

Golden BC V0A 1H0

Contact: TRAVIS JOBIN

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>BOD-BC-CL</b>		<b>Water</b>						
<b>Batch R5251086</b>								
<b>WG3420391-2 LCS</b>								
Biochemical Oxygen Demand			86.9		%		85-115	02-OCT-20
<b>WG3420391-1 MB</b>								
Biochemical Oxygen Demand			<2.0		mg/L		2	02-OCT-20
<b>TSS-CL</b>		<b>Water</b>						
<b>Batch R5247901</b>								
<b>WG3418760-2 LCS</b>								
Total Suspended Solids			100.9		%		85-115	05-OCT-20
<b>WG3418760-1 MB</b>								
Total Suspended Solids			<3.0		mg/L		3	05-OCT-20

# Quality Control Report

Workorder: L2510634

Report Date: 08-OCT-20

Page 2 of 2

## 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.



L2510634-COFC

## Chain of Custody / Analytical Request Form

**Canada Toll Free: 1 800 668 9878**

**www.alsglobal.com**

COC #

Page 1 of 1

<b>Report To</b>			<b>Report Format / Distribution</b>			<b>Service Requested</b> (Rush for routine analysis subject to availability)																						
Company: Kicking Horse Mountain Water Utility Co. Ltd.			<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)																						
Contact: Travis Jobin			<input type="checkbox"/> PDF <input type="checkbox"/> Excel <input type="checkbox"/> Digital <input checked="" type="checkbox"/> Fax			<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT																						
Address: 1500 Kicking Horse Trail			Email 1: tjobin@kickinghorseresort.com			<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT																						
			Email 2: pmajer@skircr.com			<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT																						
Phone: 250-344-6003 Fax:			Email 3: mskyring@kickinghorseresort.com																									
Invoice To Same as Report? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			<b>Client / Project Information</b>			<b>Analysis Request</b>																						
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			Job #: RCR - Kicking Horse Mountain Resort			Please indicate below Filtered, Preserved or both (F, P, F/P)																						
Company: Resorts of the Canadian Rockies			PO / AFE:																									
Contact: Patrick Majer			LSD:																									
Address: 1505 - 17th Ave SW Calgary AB																												
Phone: Fax:			Quote #: Q33059																									
Lab Work Order # (lab use only)			ALS Contact: LS		Sampler:																							
<b>Sample</b>			<b>Sample Identification</b> (This description will appear on the report)		<b>Date</b> (dd-mmm-yy)														<b>Time</b> (hh:mm)		<b>Sample Type</b>		BOD		TSS		Number of Containers	
#																												
			UV trough		30-Sep-20														9:30		Water		X X					
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.																												
SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)																					
Released by:		Date (dd-mmm-yy)	Time (hh-mm)	Received by:		Date:	Time:	Temperature:	Verified by:		Date:	Time:	Observations:															
Mark Skyring		30-Sep-19				10/11	0827	5 °C					Yes / No ? If Yes add SIF															

GENF 20.00 Front



KICKING HORSE MOUNTAIN UTILITY  
CORPORATION  
ATTN: TRAVIS JOBIN  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Date Received: 16-OCT-20  
Report Date: 24-OCT-20 16:58 (MT)  
Version: FINAL

Client Phone: 250-344-8442

## Certificate of Analysis

Lab Work Order #: L2517409

Project P.O. #: NOT SUBMITTED

Job Reference: WEEK 1 - 2020 FALL EMS PROGRAM - WW

C of C Numbers:

Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.  
Account Manager

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# ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2517409-1	WWTP EFFLUENT - UV TROUGH Sampled By: TJ/JD on 14-OCT-20 @ 08:30 Matrix: WATER							
<b>Miscellaneous Parameters</b>								
Ammonia, Total (as N)		<0.050		0.050	mg/L		23-OCT-20	R5267576
Biochemical Oxygen Demand		10.5	BODP	2.0	mg/L		16-OCT-20	R5262540
Orthophosphate-Dissolved (as P)		0.378	DLHC	0.025	mg/L		16-OCT-20	R5255349
Enterococcus		See Attached					16-OCT-20	R5267799
Coliform Bacteria - Fecal		<1		1	CFU/100mL		16-OCT-20	R5256395
MPN - E. coli		<1		1	MPN/100mL		16-OCT-20	R5256388
Phosphorus (P)-Total		0.494	DLHC	0.050	mg/L		23-OCT-20	R5267380
Total Suspended Solids		<3.0		3.0	mg/L		19-OCT-20	R5258939
<b>NO2, NO3 and Sum of NO2/NO3</b>								
<b>Nitrate in Water by IC</b>								
Nitrate (as N)		17.4		0.020	mg/L		16-OCT-20	R5256358
<b>Nitrate+Nitrite</b>								
Nitrate and Nitrite (as N)		17.5		0.022	mg/L		17-OCT-20	
<b>Nitrite in Water by IC</b>								
Nitrite (as N)		0.018		0.010	mg/L		16-OCT-20	R5256358
L2517409-2	COLUMBIA RIVER UPSTREAM Sampled By: TJ/JD on 14-OCT-20 @ 09:30 Matrix: WATER							
<b>Miscellaneous Parameters</b>								
Ammonia, Total (as N)		<0.050		0.050	mg/L		23-OCT-20	R5267576
Orthophosphate-Dissolved (as P)		<0.0050		0.0050	mg/L		16-OCT-20	R5255349
Enterococcus		See Attached					16-OCT-20	R5267799
Coliform Bacteria - Fecal		24		1	CFU/100mL		16-OCT-20	R5256395
MPN - E. coli		20	OCR	1	MPN/100mL		16-OCT-20	R5256388
Phosphorus (P)-Total		0.024	DLM	0.010	mg/L		23-OCT-20	R5267380
Total Suspended Solids		19.9		3.0	mg/L		19-OCT-20	R5258939
<b>NO2, NO3 and Sum of NO2/NO3</b>								
<b>Nitrate in Water by IC</b>								
Nitrate (as N)		0.061		0.020	mg/L		16-OCT-20	R5256358
<b>Nitrate+Nitrite</b>								
Nitrate and Nitrite (as N)		0.061		0.022	mg/L		17-OCT-20	
<b>Nitrite in Water by IC</b>								
Nitrite (as N)		<0.010		0.010	mg/L		16-OCT-20	R5256358
L2517409-3	COLUMBIA RIVER DOWN STREAM Sampled By: TJ/JD on 14-OCT-20 @ 09:30 Matrix: WATER							
<b>Miscellaneous Parameters</b>								
Ammonia, Total (as N)		<0.050		0.050	mg/L		23-OCT-20	R5267576
Orthophosphate-Dissolved (as P)		<0.0050		0.0050	mg/L		16-OCT-20	R5255349
Enterococcus		See Attached					16-OCT-20	R5267799
Coliform Bacteria - Fecal		20		1	CFU/100mL		16-OCT-20	R5256395
MPN - E. coli		15	OCR	1	MPN/100mL		16-OCT-20	R5256388
Phosphorus (P)-Total		0.0087		0.0050	mg/L		23-OCT-20	R5267380
Total Suspended Solids		8.3		3.0	mg/L		19-OCT-20	R5258939
<b>NO2, NO3 and Sum of NO2/NO3</b>								
<b>Nitrate in Water by IC</b>								
Nitrate (as N)		0.075		0.020	mg/L		16-OCT-20	R5256358
<b>Nitrate+Nitrite</b>								
Nitrate and Nitrite (as N)		0.075		0.022	mg/L		17-OCT-20	

\* 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
L2517409-3 COLUMBIA RIVER DOWN STREAM Sampled By: TJ/JD on 14-OCT-20 @ 09:30 Matrix: WATER Nitrite in Water by IC Nitrite (as N)	<0.010		0.010	mg/L		16-OCT-20	R5256358
L2517409-4 COLUMBIA RIVER SIDE CHANNEL Sampled By: TJ/JD on 14-OCT-20 @ 09:30 Matrix: WATER Miscellaneous Parameters Ammonia, Total (as N) Orthophosphate-Dissolved (as P) Enterococcus Coliform Bacteria - Fecal MPN - E. coli Phosphorus (P)-Total Total Suspended Solids NO2, NO3 and Sum of NO2/NO3 Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite (as N) Nitrite in Water by IC Nitrite (as N)	<0.050 0.098 See Attached 30 16 0.186 20.9	DLHC   OCR DLHC	0.050 0.010  1 1 0.010 3.0	mg/L mg/L  CFU/100mL MPN/100mL mg/L mg/L		23-OCT-20 16-OCT-20 16-OCT-20 16-OCT-20 16-OCT-20 23-OCT-20 19-OCT-20  16-OCT-20 17-OCT-20 16-OCT-20	R5267576 R5255349 R5267799 R5256395 R5256388 R5267380 R5258939  R5256358  R5256358

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

## Reference Information

### Qualifiers for Sample Submission Listed:

Qualifier	Description
EHR	Bacteria hold time exceeded upon arrival - Exceeded Recommended Holding Time prior to receipt at the lab.

### Sample Parameter Qualifier Key:

Qualifier	Description
BODP	BOD dilution results differed by more than 30% RPD. Precision of reported BOD result may be less than usual.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
OCR	Parameter is out of client specific range.

### Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
EC-MPN-CL	Water	MPN - E. coli	APHA 9223B
This analysis is carried out using procedures adapted from APHA Method 9223 "Enzyme Substrate Coliform Test". E. coli and Total Coliform are determined simultaneously. The sample is mixed with a mixture hydrolyzable substrates and then sealed in a multi-well packet. The packet is incubated for 18 or 24 hours and then the number of wells exhibiting a positive response are counted. The final result is obtained by comparing the positive responses to a probability table. Recommended Holding Time: Sample: 1 day Reference: APHA			
FCC-MF-CL	Water	Fecal Coliform Count-MF	APHA 9222D
This analysis is carried out using procedures adapted from APHA Method 9222 "Membrane Filter Technique for Members of the Coliform Group". Coliform bacteria is enumerated by culturing and colony counting. A known sample volume is filtered through a 0.45 micron membrane filter. The test involves an initial 24 hour incubation at 44.5 degrees C of the filter with the appropriate growth medium. This method is specific for thermotolerant bacteria (Fecal) and is used for non-turbid water with a low background bacteria level.			
N2N3-CALC-CL	Water	Nitrate+Nitrite	CALCULATION
NH3-F-CL	Water	Ammonia by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Weston et al.			
NO2-IC-N-CL	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-CL	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-COL-CL	Water	Total P in Water by Colour	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.			
PO4-DO-COL-CL	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.			

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

## Reference Information

### Test Method References:

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

*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
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, 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 ww - 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.*





## Quality Control Report

Workorder: L2517409

Report Date: 24-OCT-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>NO3-IC-N-CL</b>	<b>Water</b>							
Batch	R5256358							
<b>WG3426684-2 LCS</b>								
Nitrate (as N)			94.2		%		90-110	16-OCT-20
<b>WG3426684-1 MB</b>								
Nitrate (as N)			<0.020		mg/L		0.02	16-OCT-20
<b>P-T-COL-CL</b>	<b>Water</b>							
Batch	R5267380							
<b>WG3430881-3 DUP</b>		<b>L2517409-4</b>						
Phosphorus (P)-Total		0.186	0.169		mg/L	9.3	20	23-OCT-20
<b>WG3430881-2 LCS</b>								
Phosphorus (P)-Total			102.8		%		80-120	23-OCT-20
<b>WG3430881-1 MB</b>								
Phosphorus (P)-Total			<0.0050		mg/L		0.005	23-OCT-20
<b>WG3430881-4 MS</b>		<b>L2517409-4</b>						
Phosphorus (P)-Total			N/A	MS-B	%		-	23-OCT-20
<b>PO4-DO-COL-CL</b>	<b>Water</b>							
Batch	R5255349							
<b>WG3425203-18 LCS</b>								
Orthophosphate-Dissolved (as P)			110.0		%		80-120	15-OCT-20
<b>WG3425203-17 MB</b>								
Orthophosphate-Dissolved (as P)			<0.0050		mg/L		0.005	15-OCT-20
<b>TSS-CL</b>	<b>Water</b>							
Batch	R5258939							
<b>WG3426803-11 LCS</b>								
Total Suspended Solids			106.6		%		85-115	19-OCT-20
<b>WG3426803-10 MB</b>								
Total Suspended Solids			<3.0		mg/L		3	19-OCT-20

# Quality Control Report

Workorder: L2517409

Report Date: 24-OCT-20

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## Legend:

---

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

## Sample Parameter Qualifier Definitions:

---

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

---

# Quality Control Report

Workorder: L2517409

Report Date: 24-OCT-20

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## Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
<b>Bacteriological Tests</b>							
Fecal Coliform Count-MF	1	14-OCT-20 08:30	16-OCT-20 11:00	30	50	hours	EHTR
	2	14-OCT-20 09:30	16-OCT-20 11:00	30	49	hours	EHTR
	3	14-OCT-20 09:30	16-OCT-20 11:00	30	49	hours	EHTR
	4	14-OCT-20 09:30	16-OCT-20 11:00	30	49	hours	EHTR
MPN - E. coli	1	14-OCT-20 08:30	16-OCT-20 09:30	30	49	hours	EHTR
	2	14-OCT-20 09:30	16-OCT-20 09:30	30	48	hours	EHTR
	3	14-OCT-20 09:30	16-OCT-20 09:30	30	48	hours	EHTR
	4	14-OCT-20 09:30	16-OCT-20 09:30	30	48	hours	EHTR

## 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 L2517409 were received on 16-OCT-20 08:15.

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.



## Microbial Test Results

Samples collected October 14, 2020

Final Report

October 23, 2020

Submitted to: **ALS Environmental**  
Calgary, AB

## SAMPLE INFORMATION

Sample ID/ Internal ID	Dates		<i>Enterococcus</i> test initiation	Receipt temperature
	Collected	Received		
L2517409-1 WWTP EFFLUENT – UV TROUGH / 2021-0331-01	14-Oct-20 at 0830h	16-Oct-20 at 1130h	16-Oct-20 at 1245h	6.6°C
L2517409-2 COLUMBIA RIVER UPSTREAM / 2021-0331-02	14-Oct-20 at 0930h	16-Oct-20 at 1130h	16-Oct-20 at 1245h	7.0°C
L2517409-3 COLUMBIA RIVER DOWNSTREAM / 2021-0331-03	14-Oct-20 at 0930h	16-Oct-20 at 1130h	16-Oct-20 at 1245h	7.5°C
L2517409-4 COLUMBIA RIVER SIDE CHANNEL / 2021-0331-04	14-Oct-20 at 0930h	16-Oct-20 at 1130h	16-Oct-20 at 1245h	7.6°C

## TEST TYPES

- *Enterococcus* enumeration test

## RESULTS

### Microbial test results

Sample ID	MPN/100 mL <i>Enterococcus</i>
L2517409-1 WWTP EFFLUENT – UV TROUGH	<1
L2517409-2 COLUMBIA RIVER UPSTREAM	13.4
L2517409-3 COLUMBIA RIVER DOWNSTREAM	8.4
L2517409-4 COLUMBIA RIVER SIDE CHANNEL	19.7

MPN = Most Probable Number

---

**QA/QC**

<b>QA/QC summary</b>	<b><i>Enterococcus</i></b>
Protocol deviations	See Below
Control performance	Acceptable
Test performance	Valid

The samples were received and set outside of the required 24-hour hold time at the client's request.



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Report By:  
Sara Thiessen, BSc  
Senior Biologist



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Reviewed By:  
Leila Oosterbroek, BSc  
Environmental Scientist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

Enterolert Test Kit Literature, IDEXX Laboratories Ltd., One IDEXX Drive, Westbrook, ME, 04092  
USA

MPN Tables for IDEXX Quanti-Tray 2000 (<http://www.idexx.com/water>)

## **APPENDIX A – Test data**

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## Quanti-Tray Bench Sheet - *Enterococcus*

 Client ALS106 Reference 2021-0331
**Test Initiation**

 Date: 2020110116  
 Time: 1245  
 Technician: ST
**Sample Information**

 Dilution Factor: NA

 Reagent used: Enterolert™  
 Reagent Lot#/Expiry: CS336102MAY2021
**Comments:**

 Thermometer Serial #: 192702205  
 Incubator #: 7  
 Incubator Temperature: 41 (must be 41 ± 0.5°C)

 Quanti Tray 2000 Lot#/Expiry: DS01810411712023
**Results - 24 Hour Incubation**

 Date: 2020110117 Time: 1240 Technician: ST

Incubator Temp: <u>41</u> (must be 41 ± 0.5°C)	Enterococci (Fluorescent)									
	CTL	<u>0331-01</u>	<u>0331-02</u>	<u>0331-03</u>	<u>0331-04</u>					
# Positive Large Wells:	0	0	11	6	14					
# Ambiguous Large Wells:	0	0	0	0	0					
# Positive Small Wells (Tray 2000 only):	0	0	1	7	3					
# Ambiguous Small Wells (Tray 2000 only):	0	0	0	0	0					
Most Probable Number at 24 hours:	41	41	13.4	8.4	19.7					

**Results - 28 Hour Incubation**

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Technician: \_\_\_\_\_

Incubator Temp: _____ (must be 41 ± 0.5°C)	Enterococci (Fluorescent)									
	CTL									
# Confirmed Positive Large Wells:										
# Confirmed Positive Small Wells (Tray 2000 only):										
Most Probable Number at 28 hours:										

Confirmed positive wells includes the positive wells from 24 hours plus the ambiguous wells that became positive at 28 hours  
 At 28 hours only score marked ambiguous from 24 hours

## **APPENDIX B – Chain-of-custody form**

---

**Subcontract Request Form**
**Subcontract To:**
**NAUTILUS ENVIRONMENTAL COMPANY INC. - CALGARY, AB, CANADA**

 #4, 6125-12 STREET SE  
 CALGARY, AB T2H 2K1

**NOTES:** Please reference on final report and invoice: PO# L2517409  
 ALS requires QC data to be provided with your final results.

*Hold time past, Please Proceed*

 Please see enclosed **4** sample(s) in **4** Container(s)

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED	Priority	
			DUE DATE	Flag
L2517409-1 WWTP EFFLUENT - UV TROUGH	Enterococcus (ENTERO-HQ 1)	6.6°C 10/14/2020	830 10/23/2020	-01
L2517409-2 COLUMBIA RIVER UPSTREAM	Enterococcus (ENTERO-HQ 1)	7.0°C 10/14/2020	930 10/23/2020	-02
L2517409-3 COLUMBIA RIVER DOWN STREAM	Enterococcus (ENTERO-HQ 1)	7.5°C 10/14/2020	930 10/23/2020	-03
L2517409-4 COLUMBIA RIVER SIDE CHANNEL	Enterococcus (ENTERO-HQ 1)	7.6°C 10/14/2020	930 10/23/2020	-04

Subcontract Info Contact:

John Forbes (403) 291-9897

Analysis and reporting info contact:

 Patryk Wojciak, B.Sc., P.Chem.  
 2559 29 STREET NE  
 CALGARY, AB T1Y 7B5  
 Phone: (403) 291-9897

 2021-0331  
 2020/10/16 11:30  
 Good Condition  
 4 x 400mL bottles  
 NoS/NoS  
 Email: patryk.wojciak@alsglobal.com

Please email confirmation of receipt to:

patryk.wojciak@alsglobal.com

Shipped By: \_\_\_\_\_ Date Shipped: \_\_\_\_\_

Received By: \_\_\_\_\_ Date Received: \_\_\_\_\_

Verified By: \_\_\_\_\_ Date Verified: \_\_\_\_\_

Temperature: \_\_\_\_\_

Sample Integrity Issues: \_\_\_\_\_

**END OF REPORT**

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KICKING HORSE MOUNTAIN UTILITY  
CORPORATION  
ATTN: TRAVIS JOBIN  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Date Received: 21-OCT-20  
Report Date: 30-OCT-20 08:15 (MT)  
Version: FINAL

Client Phone: 250-344-8442

## Certificate of Analysis

Lab Work Order #: L2519399

Project P.O. #: NOT SUBMITTED

Job Reference: WEEK 2 - 2020 FALL EMS PROGRAM - WW

C of C Numbers:

Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.  
Account Manager

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

ADDRESS: 2559 29 Street NE, Calgary, AB T1Y 7B5 Canada | Phone: +1 403 291 9897 | Fax: +1 403 291 0298  
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2519399-1	WWTP EFFLUENT - UV TROUGH							
Sampled By:	TJ/JD on 20-OCT-20 @ 09:49							
Matrix:	WATER							
<b>Miscellaneous Parameters</b>								
Ammonia, Total (as N)		<0.050		0.050	mg/L		29-OCT-20	R5271409
Biochemical Oxygen Demand		<2.0		2.0	mg/L		22-OCT-20	R5269693
Orthophosphate-Dissolved (as P)		0.320	DLHC	0.025	mg/L		21-OCT-20	R5262876
Enterococcus		See Attached					21-OCT-20	R5270098
Coliform Bacteria - Fecal		<1		1	CFU/100mL		21-OCT-20	R5264877
MPN - E. coli		<1		1	MPN/100mL		21-OCT-20	R5264837
Phosphorus (P)-Total		0.466	DLHC	0.025	mg/L		26-OCT-20	R5268849
Total Suspended Solids		<3.0		3.0	mg/L		25-OCT-20	R5268577
<b>NO2, NO3 and Sum of NO2/NO3</b>								
<b>Nitrate in Water by IC</b>								
Nitrate (as N)		22.0		0.020	mg/L		21-OCT-20	R5266398
<b>Nitrate+Nitrite</b>								
Nitrate and Nitrite (as N)		22.1		0.022	mg/L		23-OCT-20	
<b>Nitrite in Water by IC</b>								
Nitrite (as N)		0.033		0.010	mg/L		21-OCT-20	R5266398
L2519399-2	COLUMBIA RIVER UPSTREAM							
Sampled By:	TJ/JD on 20-OCT-20 @ 09:30							
Matrix:	WATER							
<b>Miscellaneous Parameters</b>								
Ammonia, Total (as N)		<0.050		0.050	mg/L		29-OCT-20	R5271409
Orthophosphate-Dissolved (as P)		<0.0050		0.0050	mg/L		21-OCT-20	R5262876
Enterococcus		See Attached					21-OCT-20	R5270098
Coliform Bacteria - Fecal		2		1	CFU/100mL		21-OCT-20	R5264877
MPN - E. coli		2	OCR	1	MPN/100mL		21-OCT-20	R5264837
Phosphorus (P)-Total		0.0051		0.0050	mg/L		26-OCT-20	R5268849
Total Suspended Solids		<3.0		3.0	mg/L		25-OCT-20	R5268577
<b>NO2, NO3 and Sum of NO2/NO3</b>								
<b>Nitrate in Water by IC</b>								
Nitrate (as N)		0.090		0.020	mg/L		21-OCT-20	R5266398
<b>Nitrate+Nitrite</b>								
Nitrate and Nitrite (as N)		0.090		0.022	mg/L		23-OCT-20	
<b>Nitrite in Water by IC</b>								
Nitrite (as N)		<0.010		0.010	mg/L		21-OCT-20	R5266398
L2519399-3	COLUMBIA RIVER DOWNSTREAM							
Sampled By:	TJ/JD on 20-OCT-20 @ 09:45							
Matrix:	WATER							
<b>Miscellaneous Parameters</b>								
Ammonia, Total (as N)		<0.050		0.050	mg/L		29-OCT-20	R5271409
Orthophosphate-Dissolved (as P)		0.0054		0.0050	mg/L		21-OCT-20	R5262876
Enterococcus		See Attached					21-OCT-20	R5270098
Coliform Bacteria - Fecal		6		1	CFU/100mL		21-OCT-20	R5264877
MPN - E. coli		5	OCR	1	MPN/100mL		21-OCT-20	R5264837
Phosphorus (P)-Total		0.179	DLHC	0.010	mg/L		26-OCT-20	R5268849
Total Suspended Solids		18.2		3.0	mg/L		25-OCT-20	R5268577
<b>NO2, NO3 and Sum of NO2/NO3</b>								
<b>Nitrate in Water by IC</b>								
Nitrate (as N)		0.098		0.020	mg/L		21-OCT-20	R5266398
<b>Nitrate+Nitrite</b>								
Nitrate and Nitrite (as N)		0.098		0.022	mg/L		23-OCT-20	

\* 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
L2519399-3 COLUMBIA RIVER DOWNSTREAM Sampled By: TJ/JD on 20-OCT-20 @ 09:45 Matrix: WATER Nitrite in Water by IC Nitrite (as N)	<0.010		0.010	mg/L		21-OCT-20	R5266398
L2519399-4 COLUMBIA RIVER SIDE CHANNEL Sampled By: TJ/JD on 20-OCT-20 @ 09:15 Matrix: WATER Miscellaneous Parameters Ammonia, Total (as N) Orthophosphate-Dissolved (as P) Enterococcus Coliform Bacteria - Fecal MPN - E. coli Phosphorus (P)-Total Total Suspended Solids NO2, NO3 and Sum of NO2/NO3 Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite (as N) Nitrite in Water by IC Nitrite (as N)	<0.050 <0.0050 See Attached 28 22 0.0113 6.8	OCR	0.050 0.0050  1 1 0.0050 3.0	mg/L mg/L  CFU/100mL MPN/100mL mg/L mg/L		29-OCT-20 21-OCT-20 21-OCT-20 21-OCT-20 21-OCT-20 26-OCT-20 25-OCT-20  21-OCT-20 23-OCT-20 21-OCT-20	R5271409 R5262876 R5270098 R5264877 R5264837 R5268849 R5268577  R5266398  R5266398

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



## Reference Information

## Sample Parameter Qualifier Key:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
OCR	Parameter is out of client specific range.

## Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
EC-MPN-CL	Water	MPN - E. coli	APHA 9223B
This analysis is carried out using procedures adapted from APHA Method 9223 "Enzyme Substrate Coliform Test". E. coli and Total Coliform are determined simultaneously. The sample is mixed with a mixture hydrolyzable substrates and then sealed in a multi-well packet. The packet is incubated for 18 or 24 hours and then the number of wells exhibiting a positive response are counted. The final result is obtained by comparing the positive responses to a probability table. Recommended Holding Time: Sample: 1 day Reference: APHA			
FCC-MF-CL	Water	Fecal Coliform Count-MF	APHA 9222D
This analysis is carried out using procedures adapted from APHA Method 9222 "Membrane Filter Technique for Members of the Coliform Group". Coliform bacteria is enumerated by culturing and colony counting. A known sample volume is filtered through a 0.45 micron membrane filter. The test involves an initial 24 hour incubation at 44.5 degrees C of the filter with the appropriate growth medium. This method is specific for thermotolerant bacteria (Fecal) and is used for non-turbid water with a low background bacteria level.			
N2N3-CALC-CL	Water	Nitrate+Nitrite	CALCULATION
NH3-F-CL	Water	Ammonia by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.			
NO2-IC-N-CL	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-CL	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-COL-CL	Water	Total P in Water by Colour	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.			
PO4-DO-COL-CL	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.			

\*\* 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
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, 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 ww - 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.*

## Quality Control Report

Workorder: L2519399

Report Date: 30-OCT-20

Page 1 of 3

Client: KICKING HORSE MOUNTAIN UTILITY CORPORATION  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Contact: TRAVIS JOBIN

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>BOD-BC-CL</b>	<b>Water</b>							
Batch	R5269693							
<b>WG3433386-2 LCS</b>								
Biochemical Oxygen Demand			96.4		%		85-115	22-OCT-20
<b>WG3433386-1 MB</b>								
Biochemical Oxygen Demand			<2.0		mg/L		2	22-OCT-20
<b>EC-MPN-CL</b>	<b>Water</b>							
Batch	R5264837							
<b>WG3430319-1 MB</b>								
MPN - E. coli			<1		MPN/100mL		1	21-OCT-20
<b>FCC-MF-CL</b>	<b>Water</b>							
Batch	R5264877							
<b>WG3430333-1 MB</b>								
Coliform Bacteria - Fecal			<1		CFU/100mL		1	21-OCT-20
<b>NH3-F-CL</b>	<b>Water</b>							
Batch	R5271409							
<b>WG3435133-19 DUP</b>		<b>L2519399-4</b>						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	29-OCT-20
<b>WG3435133-18 LCS</b>								
Ammonia, Total (as N)			114.2		%		85-115	29-OCT-20
<b>WG3435133-17 MB</b>								
Ammonia, Total (as N)			<0.050		mg/L		0.05	29-OCT-20
<b>WG3435133-20 MS</b>		<b>L2519399-4</b>						
Ammonia, Total (as N)			108.7		%		75-125	29-OCT-20
<b>NO2-IC-N-CL</b>	<b>Water</b>							
Batch	R5266398							
<b>WG3430815-6 LCS</b>								
Nitrite (as N)			105.7		%		90-110	21-OCT-20
<b>WG3430815-5 MB</b>								
Nitrite (as N)			<0.010		mg/L		0.01	21-OCT-20
<b>NO3-IC-N-CL</b>	<b>Water</b>							
Batch	R5266398							
<b>WG3430815-6 LCS</b>								
Nitrate (as N)			101.8		%		90-110	21-OCT-20
<b>WG3430815-5 MB</b>								
Nitrate (as N)			<0.020		mg/L		0.02	21-OCT-20
<b>P-T-COL-CL</b>	<b>Water</b>							

## Quality Control Report

Workorder: L2519399

Report Date: 30-OCT-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>P-T-COL-CL</b>	<b>Water</b>							
Batch	R5268849							
<b>WG3432310-6 LCS</b>								
Phosphorus (P)-Total			97.6		%		80-120	26-OCT-20
<b>WG3432310-5 MB</b>								
Phosphorus (P)-Total			<0.0050		mg/L		0.005	26-OCT-20
<b>PO4-DO-COL-CL</b>	<b>Water</b>							
Batch	R5262876							
<b>WG3429535-6 LCS</b>								
Orthophosphate-Dissolved (as P)			102.0		%		80-120	21-OCT-20
<b>WG3429535-1 MB</b>								
Orthophosphate-Dissolved (as P)			<0.0050		mg/L		0.005	21-OCT-20
<b>WG3429535-8 MS</b>		<b>L2519399-1</b>						
Orthophosphate-Dissolved (as P)			N/A	MS-B	%		-	21-OCT-20
<b>TSS-CL</b>	<b>Water</b>							
Batch	R5268577							
<b>WG3431602-2 LCS</b>								
Total Suspended Solids			100.0		%		85-115	25-OCT-20
<b>WG3431602-1 MB</b>								
Total Suspended Solids			<3.0		mg/L		3	25-OCT-20

# Quality Control Report

Workorder: L2519399

Report Date: 30-OCT-20

Page 3 of 3

## Legend:

---

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

## Sample Parameter Qualifier Definitions:

---

Qualifier	Description
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.

---

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.



## Microbial Test Results

Samples collected October 20, 2020

Final Report

October 28, 2020

Submitted to: **ALS Environmental**  
Calgary, AB

## SAMPLE INFORMATION

Sample ID/ Internal ID	Dates		<i>Enterococcus</i> test initiation	Receipt temperature
	Collected	Received		
L2519399-1 WWTP EFFLUENT - UV TROUGH/ 2021-0357-01	10-Oct-20 at 0949h	21-Oct-20 at 0950h	21-Oct-20 at 1000h	3.4°C
L2519399-2 COLUMBIA RIVER UPSTREAM/ 2021-0357-02	10-Oct-20 at 0930h	21-Oct-20 at 0950h	21-Oct-20 at 1000h	3.3°C
L2519399-3 COLUMBIA RIVER DOWNSTREAM/ 2021-0357-03	10-Oct-20 at 0945h	21-Oct-20 at 0950h	21-Oct-20 at 1000h	3.6°C
L2519399-4 COLUMBIA RIVER SIDE CHANNEL/ 2021-0357-04	10-Oct-20 at 0915h	21-Oct-20 at 0950h	21-Oct-20 at 1000h	3.7°C

## TEST TYPES

- *Enterococcus* enumeration test

## RESULTS

### Microbial test results

Sample ID	MPN/100 mL <i>Enterococcus</i>
L2519399-1 WWTP EFFLUENT - UV TROUGH	<1
L2519399-2 COLUMBIA RIVER UPSTREAM	2
L2519399-3 COLUMBIA RIVER DOWNSTREAM	<1
L2519399-4 COLUMBIA RIVER SIDE CHANNEL	1

MPN = Most Probable Number

## QA/QC

QA/QC summary	<i>Enterococcus</i>
Protocol deviations	See Below
Control performance	Acceptable
Test performance	Valid

The samples were received and testing initiated outside the required 24-hour hold time at the client's request.



---

Report By:  
Lindsay Clothier, MSc  
Environmental Scientist



---

Reviewed By:  
Leila Oosterbroek, BSc  
Environmental Scientist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

## REFERENCES

Enterolert Test Kit Literature, IDEXX Laboratories Ltd., One IDEXX Drive, Westbrook, ME, 04092 USA



## **APPENDIX A – Test data**

---

# Quanti-Tray Bench Sheet - *Enterococcus*

 Client ALSI06 Reference 2021-0357-01  
-02  
-03  
-04
**Test Initiation**

 Date: 2021/10/21  
 Time: 1000  
 Technician: SC

 Reagent used: Enterolert™  
 Reagent Lot#/Expiry: 05836 2021/05/02
**Sample Information**

 Dilution Factor: N/A
**Comments:**

 Thermometer Serial #: 192702205  
 Incubator #: 7  
 Incubator Temperature: 41 (must be 41 ± 0.5°C)

 Quanti Tray 2000 Lot#/Expiry: 05018 2023/04/17
**Results - 24 Hour Incubation**

 Date: 2020/10/22 Time: 1000 Technician: LC

Incubator Temp: <u>41</u> (must be 41 ± 0.5°C)	Enterococci (Fluorescent)									
	CTL	-01	-02	-03	-04					
# Positive Large Wells:	0	20	02	0	1					
# Ambiguous Large Wells:	0	0	0	0	0					
# Positive Small Wells (Tray 2000 only):	0	0	0	0	0					
# Ambiguous Small Wells (Tray 2000 only):	0	0	0	0	0					
Most Probable Number at 24 hours:	<1	<1	2.0	<1	1.0					

**Results - 28 Hour Incubation**

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Technician: \_\_\_\_\_

Incubator Temp: _____ (must be 41 ± 0.5°C)	Enterococci (Fluorescent)									
	CTL									
# Confirmed Positive Large Wells:										
# Confirmed Positive Small Wells (Tray 2000 only):										
Most Probable Number at 28 hours:										

Confirmed positive wells includes the positive wells from 24 hours plus the ambiguous wells that became positive at 28 hours

At 28 hours only score marked ambiguous from 24 hours

## **APPENDIX B – Chain-of-custody form**

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**Subcontract Request Form**
**Subcontract To:**
**NAUTILUS ENVIRONMENTAL COMPANY INC. - CALGARY, AB, CANADA**

 #4, 6125-12 STREET SE  
 CALGARY, AB T2H 2K1

**NOTES:** Please reference on final report and invoice: PO# L2519399  
 ALS requires QC data to be provided with your final results.

*Please Proceed if Past Hold time*

 Please see enclosed 4 sample(s) in 4 Container(s)

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED	Priority Flag
		DUE DATE	
<b>L2519399-1 WWTP EFFLUENT - UV TROUGH</b>	Enterococcus (ENTERO-HQ 1)	10/20/2020	949
	3.4°C	11/2/2020	
<b>L2519399-2 COLUMBIA RIVER UPSTREAM</b>	Enterococcus (ENTERO-HQ 1)	10/20/2020	930
	3.3°C	11/2/2020	
<b>L2519399-3 COLUMBIA RIVER DOWNSTREAM</b>	Enterococcus (ENTERO-HQ 1)	10/20/2020	945
	3.6°C	11/2/2020	
<b>L2519399-4 COLUMBIA RIVER SIDE CHANNEL</b>	Enterococcus (ENTERO-HQ 1)	10/20/2020	915
	3.7°C	11/2/2020	

 Subcontract Info Contact: John Forbes (403) 291-9897  
 Analysis and reporting info contact: Patryk Wojciak, B.Sc., P.Chem.  
 2559 29 STREET NE  
 CALGARY, AB T1Y 7B5  
 Phone: (403) 291-9897

 2020/10/21 Good Condition  
 09:50  
 Drop off  
 SC  
 4x400mL bottle  
 NaS/NaB  
 Email: patryk.wojciak@alsglobal.com

 Please email confirmation of receipt to: **patryk.wojciak@alsglobal.com**

Shipped By: \_\_\_\_\_ Date Shipped: \_\_\_\_\_

Received By: \_\_\_\_\_ Date Received: \_\_\_\_\_

Verified By: \_\_\_\_\_ Date Verified: \_\_\_\_\_

Temperature: \_\_\_\_\_

Sample Integrity Issues: \_\_\_\_\_

**END OF REPORT**

---



L2519399-COFC



## Chain of Custody / Analytical Request Form

**Canada Toll Free: 1 800 668 9878**

[www.alsglobal.com](http://www.alsglobal.com)

COC #

Page 1 of 1

Report To						Report Format / Distribution								Service Requested (Rush for routine analysis subject to availability)											
Company: Kicking Horse Mountain Resort Utility Corporation						<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other <input type="checkbox"/> PDF <input type="checkbox"/> Excel <input type="checkbox"/> Digital <input checked="" type="checkbox"/> Fax								<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: Travis Jobin						Email 1: tjobin@kickinghorseresort.com																			
Address: 1500 Kicking Horse Trail						Email 2: pmajer@skircr.com																			
Phone: 250-344-8442      Fax:						Email 3: mskyring@kickinghorseresort.com																			
Invoice To Same as Report? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No						Client / Project Information								Please indicate below Filtered, Preserved or both (F, P, F/P)											
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No						Job #: Week 2 - 2020 Fall EMS program - WW																			
Company: Resorts of the Canadian Rockies						PO / AFE:																			
Contact: Patrick Majer						LSD:																			
Address: 1505 - 17th Ave SW Calgary AB																									
Phone:                          Fax:						Quote #:																			
Lab Work Order # (lab use only) L2519399						ALS Contact: PW				Sampler: TJ/JD															
Sample #		Sample Identification (This description will appear on the report)				Date (dd-mm-yy)		Time (hh:mm)		Sample Type		BOD5	TSS	N-NH4	N-NO3	N-NO2	Total P	Ortho P	Fecal Coliform	Enterococci	E. Coli				Number of Containers
		WWTP Effluent - UV trough    Temp:    pH:				20-Oct-20		2:09AM		Water		X	X	X	X	X	X	X	X	X	X				5
		Columbia River Upstream    Temp:    pH:				20-Oct-20		930		Water			X	X	X	X	X	X	X	X	X				4
		Columbia River Down stream    Temp:    pH:				20-Oct-20		945		Water			X	X	X	X	X	X	X	X	X				4
		Columbia River Side Channel    Temp:    pH:				20-Oct-20		915		Water			X	X	X	X	X	X	X	X	X				4
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.																									
SHIPMENT RELEASE (client use)						SHIPMENT RECEPTION (lab use only)						SHIPMENT VERIFICATION (lab use only)													
Released by: Travis Jobin		Date (dd-mm-yy) 26-May-20	Time (hh-mm)			Received by: 		Date: 10/21	Time: 835	Temperature: 4 °C	Verified by:		Date:	Time:	Observations: Yes / No ? If Yes add SIF										

GENF 20.00 Front



KICKING HORSE MOUNTAIN UTILITY  
CORPORATION  
ATTN: TRAVIS JOBIN  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Date Received: 28-OCT-20  
Report Date: 05-NOV-20 17:10 (MT)  
Version: FINAL

Client Phone: 250-344-8442

## Certificate of Analysis

Lab Work Order #: L2522316  
Project P.O. #: NOT SUBMITTED  
Job Reference: WEEK 3 - 2020 FALL EMS PROGRAM  
C of C Numbers:  
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.  
Account Manager

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

ADDRESS: 2559 29 Street NE, Calgary, AB T1Y 7B5 Canada | Phone: +1 403 291 9897 | Fax: +1 403 291 0298  
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
L2522316-4 COLUMBIA RIVER SIDE CHANNEL								
Sampled By: TJ/JD on 27-OCT-20 @ 09:15								
Matrix: WATER								
Miscellaneous Parameters								
Ammonia, Total (as N)		<0.050		0.050	mg/L		02-NOV-20	R5275236
Orthophosphate-Dissolved (as P)		<0.0050		0.0050	mg/L		28-OCT-20	R5270584
Enterococcus		See Attached					28-OCT-20	R5276136
Coliform Bacteria - Fecal		2		1	CFU/100mL		28-OCT-20	R5272222
Phosphorus (P)-Total		0.0081		0.0050	mg/L		30-OCT-20	R5271887
Total Suspended Solids		5.6		3.0	mg/L		30-OCT-20	R5272307
NO2, NO3 and Sum of NO2/NO3								
Nitrate in Water by IC								
Nitrate (as N)		0.188		0.020	mg/L		28-OCT-20	R5270795
Nitrate+Nitrite								
Nitrate and Nitrite (as N)		0.188		0.022	mg/L		29-OCT-20	
Nitrite in Water by IC								
Nitrite (as N)		<0.010		0.010	mg/L		28-OCT-20	R5270795

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

## Reference Information

### Sample Parameter Qualifier Key:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
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**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
FCC-MF-CL	Water	Fecal Coliform Count-MF	APHA 9222D
This analysis is carried out using procedures adapted from APHA Method 9222 "Membrane Filter Technique for Members of the Coliform Group". Coliform bacteria is enumerated by culturing and colony counting. A known sample volume is filtered through a 0.45 micron membrane filter. The test involves an initial 24 hour incubation at 44.5 degrees C of the filter with the appropriate growth medium. This method is specific for thermotolerant bacteria (Fecal) and is used for non-turbid water with a low background bacteria level.			
N2N3-CALC-CL	Water	Nitrate+Nitrite	CALCULATION
NH3-F-CL	Water	Ammonia by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.			
NO2-IC-N-CL	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-CL	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-COL-CL	Water	Total P in Water by Colour	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.			
PO4-DO-COL-CL	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.			

\*\* 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
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, 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 ww - 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.*



Workorder: L2522316

Page 1 of 3

1500 Kicking Horse Trail

Golden BC V0A 1H0

Contact: TRAVIS JOBIN

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BOD-BC-CL		Water						
Batch	R5276296							
WG3438126-2	LCS							
Biochemical Oxygen Demand			102.0		%		85-115	29-OCT-20
WG3438126-1	MB							
Biochemical Oxygen Demand			<2.0		mg/L		2	29-OCT-20
FCC-MF-CL		Water						
Batch	R5272222							
WG3436302-2	DUP	L2522316-1						
Coliform Bacteria - Fecal			<1	RPD-NA	CFU/100mL	N/A	65	28-OCT-20
WG3436302-1	MB							
Coliform Bacteria - Fecal			<1		CFU/100mL		1	28-OCT-20
NH3-F-CL		Water						
Batch	R5275236							
WG3437258-2	LCS							
Ammonia, Total (as N)			103.1		%		85-115	02-NOV-20
WG3437258-1	MB							
Ammonia, Total (as N)			<0.050		mg/L		0.05	02-NOV-20
NO2-IC-N-CL		Water						
Batch	R5270795							
WG3434690-9	DUP	L2522316-1						
Nitrite (as N)			0.042		mg/L	4.3	20	28-OCT-20
WG3434690-2	LCS							
Nitrite (as N)			101.3		%		90-110	28-OCT-20
WG3434690-1	MB							
Nitrite (as N)			<0.010		mg/L		0.01	28-OCT-20
WG3434690-10	MS	L2522316-1						
Nitrite (as N)			95.4		%		75-125	28-OCT-20
NO3-IC-N-CL		Water						
Batch	R5270795							
WG3434690-9	DUP	L2522316-1						
Nitrate (as N)			16.6		mg/L	1.9	20	28-OCT-20
WG3434690-2	LCS							
Nitrate (as N)			104.7		%		90-110	28-OCT-20
WG3434690-1	MB							
Nitrate (as N)			<0.020		mg/L		0.02	28-OCT-20
WG3434690-10	MS	L2522316-1						
Nitrate (as N)			N/A	MS-B	%		-	28-OCT-20
P-T-COL-CL		Water						

## Quality Control Report

Workorder: L2522316

Report Date: 05-NOV-20

Page 2 of 3

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>P-T-COL-CL</b>								
<b>Water</b>								
Batch	R5271887							
<b>WG3435736-2</b>	<b>LCS</b>							
Phosphorus (P)-Total			94.1		%		80-120	30-OCT-20
Batch	R5271887							
<b>WG3435736-1</b>	<b>MB</b>							
Phosphorus (P)-Total			<0.0050		mg/L		0.005	30-OCT-20
<b>PO4-DO-COL-CL</b>								
<b>Water</b>								
Batch	R5270584							
<b>WG3434320-3</b>	<b>DUP</b>	<b>L2522316-4</b>						
Orthophosphate-Dissolved (as P)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	28-OCT-20
Batch	R5270584							
<b>WG3434320-2</b>	<b>LCS</b>							
Orthophosphate-Dissolved (as P)			98.0		%		80-120	28-OCT-20
Batch	R5270584							
<b>WG3434320-1</b>	<b>MB</b>							
Orthophosphate-Dissolved (as P)			<0.0050		mg/L		0.005	28-OCT-20
<b>TSS-CL</b>								
<b>Water</b>								
Batch	R5272307							
<b>WG3435838-2</b>	<b>LCS</b>							
Total Suspended Solids			96.0		%		85-115	30-OCT-20
Batch	R5272307							
<b>WG3435838-1</b>	<b>MB</b>							
Total Suspended Solids			<3.0		mg/L		3	30-OCT-20

# Quality Control Report

Workorder: L2522316

Report Date: 05-NOV-20

Page 3 of 3

## Legend:

---

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

## Sample Parameter Qualifier Definitions:

---

Qualifier	Description
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.

---

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.



## Microbial Test Results

Samples collected October 27, 2020

Final Report

November 3, 2020

Submitted to: **ALS Environmental**  
Calgary, AB

## SAMPLE INFORMATION

Sample ID/ Internal ID	Dates		<i>Enterococcus</i> test initiation	Receipt temperature
	Collected	Received		
L2522316-1 WWTP EFFLUENT - UV TROUGH/ 2021-0395-01	27-Oct-20 at 0900h	28-Oct-20 at 0856h	28-Oct-20 at 0858h	8.4°C
L2522316-2 COLUMBIA RIVER UPSTREAM/ 2021-0395-02	27-Oct-20 at 0915h	28-Oct-20 at 0856h	28-Oct-20 at 0858h	8.5°C
L2522316-3 COLUMBIA RIVER DOWNSTREAM/ 2021-0395-03	27-Oct-20 at 0930h	28-Oct-20 at 0856h	28-Oct-20 at 0858h	7.8°C
L2522316-4 COLUMBIA RIVER SIDE CHANNEL/ 2021-0395-04	27-Oct-20 at 0945h	28-Oct-20 at 0856h	28-Oct-20 at 0858h	7.8°C

## TEST TYPES

- *Enterococcus* enumeration test

## RESULTS

### Microbial test results

Sample ID	MPN/100 mL <i>Enterococcus</i>
L2522316-1 WWTP EFFLUENT - UV TROUGH	<1
L2522316-2 COLUMBIA RIVER UPSTREAM	1.0
L2522316-3 COLUMBIA RIVER DOWNSTREAM	2.0
L2522316-4 COLUMBIA RIVER SIDE CHANNEL	<1

MPN = Most Probable Number

## QA/QC

QA/QC summary	<i>Enterococcus</i>
Protocol deviations	None
Control performance	Acceptable
Test performance	Valid





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Report By:  
Courtney Bogstie, BSc  
Senior Biologist



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Reviewed By:  
Leila Oosterbroek, BSc  
Environmental Scientist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

## REFERENCES

Enterolert Test Kit Literature, IDEXX Laboratories Ltd., One IDEXX Drive, Westbrook, ME, 04092 USA

MPN Tables for IDEXX Quanti-Tray 2000 (<http://www.idexx.com/water>)

## **APPENDIX A – Test data**

---

# NAUTILUS

## Quanti-Tray Bench Sheet - *Enterococcus*

Client ALS 106 Reference 2021-0395

### Test Initiation

Date: 2020/10/28  
Time: 0858  
Technician: AW

### Sample Information

Dilution Factor: -

Reagent used: Enterolert™  
Reagent Lot#/Expiry: C5336 - 02 MAY 2021

Comments:

Thermometer Serial #: 192702205  
Incubator #: 7  
Incubator Temperature: 41 (must be 41 ± 0.5°C)

Quanti Tray 2000 Lot#/Expiry: DS018 - 04/17/2023

### Results - 24 Hour Incubation

Date: 2020/10/29 Time: 0930 Technician: CB

Incubator Temp: <u>41</u> (must be 41 ± 0.5°C)	Enterococci (Fluorescent)									
	CTL	-01	-02	-03	-04					
# Positive Large Wells:	0	0	0	0	0					
# Ambiguous Large Wells:	↓	↓	↓	↓	↓					
# Positive Small Wells (Tray 2000 only):	↓	↓	↓	↓	↓					
# Ambiguous Small Wells (Tray 2000 only):	↓	↓	↓	↓	↓					
Most Probable Number at 24 hours:	1.1	1.1	1.0	2.0	1.1					

### Results - 28 Hour Incubation

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Technician: \_\_\_\_\_

Incubator Temp: _____ (must be 41 ± 0.5°C)	Enterococci (Fluorescent)									
	CTL									
# Confirmed Positive Large Wells:										
# Confirmed Positive Small Wells (Tray 2000 only):										
Most Probable Number at 28 hours:										

Confirmed positive wells includes the positive wells from 24 hours plus the ambiguous wells that became positive at 28 hours

At 28 hours only score marked ambiguous from 24 hours

## **APPENDIX B – Chain-of-custody form**

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**Subcontract Request Form**
**Subcontract To:**
**NAUTILUS ENVIRONMENTAL COMPANY INC. - CALGARY, AB, CANADA**

 #4, 6125-12 STREET SE  
 CALGARY, AB T2H 2K1

**NOTES:** Please reference on final report and invoice: PO# L2522316  
 ALS requires QC data to be provided with your final results.

*Please provide it part b. d. time*

 Please see enclosed 4 sample(s) in 4 Container(s)

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED	PRIORITY
		DUE DATE	Flag
L2522316-1 WWTP EFFLUENT - UV TROUGH	2021-0395 -01 8.4°C Enterococcus (ENTERO-HQ 1)	10/27/2020 11/9/2020	928
L2522316-2 COLUMBIA RIVER UPSTREAM	-02 8.5°C Enterococcus (ENTERO-HQ 1)	10/27/2020 11/9/2020	915
L2522316-3 COLUMBIA RIVER DOWNSTREAM	-03 7.8°C Enterococcus (ENTERO-HQ 1)	10/27/2020 11/9/2020	930
L2522316-4 COLUMBIA RIVER SIDE CHANNEL	-04 7.8°C Enterococcus (ENTERO-HQ 1)	10/27/2020 11/9/2020	915

Subcontract Info Contact: John Forbes (403) 291-9897  
 Analysis and reporting info contact: Patryk Wojciak, B.Sc., P.Chem.  
 2559 29 STREET NE  
 CALGARY, AB T1Y 7B5  
 Phone: (403) 291-9897

*2020/10/28 Good Condition*  
*08:56*  
*Drop off*  
*8/10*  
*4x2400mL bottles*  
*NoS/NoB*  
 Email: patryk.wojciak@alsglobal.com

 Please email confirmation of receipt to: **patryk.wojciak@alsglobal.com**

Shipped By: \_\_\_\_\_ Date Shipped: \_\_\_\_\_

Received By: \_\_\_\_\_ Date Received: \_\_\_\_\_

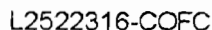
Verified By: \_\_\_\_\_ Date Verified: \_\_\_\_\_

Temperature: \_\_\_\_\_

Sample Integrity Issues: \_\_\_\_\_

**END OF REPORT**

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**Canada Toll Free: 1 800 668 9878**

**www.alsglobal.com**

COC #

Page 1 of 1

GENF 20.00 Front



KICKING HORSE MOUNTAIN UTILITY  
CORPORATION  
ATTN: TRAVIS JOBIN  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Date Received: 04-NOV-20  
Report Date: 12-NOV-20 15:45 (MT)  
Version: FINAL

Client Phone: 250-344-8442

## Certificate of Analysis

Lab Work Order #: L2525666

Project P.O. #: NOT SUBMITTED

Job Reference: WEEK 3 - 2020 FALL EMS PROGRAM - WW

C of C Numbers:

Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.  
Account Manager

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

ADDRESS: 2559 29 Street NE, Calgary, AB T1Y 7B5 Canada | Phone: +1 403 291 9897 | Fax: +1 403 291 0298  
ALS CANADA LTD Part of the ALS Group An ALS Limited Company



Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2525666-1	WWTP EFFLUENT - UV TROUGH							
Sampled By:	TJ/JD on 03-NOV-20 @ 09:00							
Matrix:	WATER							
<b>Miscellaneous Parameters</b>								
Ammonia, Total (as N)		0.065		0.050	mg/L		05-NOV-20	R5281406
Biochemical Oxygen Demand		<2.0		2.0	mg/L		05-NOV-20	R5283611
Orthophosphate-Dissolved (as P)		0.354	DLHC	0.050	mg/L		04-NOV-20	R5279363
Enterococcus		See Attached					04-NOV-20	R5283519
Coliform Bacteria - Fecal		<1		1	CFU/100mL		04-NOV-20	R5281153
MPN - E. coli		<1		1	MPN/100mL		04-NOV-20	R5281131
Phosphorus (P)-Total		0.399	DLHC	0.025	mg/L		05-NOV-20	R5280883
Total Suspended Solids		3.8		3.0	mg/L		09-NOV-20	R5283597
<b>NO2, NO3 and Sum of NO2/NO3</b>								
<b>Nitrate in Water by IC</b>								
Nitrate (as N)		15.1		0.020	mg/L		05-NOV-20	R5281564
<b>Nitrate+Nitrite</b>								
Nitrate and Nitrite (as N)		15.1		0.022	mg/L		07-NOV-20	
<b>Nitrite in Water by IC</b>								
Nitrite (as N)		0.053		0.010	mg/L		05-NOV-20	R5281564
L2525666-2	COLUMBIA RIVER UPSTREAM							
Sampled By:	TJ/JD on 03-NOV-20 @ 09:30							
Matrix:	WATER							
<b>Miscellaneous Parameters</b>								
Ammonia, Total (as N)		<0.050		0.050	mg/L		05-NOV-20	R5281406
Orthophosphate-Dissolved (as P)		<0.0050		0.0050	mg/L		04-NOV-20	R5279363
Enterococcus		See Attached					04-NOV-20	R5283519
Coliform Bacteria - Fecal		1		1	CFU/100mL		04-NOV-20	R5281153
MPN - E. coli		<1		1	MPN/100mL		04-NOV-20	R5281131
Phosphorus (P)-Total		0.0060		0.0050	mg/L		05-NOV-20	R5280883
Total Suspended Solids		5.4		3.0	mg/L		09-NOV-20	R5283597
<b>NO2, NO3 and Sum of NO2/NO3</b>								
<b>Nitrate in Water by IC</b>								
Nitrate (as N)		0.123		0.020	mg/L		05-NOV-20	R5281564
<b>Nitrate+Nitrite</b>								
Nitrate and Nitrite (as N)		0.123		0.022	mg/L		07-NOV-20	
<b>Nitrite in Water by IC</b>								
Nitrite (as N)		<0.010		0.010	mg/L		05-NOV-20	R5281564
L2525666-3	COLUMBIA RIVER DOWN STREAM							
Sampled By:	TJ/JD on 03-NOV-20 @ 09:45							
Matrix:	WATER							
<b>Miscellaneous Parameters</b>								
Ammonia, Total (as N)		<0.050		0.050	mg/L		05-NOV-20	R5281406
Orthophosphate-Dissolved (as P)		<0.0050		0.0050	mg/L		04-NOV-20	R5279363
Enterococcus		See Attached					04-NOV-20	R5283519
Coliform Bacteria - Fecal		<1		1	CFU/100mL		04-NOV-20	R5281153
MPN - E. coli		<1		1	MPN/100mL		04-NOV-20	R5281131
Phosphorus (P)-Total		0.0087		0.0050	mg/L		05-NOV-20	R5280883
Total Suspended Solids		9.8		3.0	mg/L		09-NOV-20	R5283597
<b>NO2, NO3 and Sum of NO2/NO3</b>								
<b>Nitrate in Water by IC</b>								
Nitrate (as N)		0.098		0.020	mg/L		05-NOV-20	R5281564
<b>Nitrate+Nitrite</b>								
Nitrate and Nitrite (as N)		0.098		0.022	mg/L		07-NOV-20	

\* 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
L2525666-3 COLUMBIA RIVER DOWN STREAM Sampled By: TJ/JD on 03-NOV-20 @ 09:45 Matrix: WATER Nitrite in Water by IC Nitrite (as N)	<0.010		0.010	mg/L		05-NOV-20	R5281564
L2525666-4 COLUMBIA RIVER SIDE CHANNEL Sampled By: TJ/JD on 03-NOV-20 @ 09:15 Matrix: WATER Miscellaneous Parameters Ammonia, Total (as N) Orthophosphate-Dissolved (as P) Enterococcus Coliform Bacteria - Fecal MPN - E. coli Phosphorus (P)-Total Total Suspended Solids NO2, NO3 and Sum of NO2/NO3 Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite (as N) Nitrite in Water by IC Nitrite (as N)	<0.050 <0.0050 See Attached <1 <1 0.0065 5.0  0.117 0.117 <0.010		0.050 0.0050  1 1 0.0050 3.0  0.020 0.022 0.010	mg/L mg/L  CFU/100mL MPN/100mL mg/L mg/L  mg/L mg/L mg/L		05-NOV-20 04-NOV-20 04-NOV-20 04-NOV-20 04-NOV-20 05-NOV-20 09-NOV-20  05-NOV-20 07-NOV-20 05-NOV-20	R5281406 R5279363 R5283519 R5281153 R5281131 R5280883 R5283597  R5281564  R5281564

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

## Reference Information

### Sample Parameter Qualifier Key:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
LCS-ND	Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.

### Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
EC-MPN-CL	Water	MPN - E. coli	APHA 9223B
This analysis is carried out using procedures adapted from APHA Method 9223 "Enzyme Substrate Coliform Test". E. coli and Total Coliform are determined simultaneously. The sample is mixed with a mixture hydrolyzable substrates and then sealed in a multi-well packet. The packet is incubated for 18 or 24 hours and then the number of wells exhibiting a positive response are counted. The final result is obtained by comparing the positive responses to a probability table. Recommended Holding Time: Sample: 1 day Reference: APHA			
FCC-MF-CL	Water	Fecal Coliform Count-MF	APHA 9222D
This analysis is carried out using procedures adapted from APHA Method 9222 "Membrane Filter Technique for Members of the Coliform Group". Coliform bacteria is enumerated by culturing and colony counting. A known sample volume is filtered through a 0.45 micron membrane filter. The test involves an initial 24 hour incubation at 44.5 degrees C of the filter with the appropriate growth medium. This method is specific for thermotolerant bacteria (Fecal) and is used for non-turbid water with a low background bacteria level.			
N2N3-CALC-CL	Water	Nitrate+Nitrite	CALCULATION
NH3-F-CL	Water	Ammonia by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Weston et al.			
NO2-IC-N-CL	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-CL	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-COL-CL	Water	Total P in Water by Colour	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.			
PO4-DO-COL-CL	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.			

\*\* 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
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

### Chain of Custody Numbers:

## Reference Information

### Test Method References:

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

#### 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-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.*

## Quality Control Report

Workorder: L2525666

Report Date: 12-NOV-20

Page 1 of 3

Client: KICKING HORSE MOUNTAIN UTILITY CORPORATION

1500 Kicking Horse Trail

Golden BC V0A 1H0

Contact: TRAVIS JOBIN

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>BOD-BC-CL</b>								
<b>Water</b>								
<b>Batch R5283611</b>								
<b>WG3442882-2</b>	<b>LCS</b>							
Biochemical Oxygen Demand			83.1	LCS-ND	%		85-115	05-NOV-20
<b>WG3442882-1</b>	<b>MB</b>							
Biochemical Oxygen Demand			<2.0		mg/L		2	05-NOV-20
<b>EC-MPN-CL</b>								
<b>Water</b>								
<b>Batch R5281131</b>								
<b>WG3439963-4</b>	<b>MB</b>							
MPN - E. coli			<1		MPN/100mL		1	04-NOV-20
<b>WG3439963-7</b>	<b>MB</b>							
MPN - E. coli			<1		MPN/100mL		1	04-NOV-20
<b>FCC-MF-CL</b>								
<b>Water</b>								
<b>Batch R5281153</b>								
<b>WG3440011-1</b>	<b>MB</b>							
Coliform Bacteria - Fecal			<1		CFU/100mL		1	04-NOV-20
<b>NH3-F-CL</b>								
<b>Water</b>								
<b>Batch R5281406</b>								
<b>WG3439699-15</b>	<b>DUP</b>	<b>L2525666-2</b>						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	05-NOV-20
<b>WG3439699-14</b>	<b>LCS</b>							
Ammonia, Total (as N)			104.4		%		85-115	05-NOV-20
<b>WG3439699-13</b>	<b>MB</b>							
Ammonia, Total (as N)			<0.050		mg/L		0.05	05-NOV-20
<b>WG3439699-16</b>	<b>MS</b>	<b>L2525666-2</b>						
Ammonia, Total (as N)			116.5		%		75-125	05-NOV-20
<b>NO2-IC-N-CL</b>								
<b>Water</b>								
<b>Batch R5281564</b>								
<b>WG3440343-2</b>	<b>LCS</b>							
Nitrite (as N)			105.6		%		90-110	05-NOV-20
<b>WG3440343-1</b>	<b>MB</b>							
Nitrite (as N)			<0.010		mg/L		0.01	05-NOV-20
<b>NO3-IC-N-CL</b>								
<b>Water</b>								
<b>Batch R5281564</b>								
<b>WG3440343-2</b>	<b>LCS</b>							
Nitrate (as N)			99.2		%		90-110	05-NOV-20
<b>WG3440343-1</b>	<b>MB</b>							
Nitrate (as N)			<0.020		mg/L		0.02	05-NOV-20

## Quality Control Report

Workorder: L2525666

Report Date: 12-NOV-20

Page 2 of 3

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>P-T-COL-CL</b>	<b>Water</b>							
Batch	R5280883							
<b>WG3439751-14 LCS</b>								
Phosphorus (P)-Total			89.6		%		80-120	05-NOV-20
<b>WG3439751-13 MB</b>								
Phosphorus (P)-Total			<0.0050		mg/L		0.005	05-NOV-20
<b>PO4-DO-COL-CL</b>	<b>Water</b>							
Batch	R5279363							
<b>WG3439017-2 LCS</b>								
Orthophosphate-Dissolved (as P)			103.0		%		80-120	04-NOV-20
<b>WG3439017-1 MB</b>								
Orthophosphate-Dissolved (as P)			<0.0050		mg/L		0.005	04-NOV-20
<b>TSS-CL</b>	<b>Water</b>							
Batch	R5283597							
<b>WG3441621-2 LCS</b>								
Total Suspended Solids			102.3		%		85-115	09-NOV-20
<b>WG3441621-1 MB</b>								
Total Suspended Solids			<3.0		mg/L		3	09-NOV-20

# Quality Control Report

Workorder: L2525666

Report Date: 12-NOV-20

Page 3 of 3

## Legend:

---

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

## Sample Parameter Qualifier Definitions:

---

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
LCS-ND	Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.
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.

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



## Microbial Test Results

Sample collected November 3, 2020

Final Report

November 10, 2020

Submitted to: **ALS Environmental**  
Calgary, AB



## SAMPLE INFORMATION

Sample ID/ Internal ID	Dates		<i>Enterococcus</i> test initiation	Receipt temperature
	Collected	Received		
L2525666-1 WWTP EFFLUENT – UV TROUGH / 2021-0456-01	3-Nov-20 at 0900h	4-Nov-20 at 1310h	4-Nov-20 at 1425h	4.6°C
L2525666-2 COLUMBIA RIVER UPSTREAM / 2021-0456-02	3-Nov-20 at 0930h	4-Nov-20 at 1310h	4-Nov-20 at 1425h	4.8°C
L2525666-3 COLUMBIA RIVER DOWN STREAM / 2021-0456-03	3-Nov-20 at 0945h	4-Nov-20 at 1310h	4-Nov-20 at 1425h	3.8°C
L2525666-4 COLUMBIA RIVER SIDE CHANNEL / 2021-0456-04	3-Nov-20 at 0915h	4-Nov-20 at 1310h	4-Nov-20 at 1425h	3.9°C

## TEST TYPES

- *Enterococcus* enumeration test

## RESULTS

### Microbial test results

Sample ID	MPN/100 mL
	<i>Enterococcus</i>
L2525666-1 WWTP EFFLUENT –UV TROUGH	<1
L2525666-2 COLUMBIA RIVER UPSTREAM	1.0
L2525666-3 COLUMBIA RIVER DOWN STREAM	1.0
L2525666-4 COLUMBIA RIVER SIDE CHANNEL	<1

MPN = Most Probable Number

---

**QA/QC**

<b>QA/QC summary</b>	<b><i>Enterococcus</i></b>
Protocol deviations	See Below
Control performance	Acceptable
Test performance	Valid

The samples were received and testing initiated outside of the required 24-hour hold time at the client's request.



---

Report By:  
Kayla Knol, BSc  
Senior Biologist



---

Reviewed By:  
Leila Oosterbroek, BSc  
Environmental Scientist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

## REFERENCES

Enterolert Test Kit Literature, IDEXX Laboratories Ltd., One IDEXX Drive, Westbrook, ME, 04092 USA

MPN Tables for IDEXX Quanti-Tray 2000 (<http://www.idexx.com/water>)

## **APPENDIX A – Test data**

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# NAUTILUS

## Quanti-Tray Bench Sheet - *Enterococcus*

Client ALS 166 Reference 2621-0456-0144

### Test Initiation

Date: 2020/11/04  
Time: 1425  
Technician: MW

### Sample Information

Dilution Factor: N/A

### Comments:

Thermometer Serial #: 192702205  
Incubator #: 7  
Incubator Temperature: 41 (must be  $41 \pm 0.5^{\circ}\text{C}$ )

Reagent used: Enterolert™  
Reagent Lot#/Expiry: C5336 02 May 2021

Quanti Tray 2000 Lot#/Expiry: DS018 / 2023/04/17

### Results - 24 Hour Incubation

Date: 2020/11/05 Time: 1425 Technician: KL

Incubator Temp: <u>41</u> (must be $41 \pm 0.5^{\circ}\text{C}$ )	Enterococci (Fluorescent)									
	CTL	01	02	03	04					
# Positive Large Wells:	0	0	1	1	0					
# Ambiguous Large Wells:	0	0	0	0	0					
# Positive Small Wells (Tray 2000 only):	0	0	0	0	0					
# Ambiguous Small Wells (Tray 2000 only):	0	0	0	0	0					
Most Probable Number at 24 hours:	4	4	1.0	1.0	4					

### Results - 28 Hour Incubation

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Technician: \_\_\_\_\_

Incubator Temp: _____ (must be $41 \pm 0.5^{\circ}\text{C}$ )	Enterococci (Fluorescent)									
	CTL									
# Confirmed Positive Large Wells:										
# Confirmed Positive Small Wells (Tray 2000 only):										
Most Probable Number at 28 hours:										

Confirmed positive wells includes the positive wells from 24 hours plus the ambiguous wells that became positive at 28 hours

At 28 hours only score marked ambiguous from 24 hours

## **APPENDIX B – Chain-of-custody form**

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## Subcontract Request Form

## Subcontract To:

NAUTILUS ENVIRONMENTAL COMPANY INC. - CALGARY, AB, CANADA

#4, 6125-12 STREET SE  
CALGARY, AB T2H 2K1

**NOTES:** Please reference on final report and invoice: PO# L2525666  
ALS requires QC data to be provided with your final results.

Hold Time Exceeded - Please Proceed

Please see enclosed 4 sample(s) in 4 Container(s)

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED	PRIORITY Flag
		DUE DATE	
L2525666-1 WWTP EFFLUENT - UV TROUGH	2021-0456 -01 4.6°C Enterococcus (ENTERO-HQ 1)	11/3/2020 11/12/2020	900
L2525666-2 COLUMBIA RIVER UPSTREAM	-02 4.8°C Enterococcus (ENTERO-HQ 1)	11/3/2020 11/12/2020	930
L2525666-3 COLUMBIA RIVER DOWN STREAM	-03 3.8°C Enterococcus (ENTERO-HQ 1)	11/3/2020 11/12/2020	945
L2525666-4 COLUMBIA RIVER SIDE CHANNEL	-04 3.9°C Enterococcus (ENTERO-HQ 1)	11/3/2020 11/12/2020	915

Subcontract Info Contact:

John Forbes (403) 291-9897

Analysis and reporting info contact:

Patryk Wojciak, B.Sc., P.Chem.

2559 29 STREET NE

CALGARY, AB T1Y 7B5

Phone: (403) 291-9897

2020/11/04

13:10

30200

SC

4x400mL bottles

N6&amp;N6B

Email: patryk.wojciak@alsglobal.com

Good Condition

Please email confirmation of receipt to:

patryk.wojciak@alsglobal.com

Shipped By: \_\_\_\_\_

Date Shipped: \_\_\_\_\_

Received By: \_\_\_\_\_

Date Received: \_\_\_\_\_

Verified By: \_\_\_\_\_

Date Verified: \_\_\_\_\_

Temperature: \_\_\_\_\_

Sample Integrity Issues: \_\_\_\_\_

**END OF REPORT**

---





1 2525666-COFC

**Chain of Custody / Analytical Request Form**  
**Canada Toll Free: 1 800 668 9878**  
**[www.alsglobal.com](http://www.alsglobal.com)**

COC #

Page 1 of

<b>Report To</b>			<b>Report Format / Distribution</b>			<b>Service Requested</b> (Rush for routine analysis subject to availability)												
Company: Kicking Horse Mountain Resort Utility Corporation			<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)												
Contact: Travis Jobin			<input type="checkbox"/> PDF <input type="checkbox"/> Excel <input type="checkbox"/> Digital <input checked="" type="checkbox"/> Fax			<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT												
Address: 1500 Kicking Horse Trail			Email 1: tjobin@kickinghorseresort.com			<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT												
			Email 2: pmajer@skircr.com			<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT												
Phone: 250-344-8442 Fax:			Email 3: mskyring@kickinghorseresort.com			<b>Analysis Request</b>												
Invoice To Same as Report? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			<b>Client / Project Information</b>			Please indicate below Filtered, Preserved or both (F, P, F/P)												
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			Job #: Week 3 - 2020 Fall EMS program - WW															
Company: Resorts of the Canadian Rockies			PO / AFE:															
Contact: Patrick Majer			LSD:															
Address: 1505 - 17th Ave SW Calgary AB																		
Phone: Fax:			Quote #:															
Lab Work Order # (lab use only) L2525666			ALS Contact: PW		Sampler: TJ/JD													
Sample #	Sample Identification (This description will appear on the report)			Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BOD5	TSS	N-NH4	N-NO3	N-NO2	Total P	Ortho P	Fecal Coliform	Enterococci	E. Coli	Number of Containers	
	WWTP Effluent - UV trough Temp: pH:			03-Nov-20	9:00AM	Water	X	X	X	X	X	X	X	X	X	X	5	
	Columbia River Upstream Temp: pH:			03-Nov-20	9:30 AM	Water		X	X	X	X	X	X	X	X	X	4	
	Columbia River Down stream Temp: pH:			03-Nov-20	9:45 AM	Water		X	X	X	X	X	X	X	X	X	4	
	Columbia River Side Channel Temp: pH:			03-Nov-20	9:15	Water		X	X	X	X	X	X	X	X	X	4	

GENF 20.00 Front



KICKING HORSE MOUNTAIN UTILITY  
CORPORATION  
ATTN: TRAVIS JOBIN  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Date Received: 10-NOV-20  
Report Date: 18-NOV-20 16:20 (MT)  
Version: FINAL

Client Phone: 250-344-8442

## Certificate of Analysis

Lab Work Order #: L2527782

Project P.O. #: NOT SUBMITTED

Job Reference: WEEK 5 - 2020 FALL EMS PROGRAM - WW

C of C Numbers:

Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.  
Account Manager

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

ADDRESS: 2559 29 Street NE, Calgary, AB T1Y 7B5 Canada | Phone: +1 403 291 9897 | Fax: +1 403 291 0298  
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2527782-1	WWTP EFFLUENT - UV TROUGH							
Sampled By:	TJ/MS on 09-NOV-20 @ 08:15							
Matrix:	WATER							
<b>Miscellaneous Parameters</b>								
Ammonia, Total (as N)		<0.050		0.050	mg/L		12-NOV-20	R5284785
Biochemical Oxygen Demand		<2.0		2.0	mg/L		10-NOV-20	R5286195
Orthophosphate-Dissolved (as P)		0.457	DLHC	0.050	mg/L		10-NOV-20	R5283690
Enterococcus		See Attached					10-NOV-20	R5286683
Coliform Bacteria - Fecal		<1		1	CFU/100mL		10-NOV-20	R5284009
MPN - E. coli		<1		1	MPN/100mL		10-NOV-20	R5283997
Phosphorus (P)-Total		0.593	DLHC	0.050	mg/L		17-NOV-20	R5286966
Total Suspended Solids		<3.0		3.0	mg/L		13-NOV-20	R5285539
<b>NO2, NO3 and Sum of NO2/NO3</b>								
<b>Nitrate in Water by IC</b>								
Nitrate (as N)		20.3		0.020	mg/L		10-NOV-20	R5284199
<b>Nitrate+Nitrite</b>								
Nitrate and Nitrite (as N)		20.4		0.022	mg/L		12-NOV-20	
<b>Nitrite in Water by IC</b>								
Nitrite (as N)		0.021		0.010	mg/L		10-NOV-20	R5284199
L2527782-2	COLUMBIA RIVER UPSTREAM							
Sampled By:	TJ/MS on 09-NOV-20 @ 09:00							
Matrix:	WATER							
<b>Miscellaneous Parameters</b>								
Ammonia, Total (as N)		<0.050		0.050	mg/L		12-NOV-20	R5284785
Orthophosphate-Dissolved (as P)		<0.0050		0.0050	mg/L		10-NOV-20	R5283690
Enterococcus		See Attached					10-NOV-20	R5286683
Coliform Bacteria - Fecal		3		1	CFU/100mL		10-NOV-20	R5284009
MPN - E. coli		<1		1	MPN/100mL		10-NOV-20	R5283997
Phosphorus (P)-Total		0.0116		0.0050	mg/L		17-NOV-20	R5286966
Total Suspended Solids		17.7		3.0	mg/L		13-NOV-20	R5285539
<b>NO2, NO3 and Sum of NO2/NO3</b>								
<b>Nitrate in Water by IC</b>								
Nitrate (as N)		0.104		0.020	mg/L		10-NOV-20	R5284199
<b>Nitrate+Nitrite</b>								
Nitrate and Nitrite (as N)		0.104		0.022	mg/L		12-NOV-20	
<b>Nitrite in Water by IC</b>								
Nitrite (as N)		<0.010		0.010	mg/L		10-NOV-20	R5284199
L2527782-3	COLUMBIA RIVER DOWNSTREAM							
Sampled By:	TJ/MS on 09-NOV-20 @ 09:15							
Matrix:	WATER							
<b>Miscellaneous Parameters</b>								
Ammonia, Total (as N)		<0.050		0.050	mg/L		12-NOV-20	R5284785
Orthophosphate-Dissolved (as P)		<0.0050		0.0050	mg/L		10-NOV-20	R5283690
Enterococcus		See Attached					10-NOV-20	R5286683
Coliform Bacteria - Fecal		1		1	CFU/100mL		10-NOV-20	R5284009
MPN - E. coli		1	OCR	1	MPN/100mL		10-NOV-20	R5283997
Phosphorus (P)-Total		0.0086		0.0050	mg/L		17-NOV-20	R5286966
Total Suspended Solids		11.5		3.0	mg/L		13-NOV-20	R5285539
<b>NO2, NO3 and Sum of NO2/NO3</b>								
<b>Nitrate in Water by IC</b>								
Nitrate (as N)		0.118		0.020	mg/L		10-NOV-20	R5284199
<b>Nitrate+Nitrite</b>								
Nitrate and Nitrite (as N)		0.118		0.022	mg/L		12-NOV-20	

\* 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
L2527782-3 COLUMBIA RIVER DOWNSTREAM Sampled By: TJ/MS on 09-NOV-20 @ 09:15 Matrix: WATER Nitrite in Water by IC Nitrite (as N)	<0.010		0.010	mg/L		10-NOV-20	R5284199
L2527782-4 COLUMBIA RIVER SIDE CHANNEL Sampled By: TJ/MS on 09-NOV-20 @ 08:45 Matrix: WATER Miscellaneous Parameters Ammonia, Total (as N) Orthophosphate-Dissolved (as P) Enterococcus Coliform Bacteria - Fecal MPN - E. coli Phosphorus (P)-Total Total Suspended Solids NO2, NO3 and Sum of NO2/NO3 Nitrate in Water by IC Nitrate (as N) Nitrate+Nitrite Nitrate and Nitrite (as N) Nitrite in Water by IC Nitrite (as N)	<0.050 <0.0050 See Attached 1 <1 0.0120 18.1		0.050 0.0050  1 1 0.0050 3.0	mg/L mg/L  CFU/100mL MPN/100mL mg/L mg/L		13-NOV-20 10-NOV-20 10-NOV-20 10-NOV-20 10-NOV-20 17-NOV-20 13-NOV-20  10-NOV-20 12-NOV-20 10-NOV-20	R5284785 R5283690 R5286683 R5284009 R5283997 R5286966 R5285539  R5284199  R5284199

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

## Reference Information

### Sample Parameter Qualifier Key:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
OCR	Parameter is out of client specific range.

### Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
EC-MPN-CL	Water	MPN - E. coli	APHA 9223B
This analysis is carried out using procedures adapted from APHA Method 9223 "Enzyme Substrate Coliform Test". E. coli and Total Coliform are determined simultaneously. The sample is mixed with a mixture hydrolyzable substrates and then sealed in a multi-well packet. The packet is incubated for 18 or 24 hours and then the number of wells exhibiting a positive response are counted. The final result is obtained by comparing the positive responses to a probability table. Recommended Holding Time: Sample: 1 day Reference: APHA			
FCC-MF-CL	Water	Fecal Coliform Count-MF	APHA 9222D
This analysis is carried out using procedures adapted from APHA Method 9222 "Membrane Filter Technique for Members of the Coliform Group". Coliform bacteria is enumerated by culturing and colony counting. A known sample volume is filtered through a 0.45 micron membrane filter. The test involves an initial 24 hour incubation at 44.5 degrees C of the filter with the appropriate growth medium. This method is specific for thermotolerant bacteria (Fecal) and is used for non-turbid water with a low background bacteria level.			
N2N3-CALC-CL	Water	Nitrate+Nitrite	CALCULATION
NH3-F-CL	Water	Ammonia by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.			
NO2-IC-N-CL	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-IC-N-CL	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-COL-CL	Water	Total P in Water by Colour	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.			
PO4-DO-COL-CL	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.			

\*\* 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
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, 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 ww - 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.*



## Quality Control Report

Workorder: L2527782

Report Date: 18-NOV-20

Page 2 of 3

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>NO3-IC-N-CL</b>	<b>Water</b>							
Batch	R5284199							
<b>WG3443556-2</b>	<b>LCS</b>							
Nitrate (as N)			101.9		%		90-110	10-NOV-20
<b>WG3443556-1</b>	<b>MB</b>							
Nitrate (as N)			<0.020		mg/L		0.02	10-NOV-20
<b>P-T-COL-CL</b>	<b>Water</b>							
Batch	R5286966							
<b>WG3446486-2</b>	<b>LCS</b>							
Phosphorus (P)-Total			97.5		%		80-120	17-NOV-20
<b>WG3446486-1</b>	<b>MB</b>							
Phosphorus (P)-Total			<0.0050		mg/L		0.005	17-NOV-20
<b>PO4-DO-COL-CL</b>	<b>Water</b>							
Batch	R5283690							
<b>WG3442854-2</b>	<b>LCS</b>							
Orthophosphate-Dissolved (as P)			97.0		%		80-120	10-NOV-20
<b>WG3442854-1</b>	<b>MB</b>							
Orthophosphate-Dissolved (as P)			<0.0050		mg/L		0.005	10-NOV-20
<b>TSS-CL</b>	<b>Water</b>							
Batch	R5285539							
<b>WG3444928-2</b>	<b>LCS</b>							
Total Suspended Solids			108.7		%		85-115	13-NOV-20
<b>WG3444928-1</b>	<b>MB</b>							
Total Suspended Solids			<3.0		mg/L		3	13-NOV-20



# Quality Control Report

Workorder: L2527782

Report Date: 18-NOV-20

Page 3 of 3

## 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
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.

---

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.



## Microbial Test Results

Samples collected November 9, 2020

Final Report

November 17, 2020

Submitted to: **ALS Environmental**  
Calgary, AB

## SAMPLE INFORMATION

Sample ID/ Internal ID	Dates		<i>Enterococcus</i> test initiation	Receipt temperature
	Collected	Received		
L2527782-1 WWTP EFFLUENT – UV TROUGH / 2021-0483-01	9-Nov-20 at 0815h	10-Nov-20 at 1000h	10-Nov-20 at 1450h	6.7°C
L2527782-2 COLUMBIA RIVER UPSTREAM / 2021-0483-02	9-Nov-20 at 0900h	10-Nov-20 at 1000h	10-Nov-20 at 1450h	6.4°C
L2527782-3 COLUMBIA RIVER DOWNSTREAM / 2021-0483-03	9-Nov-20 at 0915h	10-Nov-20 at 1000h	10-Nov-20 at 1450h	6.8°C
L2527782-4 COLUMBIA RIVER SIDE CHANNEL / 2021-0483-04	9-Nov-20 at 0845h	10-Nov-20 at 1000h	10-Nov-20 at 1450h	6.3°C

## TEST TYPES

- *Enterococcus* enumeration test

## RESULTS

### Microbial test results

Sample ID	MPN/100 mL <i>Enterococcus</i>
L2527782-1 WWTP EFFLUENT – UV TROUGH	<1
L2527782-2 COLUMBIA RIVER UPSTREAM	4.1
L2527782-3 COLUMBIA RIVER DOWNSTREAM	3.1
L2527782-4 COLUMBIA RIVER SIDE CHANNEL	4.1

MPN = Most Probable Number

---

**QA/QC**

<b>QA/QC summary</b>	<b><i>Enterococcus</i></b>
Protocol deviations	See Below
Control performance	Acceptable
Test performance	Valid

Samples were received and testing initiated beyond the required hold time as per the client's request.



---

Report By:  
Shae Cole, BSc  
Biologist



---

Reviewed By:  
Leila Oosterbroek, BSc  
Environmental Scientist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

## REFERENCES

Enterolert Test Kit Literature, IDEXX Laboratories Ltd., One IDEXX Drive, Westbrook, ME, 04092 USA

MPN Tables for IDEXX Quanti-Tray 2000 (<http://www.idexx.com/water>)

## **APPENDIX A – Test data**

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## Quanti-Tray Bench Sheet - *Enterococcus*

Client ALS106 Reference 2021-0383  
<sup>04</sup>  
<sub>✓</sub>

### Test Initiation

Date: 2020/11/10  
 Time: 1450  
 Technician: LF

### Sample Information

Dilution Factor: —

### Comments:

Thermometer Serial #: 192702205  
 Incubator #: 7  
 Incubator Temperature: 41 (must be 41 ± 0.5°C)

Reagent used: Enterolert™  
 Reagent Lot#/Expiry: C8336 102 MAY 2021

Quanti Tray 2000 Lot#/Expiry: D5018/04/17/2023

### Results - 24 Hour Incubation

Date: 2020/11/11 Time: 1450 Technician: KL

Incubator Temp: <u>41</u> (must be 41 ± 0.5°C)	Enterococci (Fluorescent)									
	CTL	0483-d	0483-d	0483-d	0483-d					
# Positive Large Wells:	0	0	2	3	4					
# Ambiguous Large Wells:	0	0	0	0	0					
# Positive Small Wells (Tray 2000 only):	0	0	2	0	0					
# Ambiguous Small Wells (Tray 2000 only):	0	0	0	0	0					
Most Probable Number at 24 hours:	41	41	91	31	41					

### Results - 28 Hour Incubation

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Technician: \_\_\_\_\_

Incubator Temp: _____ (must be 41 ± 0.5°C)	Enterococci (Fluorescent)									
	CTL									
# Confirmed Positive Large Wells:										
# Confirmed Positive Small Wells (Tray 2000 only):										
Most Probable Number at 28 hours:										

Confirmed positive wells includes the positive wells from 24 hours plus the ambiguous wells that became positive at 28 hours

At 28 hours only score marked ambiguous from 24 hours

## **APPENDIX B – Chain-of-custody form**

---



**Subcontract Request Form**
**Subcontract To:**
**NAUTILUS ENVIRONMENTAL COMPANY INC. - CALGARY, AB, CANADA**

 #4, 6125-12 STREET SE  
 CALGARY, AB T2H 2K1

**NOTES:** Please reference on final report and invoice: PO# L2527782  
 ALS requires QC data to be provided with your final results.

*Past Hold time - Please Proceed*

 Please see enclosed **4** sample(s) in **4** Container(s)

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED	PRIORITY Flag
		DUE DATE	
<b>L2527782-1 WWTP EFFLUENT - UV TROUGH</b>	Enterococcus (ENTERO-HQ 1)	11/9/2020	815
	<i>6.7°C -01</i>	11/23/2020	
<b>L2527782-2 COLUMBIA RIVER UPSTREAM</b>	Enterococcus (ENTERO-HQ 1)	11/9/2020	900
	<i>6.4°C -02</i>	11/23/2020	
<b>L2527782-3 COLUMBIA RIVER DOWNSTREAM</b>	Enterococcus (ENTERO-HQ 1)	11/9/2020	915
	<i>6.6°C -03</i>	11/23/2020	
<b>L2527782-4 COLUMBIA RIVER SIDE CHANNEL</b>	Enterococcus (ENTERO-HQ 1)	11/9/2020	845
	<i>6.3°C -04</i>	11/23/2020	

Subcontract Info Contact:

John Forbes (403) 291-9897

Analysis and reporting info contact:

 Patryk Wojciak, B.Sc., P.Chem.  
 2559 29 STREET NE  
 CALGARY, AB T1Y 7B5  
 Phone: (403) 291-9897

*2020/11/10 10:00*  
*Associated Cab*  
*30/BS*  
*4x 400ml bottles*  
*NCS/NoS*  
*Good Condition*  
 Email: patryk.wojciak@alsglobal.com

Please email confirmation of receipt to:

patryk.wojciak@alsglobal.com

Shipped By: _____	Date Shipped: _____
Received By: _____	Date Received: _____
Verified By: _____	Date Verified: _____
	Temperature: _____

Sample Integrity Issues: \_\_\_\_\_

**END OF REPORT**

---



L2527782-COFC

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

COC # \_\_\_\_\_

Page 1 of 1

<b>Report To</b>			<b>Format / Distribution</b>			<b>Service Requested</b> (Rush for routine analysis subject to availability)															
Company: Kicking Horse Mountain Resort Utility Corporation			<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)															
Contact: Travis Jobin			<input type="checkbox"/> PDF <input type="checkbox"/> Excel <input type="checkbox"/> Digital <input checked="" type="checkbox"/> Fax			<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT															
Address: 1500 Kicking Horse Trail			Email 1: tjobin@kickinghorseresort.com			<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT															
Phone: 250-344-8442 Fax: _____			Email 2: pmajer@skircr.com			<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT															
Email 3: mskyring@kickinghorseresort.com																					
<b>Invoice To</b> Same as Report? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			<b>Client / Project Information</b>			<b>Analysis Request</b>															
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			Job #: Week 5 - 2020 Fall EMS program - WW			Please indicate below Filtered, Preserved or both (F, P, F/P)															
Company: Resorts of the Canadian Rockies			PO / AFE:																		
Contact: Patrick Majer			LSD:																		
Address: 1505 - 17th Ave SW Calgary AB																					
Phone: _____ Fax: _____			Quote #:																		
Lab Work Order # _____ (lab use only)			ALS Contact: PW		Sampler: TJ/MS																
<b>Sample #</b>	<b>Sample Identification</b> (This description will appear on the report)			<b>Date</b> (dd-mmm-yy)	<b>Time</b> (hh:mm)	<b>Sample Type</b>	BOD5	TSS	N-NH4	N-NO3	N-NO2	Total P	Ortho P	Fecal Coliform	Enterococci	E. Coli	<b>Number of Containers</b>				
	WWTP Effluent - UV trough Temp: pH:			09-Nov-20	8:15	Water	X	X	X	X	X	X	X	X	X	X		5			
	Columbia River Upstream Temp: pH:			09-Nov-20	9:00	Water		X	X	X	X	X	X	X	X	X		4			
	Columbia River Down stream Temp: pH:			09-Nov-20	9:15	Water		X	X	X	X	X	X	X	X	X		4			
	Columbia River Side Channel Temp: pH:			09-Nov-20	8:45	Water		X	X	X	X	X	X	X	X	X		4			
<b>Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR Commercial/AB Tier 1 - Natural, etc) / Hazardous Details</b>																					
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.																					
<b>SHIPMENT RELEASE</b> (client use)				<b>SHIPMENT RECEPTION</b> (lab use only)				<b>SHIPMENT VERIFICATION</b> (lab use only)													
Released by:		Date (dd-mmm-yy)		Time (hh-mm)		Received by:		Date:		Time:		Temperature:		Verified by:		Date:		Time:		Observations:	
Travis Jobin		NOV 9		20-NOV-20				11/10		8:30		5 °C								Yes / No ? If Yes add SIF	



KICKING HORSE MOUNTAIN UTILITY  
CORPORATION  
ATTN: TRAVIS JOBIN  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Date Received: 22-DEC-20  
Report Date: 29-DEC-20 17:10 (MT)  
Version: FINAL

Client Phone: 250-344-8442

## Certificate of Analysis

Lab Work Order #: L2542945  
Project P.O. #: NOT SUBMITTED  
Job Reference: RCR-KICKING HORSE MOUNTAIN RESORT  
C of C Numbers:  
Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.  
Account Manager

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ADDRESS: 2559 29 Street NE, Calgary, AB T1Y 7B5 Canada | Phone: +1 403 291 9897 | Fax: +1 403 291 0298  
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
L2542945-1      UV TROUGH Sampled By:    TJ on 21-DEC-20 @ 09:00 Matrix:         WATER <b>Miscellaneous Parameters</b> Biochemical Oxygen Demand Orthophosphate-Dissolved (as P) Coliform Bacteria - Fecal Phosphorus (P)-Total Total Suspended Solids	   6.1 0.0447  <1 0.358 5.5	     DLHC	   2.0 0.0050 1 0.025 3.0	   mg/L mg/L CFU/100mL mg/L mg/L	     	   22-DEC-20 22-DEC-20 22-DEC-20 29-DEC-20 28-DEC-20	   R5325243 R5322038 R5322397 R5326697 R5326276

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

## Reference Information

## Sample Parameter Qualifier Key:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

## Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-BC-CL	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
FCC-MF-CL	Water	Fecal Coliform Count-MF	APHA 9222D
This analysis is carried out using procedures adapted from APHA Method 9222 "Membrane Filter Technique for Members of the Coliform Group". Coliform bacteria is enumerated by culturing and colony counting. A known sample volume is filtered through a 0.45 micron membrane filter. The test involves an initial 24 hour incubation at 44.5 degrees C of the filter with the appropriate growth medium. This method is specific for thermotolerant bacteria (Fecal) and is used for non-turbid water with a low background bacteria level.			
P-T-COL-CL	Water	Total P in Water by Colour	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.			
PO4-DO-COL-CL	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.			
TSS-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.			

\*\* 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
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, 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 ww - 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.

## Quality Control Report

Workorder: L2542945

Report Date: 29-DEC-20

Page 1 of 2

Client: KICKING HORSE MOUNTAIN UTILITY CORPORATION

1500 Kicking Horse Trail

Golden BC V0A 1H0

Contact: TRAVIS JOBIN

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>BOD-BC-CL</b>	<b>Water</b>							
Batch	R5325243							
<b>WG3467234-2 LCS</b>								
Biochemical Oxygen Demand			96.9		%		85-115	22-DEC-20
<b>WG3467234-1 MB</b>								
Biochemical Oxygen Demand			<2.0		mg/L		2	22-DEC-20
<b>FCC-MF-CL</b>	<b>Water</b>							
Batch	R5322397							
<b>WG3466570-1 MB</b>								
Coliform Bacteria - Fecal			<1		CFU/100mL		1	22-DEC-20
<b>P-T-COL-CL</b>	<b>Water</b>							
Batch	R5326697							
<b>WG3467671-22 LCS</b>								
Phosphorus (P)-Total			89.9		%		80-120	29-DEC-20
<b>WG3467671-21 MB</b>								
Phosphorus (P)-Total			<0.0050		mg/L		0.005	29-DEC-20
<b>PO4-DO-COL-CL</b>	<b>Water</b>							
Batch	R5322038							
<b>WG3466269-2 LCS</b>								
Orthophosphate-Dissolved (as P)			117.0		%		80-120	22-DEC-20
<b>WG3466269-1 MB</b>								
Orthophosphate-Dissolved (as P)			<0.0050		mg/L		0.005	22-DEC-20
<b>WG3466269-4 MS</b>		<b>L2542945-1</b>						
Orthophosphate-Dissolved (as P)			77.9		%		70-130	22-DEC-20
<b>TSS-CL</b>	<b>Water</b>							
Batch	R5326276							
<b>WG3466990-2 LCS</b>								
Total Suspended Solids			97.7		%		85-115	28-DEC-20
<b>WG3466990-1 MB</b>								
Total Suspended Solids			<3.0		mg/L		3	28-DEC-20

# Quality Control Report

Workorder: L2542945

Report Date: 29-DEC-20

Page 2 of 2

## Legend:

---

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

## 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.

---

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.







KICKING HORSE MOUNTAIN UTILITY  
CORPORATION  
ATTN: TRAVIS JOBIN  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Date Received: 15-OCT-20  
Report Date: 04-NOV-20 14:21 (MT)  
Version: FINAL

Client Phone: 250-344-8442

## Certificate of Analysis

Lab Work Order #: L2517179

Project P.O. #: NOT SUBMITTED

Job Reference: RCR - KICKING HORSE MOUNTAIN RESORT

C of C Numbers:

Legal Site Desc:

Patryk Wojciak, B.Sc., P.Chem.  
Account Manager

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ADDRESS: 2559 29 Street NE, Calgary, AB T1Y 7B5 Canada | Phone: +1 403 291 9897 | Fax: +1 403 291 0298  
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
L2517179-1    UV TROUGH Sampled By:    TJ on 15-OCT-20 @ 09:30 Matrix:        WATER <b>Miscellaneous Parameters</b> Trout Bioassay LC50	See Attached					19-OCT-20	R5278541

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

## Reference Information

### Test Method References:

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

\*\* 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
----------------------------	---------------------

### 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 ww - 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.*



## Quality Control Report

Workorder: L2517179

Report Date: 04-NOV-20

Page 1 of 2

Client: KICKING HORSE MOUNTAIN UTILITY CORPORATION  
1500 Kicking Horse Trail  
Golden BC V0A 1H0

Contact: TRAVIS JOBIN

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
------	--------	-----------	--------	-----------	-------	-----	-------	----------

# Quality Control Report

Workorder: L2517179

Report Date: 04-NOV-20

Page 2 of 2

## Legend:

---

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

## 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.

---

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.



# Acute Toxicity Test Results

Sample collected October 15, 2020

Final Report

November 3, 2020

Submitted to: **ALS Environmental**  
Calgary, AB

## SAMPLE INFORMATION

Sample ID/ Internal ID	Dates		Rainbow trout test initiation	Receipt temperature
	Collected	Received		
L2517179-1 UV TROUGH / 2021-0324	15-Oct-20 at 0930h	15-Oct-20 at 1520h	19-Oct-20 at 1405h	6.9°C

## TEST TYPES

- Rainbow trout 96-h LC50 test

## RESULTS

### Toxicity test results

Sample ID	Rainbow trout LC50 (% v/v)
L2517179-1 UV TROUGH	>100

LC = Lethal Concentration

## QA/QC

QA/QC summary	Rainbow trout
Reference toxicant LC50 (95% CL)	3.2 (3.0-3.5) g/L KCl <sup>1</sup>
Reference toxicant historical mean (2 SD Range)	3.5 (2.6-4.6) g/L KCl
Reference toxicant CV	9.6%
Organism health history	Acceptable
Protocol deviations	None
Water quality range deviations	None
Control performance	Acceptable
Test performance	Valid

<sup>1</sup> Test date, October 5, 2020

LC = Lethal Concentration; CL = Confidence Limit





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Report By:  
Michael Wrubleski, BSc  
Biologist



---

Reviewed By:  
Sara Thiessen, BSc  
Senior Biologist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

## **APPENDIX A – Summary of test conditions**

---

**Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.**

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 - 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	Five concentrations, plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	96-hour LC50
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

## **APPENDIX B – Toxicity test data**

---

# Trout Bench Sheet

Method TRD Client ALS106 Reference 2021-0324 Chamber 5

## Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review
0	2020/10/19	1405	AW / KK	1	WPF
1	2020/10/20	0900	AW	-	LF
2	2020/10/21	0815	IF	-	CC
3	2020/10/22	0830	AE	-	MMW
4	2020/10/23	0815	ST	1	MMW

## Sample Information

Initial pH: 7.0  
Initial EC (µS/cm): 572  
Initial DO (mg/L): 7.6  
Initial Temp (°C): 17  
Salinity (ppt): 0

Note: \*; time when the test was loaded with fish

## Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L

Preaeration time

DO(mg/L) of 100%

yes/no  
0.5 hours 1 hour 1.5 hours 2 hours  
0.0

## DO in mg/L (70% - 100% saturation)\*\*

6.2 mg/L - 8.9 mg/L at 14°C

6.1 mg/L - 8.8 mg/L at 15°C

6.0 mg/L - 8.6 mg/L at 16°C

\*\*corrected for altitude

## Test Chemistry and Biology

Conc.	CTL	6	12	25	50	100
-------	-----	---	----	----	----	-----

pH (units) (range: 5.5-8.5)

Day 0	<u>8.3</u>	<u>8.2</u>	<u>8.1</u>	<u>8.1</u>	<u>8.0</u>	<u>7.5</u>
Day 4	<u>7.9</u>	<u>7.9</u>	<u>8.0</u>	<u>8.0</u>	<u>8.0</u>	<u>8.0</u>

EC (µS/cm)

Day 0	<u>436</u>	<u>447</u>	<u>458</u>	<u>475</u>	<u>515</u>	<u>589</u>
Day 4	<u>440</u>	<u>460</u>	<u>463</u>	<u>480</u>	<u>514</u>	<u>590</u>

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.8</u>	<u>8.8</u>	<u>8.8</u>	<u>8.8</u>	<u>8.6</u>	<u>8.0</u>
Day 4	<u>8.5</u>	<u>8.5</u>	<u>8.5</u>	<u>8.5</u>	<u>8.7</u>	<u>8.5</u>

Temperature (°C) (range: 14-16°C)

Day 0	<u>15</u>	<u>15</u>	<u>15</u>	<u>15</u>	<u>15</u>	<u>15</u>
Day 4	<u>15</u>	<u>15</u>	<u>15</u>	<u>15</u>	<u>15</u>	<u>15</u>

Number Alive (In brackets number stressed)

Day 0	10	10	10	10	10	10
Day 1	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
Day 2	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
Day 3	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
Day 4	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control

Unless otherwise noted, behavior is considered to be normal

## Control Organism Data

Control Fish	Length (cm)	Weight (g)
1	<u>3.2</u>	<u>0.3</u>
2	<u>3.2</u>	<u>0.4</u>
3	<u>3.7</u>	<u>0.2</u>
4	<u>3.1</u>	<u>0.3</u>
5	<u>3.0</u>	<u>0.2</u>
6	<u>2.9</u>	<u>0.3</u>
7	<u>3.5</u>	<u>0.5</u>
8	<u>3.0</u>	<u>0.3</u>
9	<u>3.0</u>	<u>0.3</u>
10	<u>3.1</u>	<u>0.3</u>

Loading Density (g/L):  
(must be ≤ 0.5 g/L)

0.2

Mean Length (cm):

3.1

Length Range (cm):

2.7-3.5

Mean Weight (g):

0.3

(Must be ≥ 0.3g)

Weight Range (g):

0.2-0.5

## Test Organism Information

Batch 20200820TR

Source Troutlodge

Tank # 4

Days Held at 15 ± 2°C  
(must be ≥ 14 days) 38

Percent stock mortality  
(7 days prior to test, must be ≤ 2%) 0

Test Volume (L) 16L

## Comments :

Reviewed By: TP

Date Reviewed: 2020/10/23

## **APPENDIX C – Chain-of-custody form**

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**L2517179**

CALGARY

**Subcontract Request Form****Subcontract To:****NAUTILUS ENVIRONMENTAL COMPANY INC. - CALGARY, AB, CANADA**#4, 6125-12 STREET SE  
CALGARY, AB T2H 2K1**NOTES:** Please reference on final report and invoice: PO# L2517179  
ALS requires QC data to be provided with your final results.Please see enclosed **1** sample(s) in **2** Container(s)**SAMPLE  
NUMBER****ANALYTICAL REQUIRED****DATE SAMPLED****DUE DATE****Priority  
Flag****L2517179-1 UV TROUGH****10/15/2020**

Trout LC50 (96h) Bioassay (TROUT-LC50-HQ 14)

11/5/2020

Subcontract Info Contact:

John Forbes (403) 291-9897

Analysis and reporting info contact:

Patryk Wojciak, B.Sc., P.Chem.

2559 29 STREET NE

CALGARY, AB T1Y 7B5

Phone: (403) 291-9897

Email: patryk.wojciak@alsglobal.com

**Please email confirmation of receipt to:****patryk.wojciak@alsglobal.com**

Shipped By: \_\_\_\_\_

Date Shipped: \_\_\_\_\_

Received By: \_\_\_\_\_

Date Received: \_\_\_\_\_

Verified By: \_\_\_\_\_

Date Verified: \_\_\_\_\_

Temperature: \_\_\_\_\_

Sample Integrity Issues: \_\_\_\_\_

2021-0324  
2020/10/15  
15:20  
JC  
2x20L carboys  
NoS/NoT  
Good Condition  
6.9°C

**END OF REPORT**

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L2517179-COFC

## Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # \_\_\_\_\_

Page 1 of 1

<b>Report To</b>			<b>Report Format / Distribution</b>			<b>Service Requested</b> (Rush for routine analysis subject to availability)																							
Company: Kicking Horse Mountain Water Utility Co. Ltd.			<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)																							
Contact: Travis Jobin			<input type="checkbox"/> PDF <input type="checkbox"/> Excel <input type="checkbox"/> Digital <input checked="" type="checkbox"/> Fax			<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT																							
Address: 1500 Kicking Horse Trail			Email 1: tjobin@kickinghorseresort.com			<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT																							
			Email 2: pmaier@skircr.com			<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT																							
Phone: 250-344-6003 Fax:			Email 3: mskyring@kickinghorseresort.com			<b>Analysis Request</b>																							
Invoice To Same as Report? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			<b>Client / Project Information</b>			Please indicate below Filtered, Preserved or both (F, P, F/P)																							
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			Job #: RCR - Kicking Horse Mountain Resort																										
Company: Resorts of the Canadian Rockies			PO / AFE:																										
Contact: Patrick Majer			LSD:																										
Address: 1505 - 17th Ave SW Calgary AB			Quote #: Q33059																										
Phone: Fax:			ALS Contact: LS			Sampler: TJ			<div>LC50</div> <div>Number of Containers</div>																				
Lab Work Order # (lab use only)																													
Sample #	Sample Identification (This description will appear on the report)		Date (dd-mm-yy)	Time (hh:mm)	Sample Type																								
	UV trough		15-Oct-20	9:30	Water																								
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.																													
SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)																							
Released by:	Date (dd-mm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF																			
TJ	Oct 15					°C																							
Mark Skyring	30-Sep-19																												